Activate VOS Devices

For supported software information, click here.

You can activate Versa Operating System™ (VOS™) devices automatically and remotely using zero-touch provisioning (ZTP), and you can also activate a VOS device from the CLI on the device. For VOS devices in a virtual environment, you can use cloud-init functionality to automatically onboard them.

You can use the following methods to activate new VOS devices:

- Global ZTP—Global ZTP allows you to activate multiple VOS devices remotely. The VOS device activation process begins automatically when it powers on. The device uses the call-home feature to connect to a cloud-based staging server. The staging server validates the VOS device and redirects it to a staging Controller node, which completes the activation process. For global ZTP to work, you must provide Versa Networks with the serial numbers of all your VOS devices and the FQDN or IP address of the staging Controller node.
- URL-based ZTP—URL-based ZTP allows an onsite administrator to activate a VOS device. The administrator connects a laptop to the VOS device, or over a wireless network via a mobile phone for WiFi-enabled VOS devices, and clicks an email link to a staging Controller node, which completes the activation process.
- From the CLI—A site administrator can connect to the CLI on a VOS device and run a staging script that activates the device.

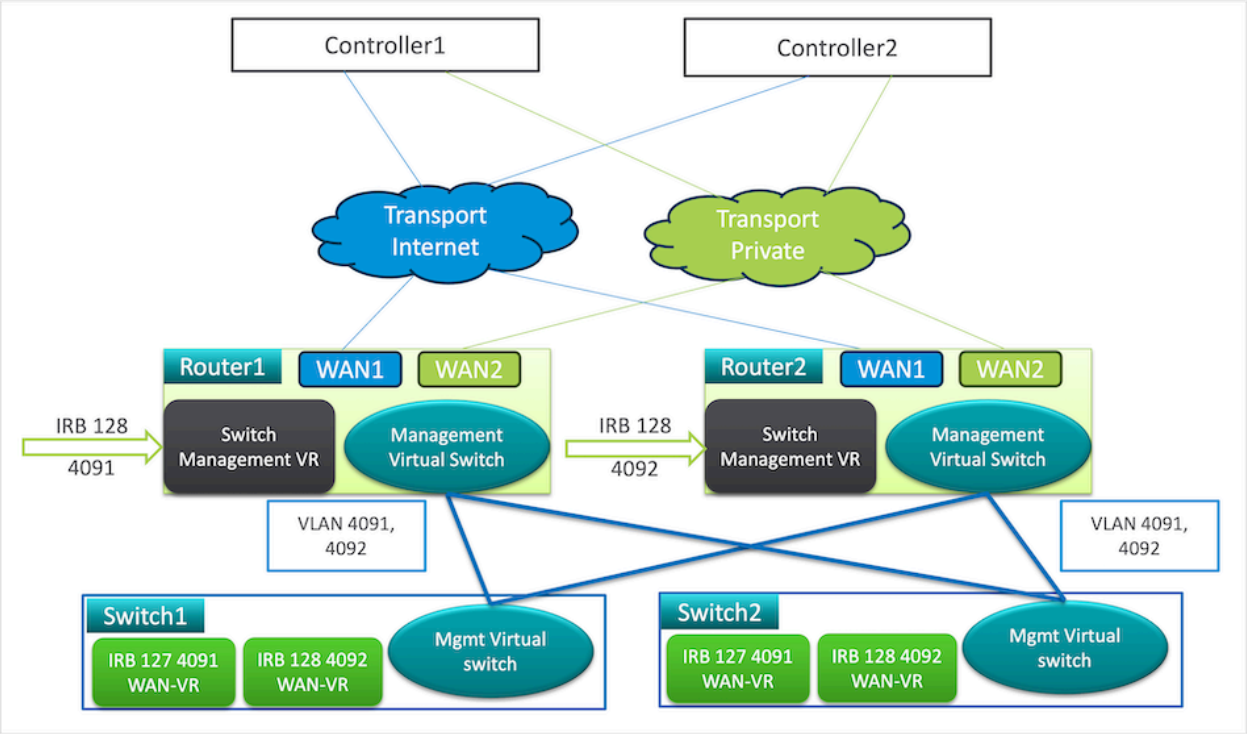
For Releases 22.1.3 and later, you can configure an SD-WAN edge device, such as a Versa Cloud Services Gateway (CSG) 750, to manage Layer 2 access and core switches.

Configure an SD-WAN Branch Edge Device to Manage Access and Core Switches

For Releases 22.1.3 and later.

You can use Workflow templates configure an SD-WAN branch edge device, such as a Versa Cloud Services Gateway (CSG) 750, to manage access and core switches. You configure Layer 2 interfaces on the WAN edge device to provide the device management connection between the SD-LAN switches connected to it and the management Controller node in the SD-WAN network.

The following figure shows a single SD-WAN branch that has two SD-WAN edge devices (Router 1 and Router 2). The two branch devices are configured as an active–active pair. Together, they manage two SD-LAN (Switch 1 and Switch 2), and they provide connectivity between the switches and two Controller nodes (Controller 1 and Controller 2).



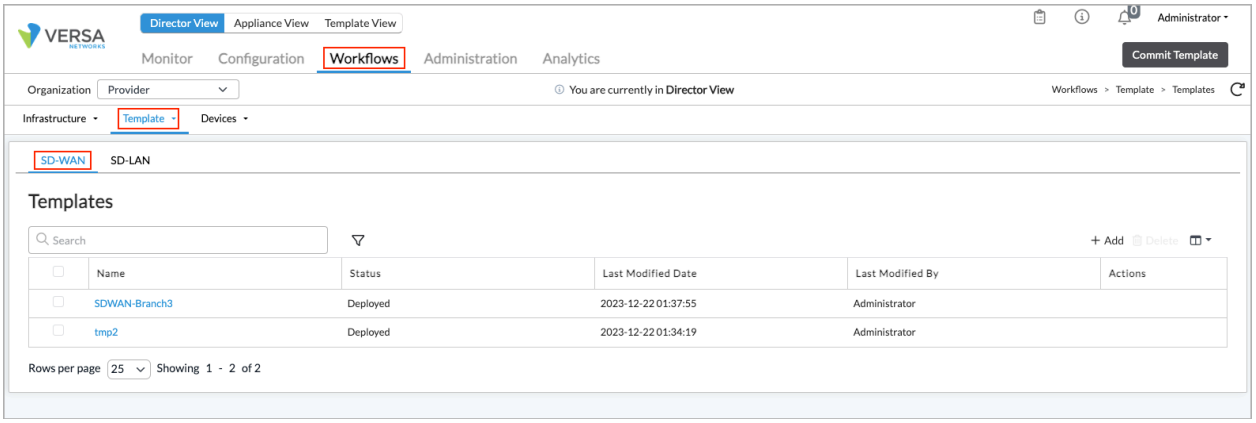
SD-WAN branch edge devices and the SD-LAN access and core switches use VLANs to communicate with each other in the branch. You must assign VLAN IDs to the Layer 2 interfaces on each SD-WAN branch edge device that provides connectivity to the access and core switches, and you must configure the same VLAN IDs to the virtual ports on the switches that connect to the SD-WAN branch edge devices. Note that if there is only one SD-WAN branch edge device in the branch, you need only one VLAN to connect the SD-WAN branch edge device to the switches.

To configure an SD-WAN device to manage switches, you use both the SD-WAN and SD-LAN Workflows. For SD-WAN, you configure Layer 2 interfaces, and you create a monitor on each WAN interface to use to manage the access switches. For the SD-LAN, you configure a device management interface on the switch to connect to the SD-WAN.

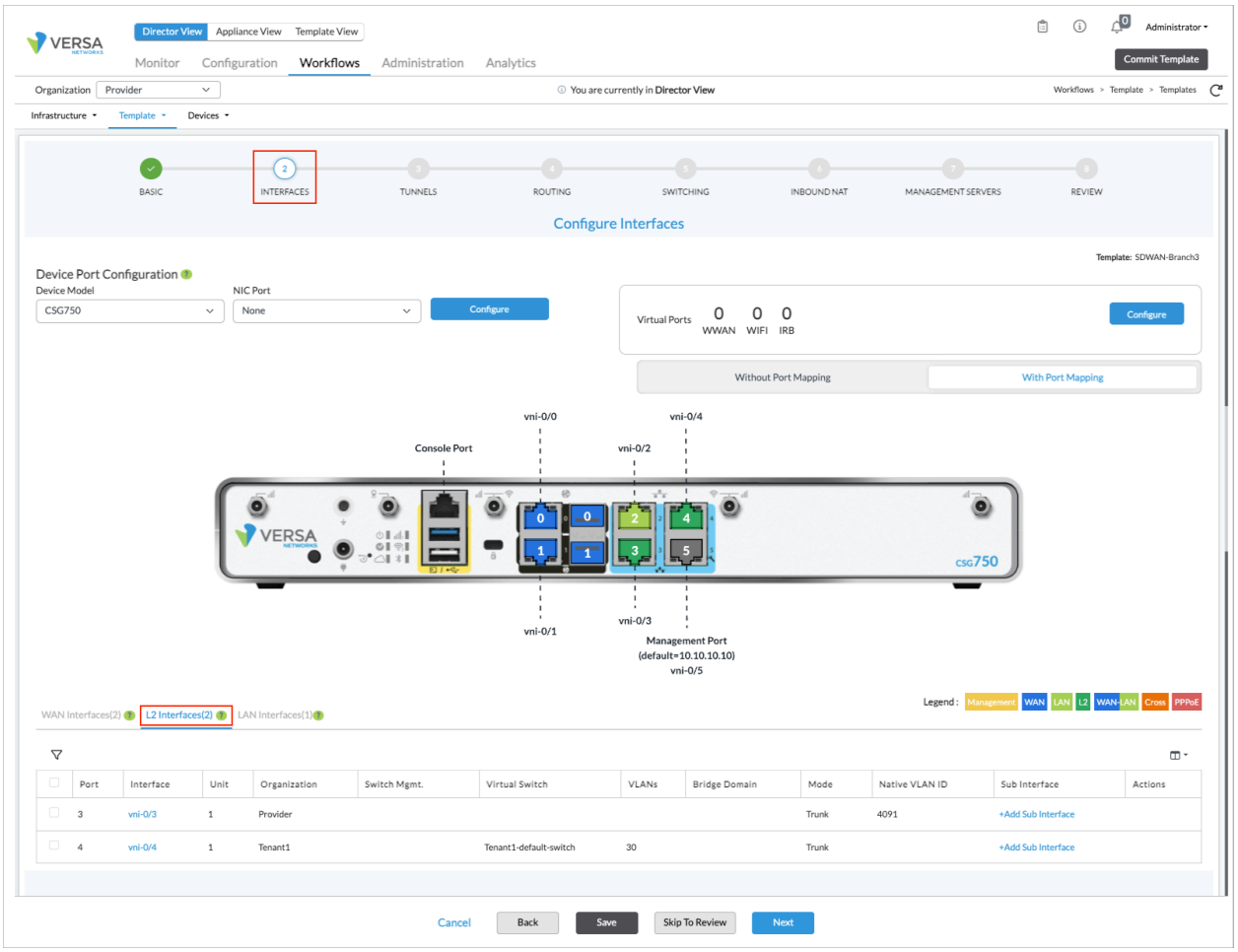
Configure Layer 2 Interfaces

To configure the Layer 2 interfaces on the SD-WAN branch edge device:

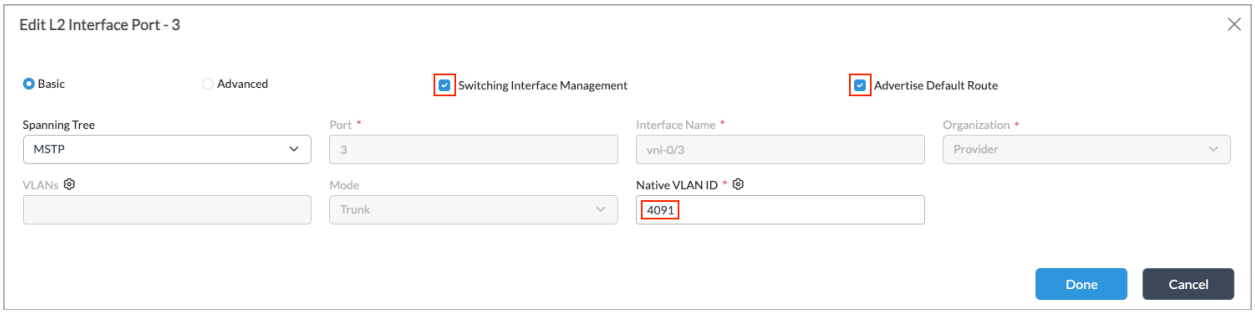
1. In Director view, select the Workflows tab in the top menu bar.
2. Select Template > Templates in the horizontal menu bar, and then select the SD-WAN tab. The screen displays the SD-WAN templates that are already configured.



3. Click a template in the main pane, and then select Step 2, Interfaces.
4. Select the Interfaces tab. The following screen displays.



5. Click the L2 Interfaces subtab, which displays the Layer 2 interfaces that are already configured.
6. Click an interface name. The Edit Layer 2 Interface popup window displays.

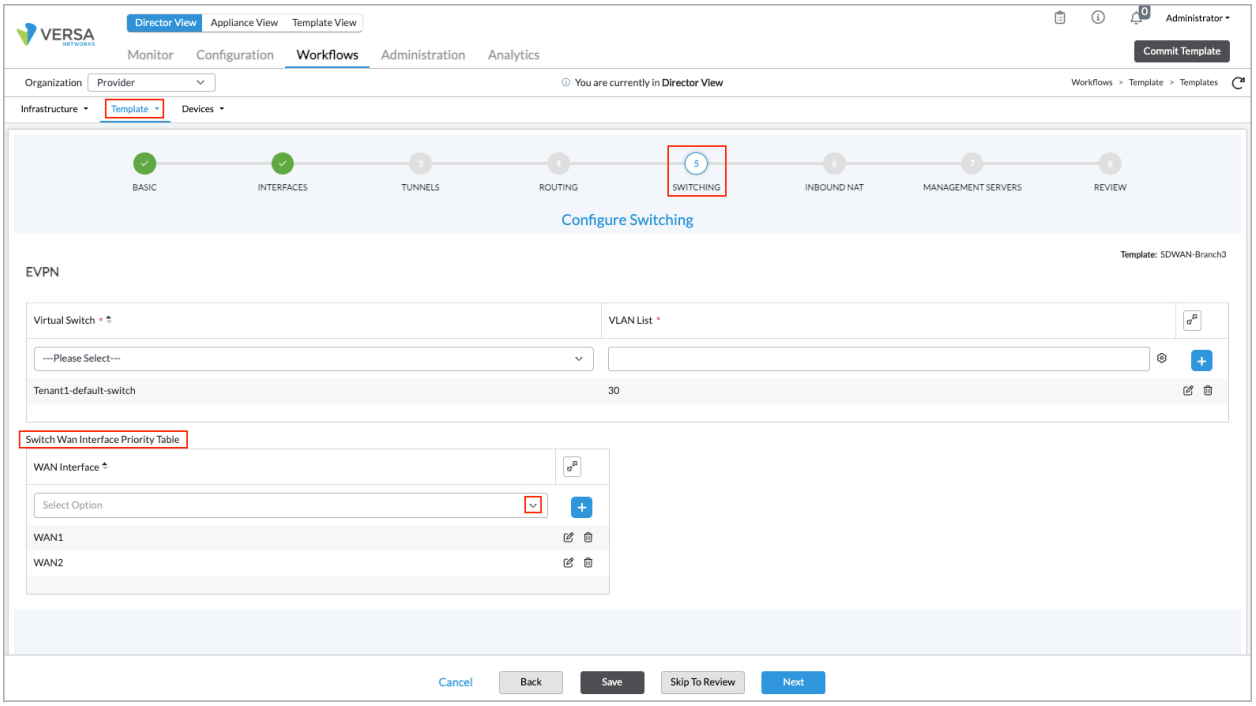


7. To create a LAN VR on the SD-WAN branch device, click Switching Interface Management. This LAN VR provides connectivity between the access switches and the Controller nodes.
8. To allow the access switches to be able to connect to other types of servers, such as DNS and DHCP servers, click Advertise Default Route so that the switches advertise a default route to the servers.
9. In the Native VLAN ID field, enter a VLAN ID. It is recommended that you use VLAN ID 4091 or 4092. If you choose a different VLAN ID, ensure that you use the same VLAN ID in the SD-LAN configuration. For more information, see Configure the SD-LAN Devices Using Workflows, below.
10. Click Done.

Select the WAN Interfaces To Manage the Access Switches

To select the WAN interfaces to use to manage the access switches and assign a priority to each interface:

1. In Director view, select the Workflows tab in the top menu bar.
2. Select Template > Templates in the horizontal menu bar.
3. Select Template in the horizontal menu bar, and then select the SD-WAN tab.
4. Select Step 5, Switching.



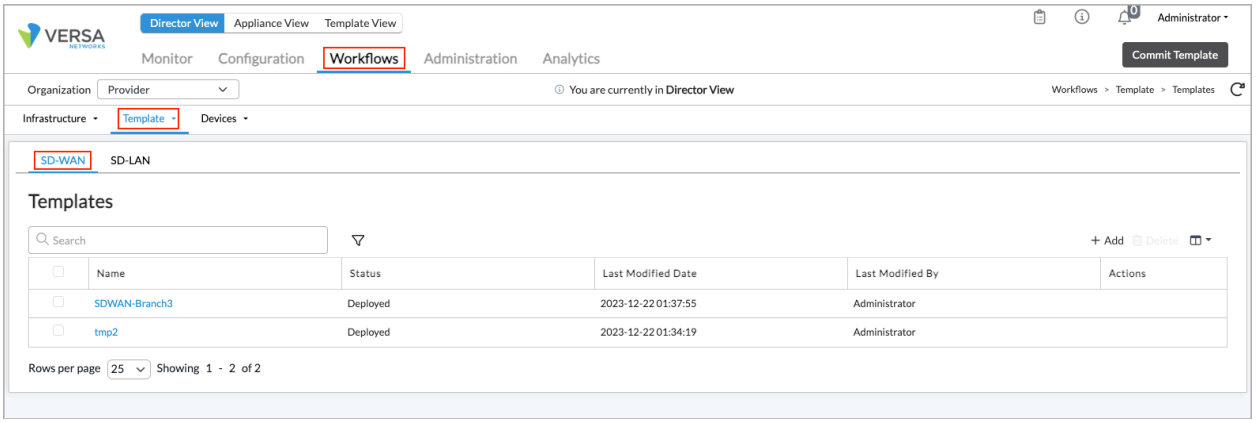
5. In the Switch WAN Interface Priority Table, select the primary WAN interface to use to manage the switch, and then select the secondary WAN interface to use if the primary WAN interface fails. The priority is determined by the order in which you select the interfaces. In the screenshot above, WAN1 is listed first, so it is the primary WAN interface and WAN 2 is the secondary WAN interface. If WAN1 fails, WAN2 takes over the management of the switch.
6. Click Save.

Create a Monitor on the WAN Interfaces

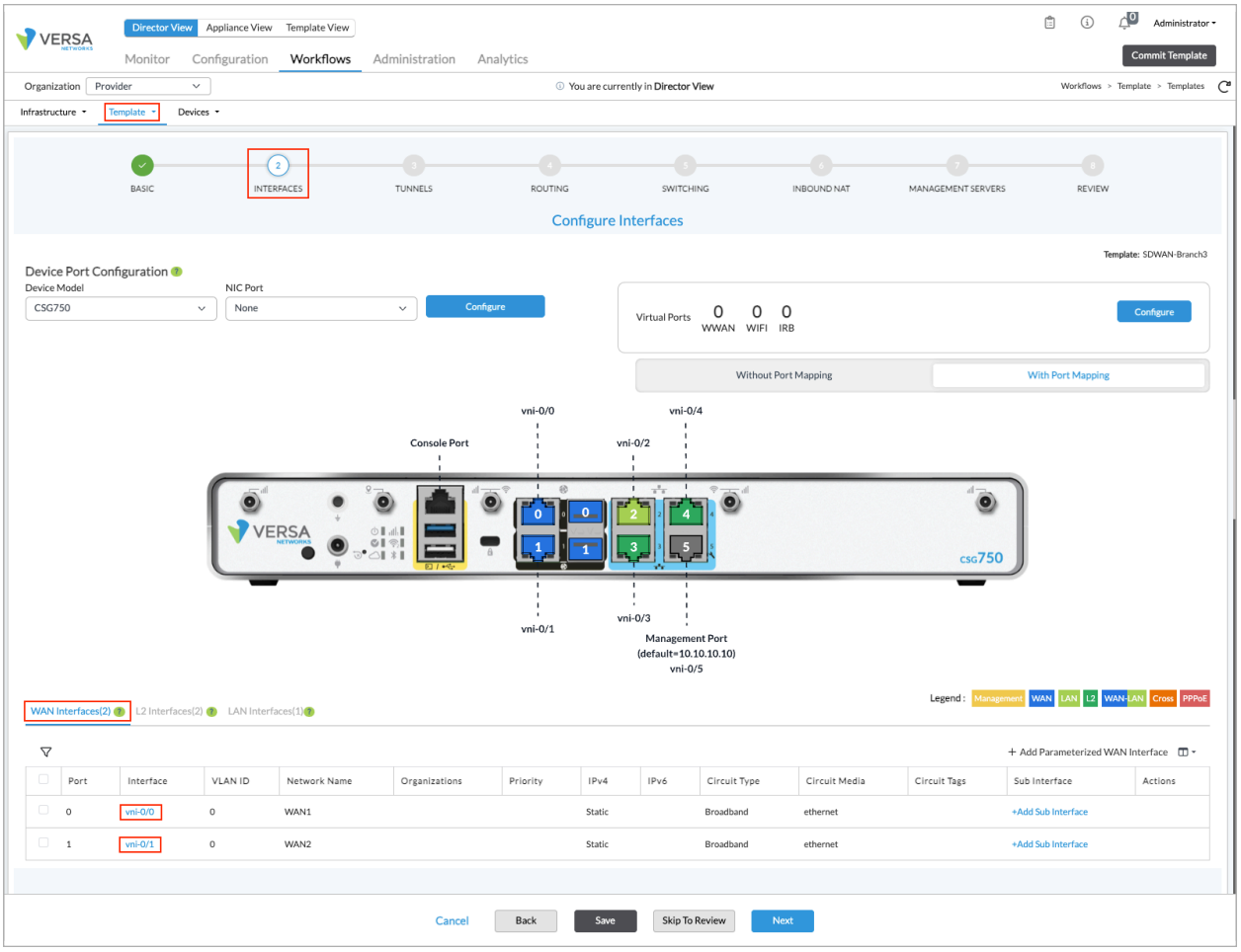
To determine whether the WAN interfaces are up or down, and to provide the proper SLA connectivity from the access switches towards the Controller nodes, you configure a monitor on each of the WAN interfaces that you are using to manage the access switches.

To create a monitor on an WAN interface to use to manage the access switches:

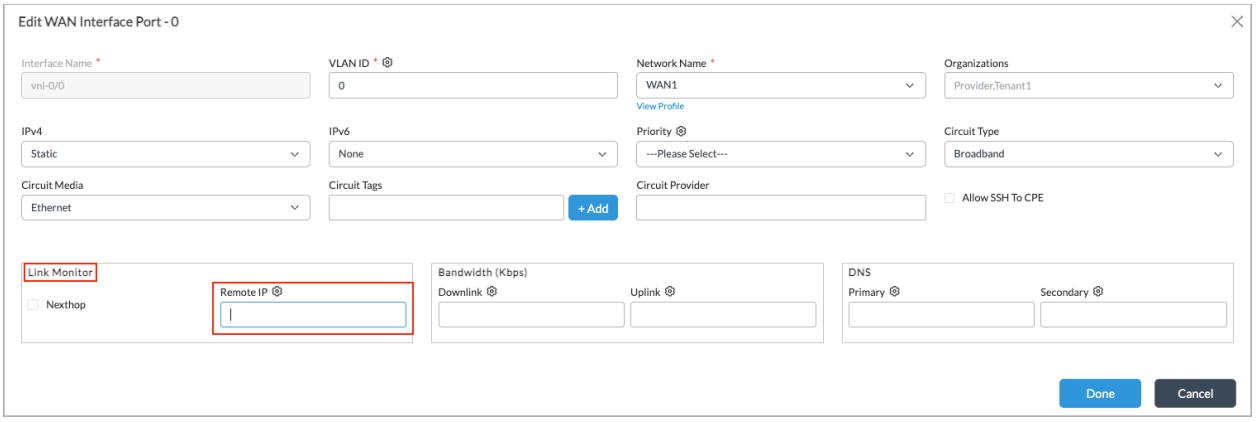
1. In Director view, select the Workflows tab in the top menu bar.
2. Select Template > Templates in the horizontal menu bar.
3. Select Template in the horizontal menu bar, and then select the SD-WAN tab. The main pane displays the templates that are already configured.



4. Select the template that includes the WAN interfaces that you are using. The following screen displays.



5. Select Step 2, Interfaces, select the WAN Interfaces tab, and then the click a WAN (vni) interface. The Edit WAN Interface Port popup window displays.



6. In the Link Monitor field, enter the IP address of a remote device to monitor to ensure that the WAN interface is up and can reach the device in the cloud. If the WAN interface is down and cannot connect to the remote device, the next WAN interface listed in the Switch WAN Interface Priority Table becomes the primary WAN interface.
7. Click Done.
8. Repeat Steps 5 through 7 on the second WAN interface.
9. Click Done.

Configure the SD-LAN Devices Using Workflows

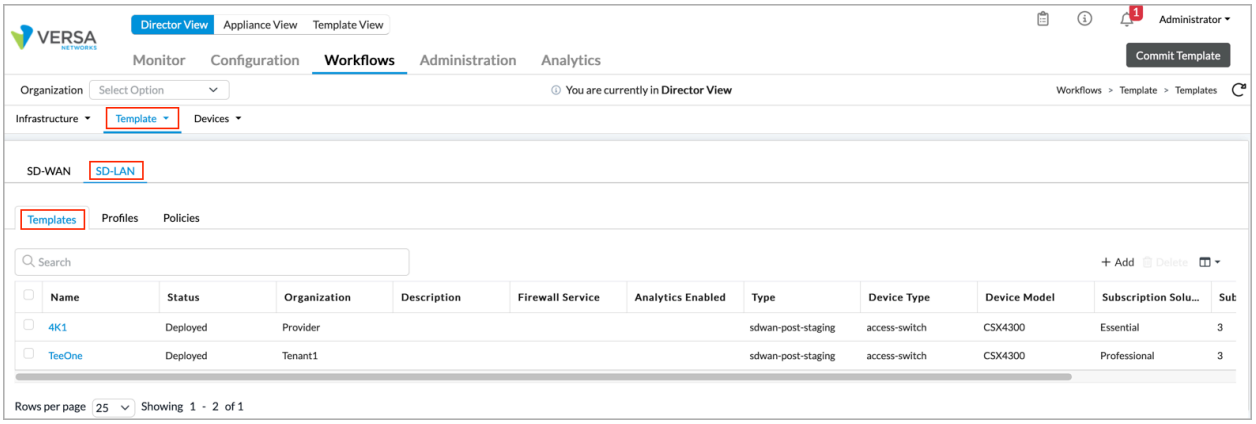
Access switches must connect to the edge devices in the WAN so that the access switches can reach the Controller node. A branch's WAN edge devices provide WAN connectivity between the access switches and the Controller node. This connectivity is required so that the Director node can provision the access switches using zero-touch provisioning (ZTP).

On the access switch, you configure a device management interface to connect to the WAN edge device. You configure the device management interface for WAN connectivity using the SD-LAN Workflows template.

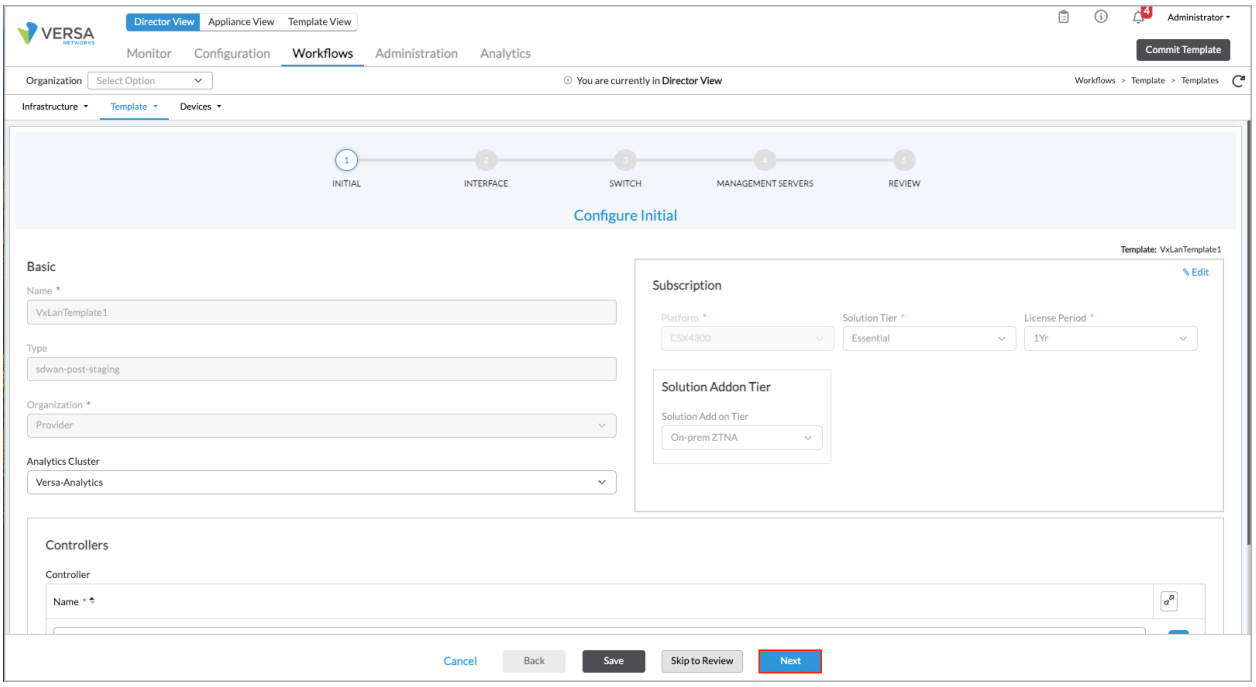
Before you begin this procedure, you must have a template for the access switch. To create a template using SD-LAN workflow, see Configure SD-LAN Using Workflow Templates.

To configure a device management interface for WAN connectivity:

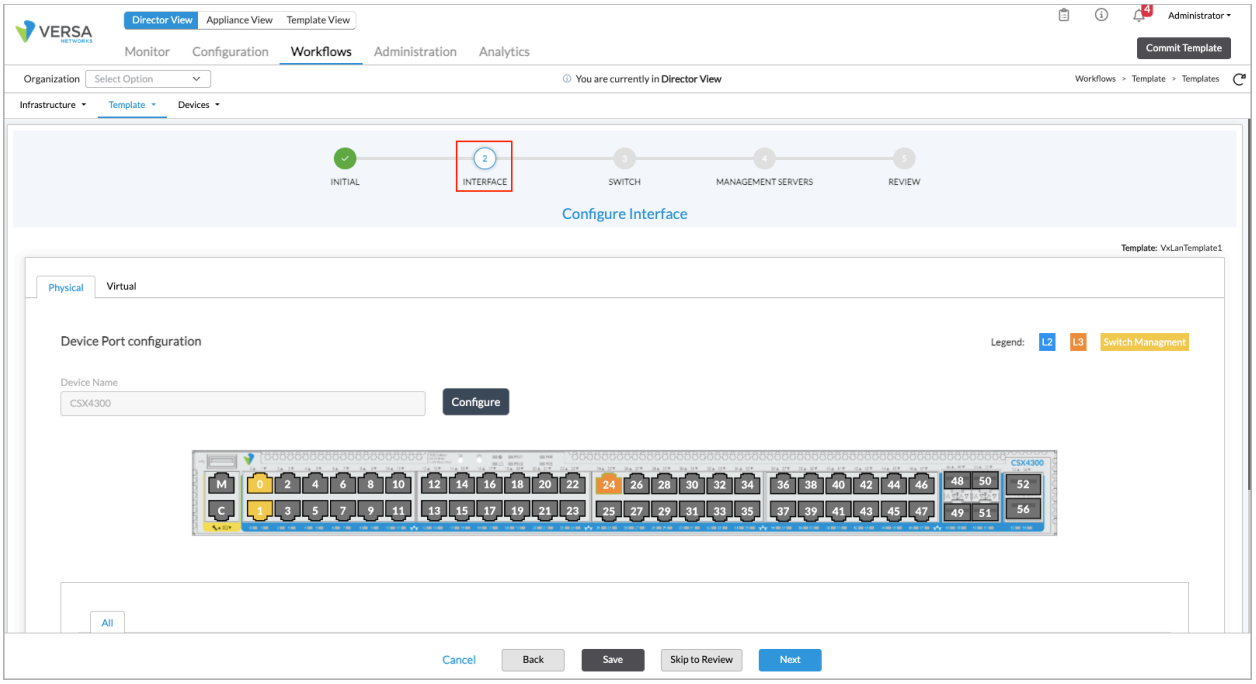
1. In Director view, select the Workflows tab.
2. Select Template > Templates in the horizontal menu bar. The Template screen displays.
3. Select the SD-LAN tab, and then select the Templates subtab. The screen displays the templates that are already configured.



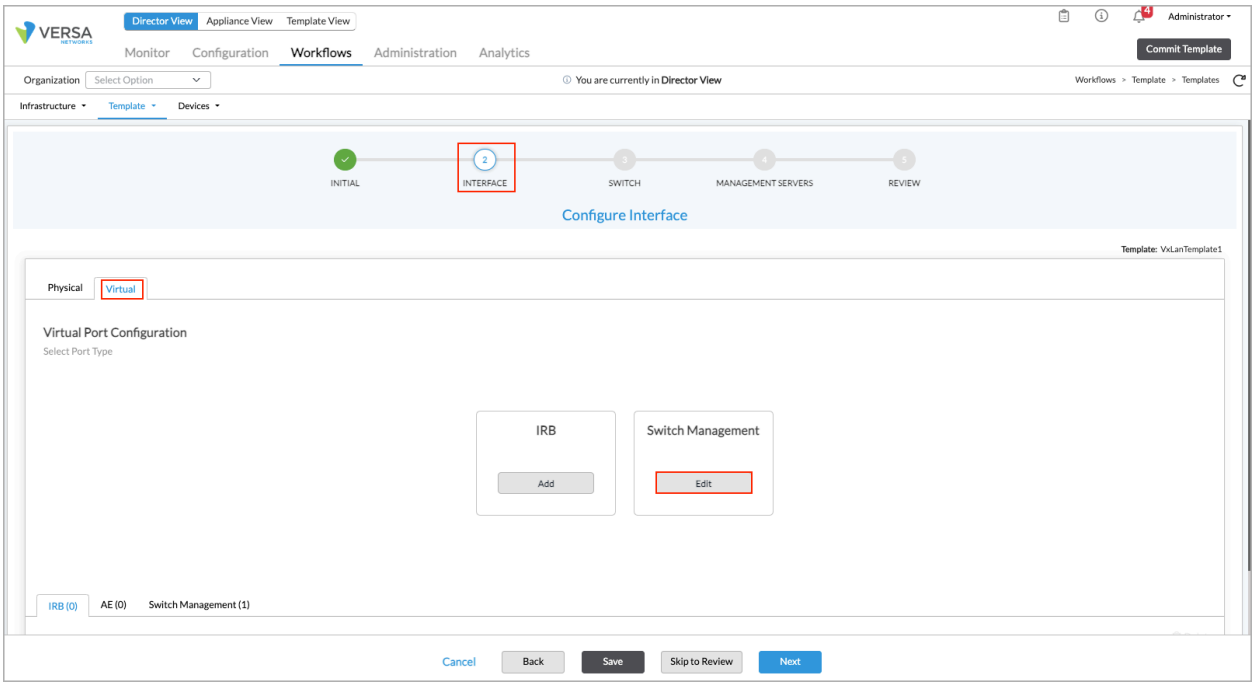
4. Select the template for the access switch you want to configure. The Configure Initial screen displays with Step 1, Initial, selected by default.



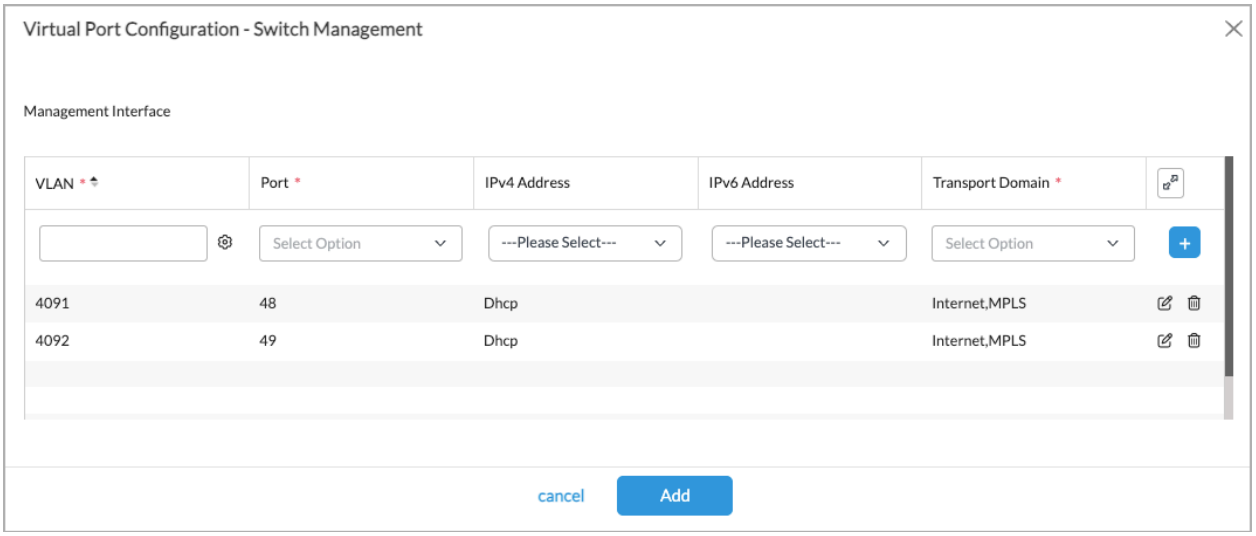
5. Select Step 2, Interface, or click Next at the bottom of the screen. The Step 2, Interface screen displays with the Physical tab selected by default.



6. Select the Virtual tab in the horizontal menu bar. The Virtual Port Configuration screen displays.



7. If you have already configured a switch management interface on the switch, click Edit in the Switch Management field. Otherwise, click Add. The Virtual Port Configuration—Device Management popup window displays.



8. Enter information for the following fields.

Field	Description
VLAN	Enter the VLAN ID to use to connect the WAN edge device. This must match the Na on the WAN edge device. It is recommended that you use VLAN ID 4091 or 4092.
Port	Select the port number.
IPv4 Address	Select the IPv4 address: ◦ DHCP—Use the Dynamic Host Configuration Protocol to dynamically assign the to a Versa or a non-Versa WAN edge device. ◦ Static—Assign an IPv4 address. You can select this option if the switch is conne device. Do not select it if the switch is connecting to a Versa WAN edge device.
Transport Domain	Select the transport domains for the switch to reach the Controller node. This field lis associated with the same template. If the Controller nodes have two transport domai both. ◦ Internet ◦ MPLS
Add	Click to add the interface.

9. If the access switch connects to a second WAN edge device in the branch, repeat Step 8 to add a second device management interface. You must use a different VLAN ID for each WAN connection.

10. Click Add.

Use Global ZTP To Activate a VOS Device

Global ZTP activates a VOS device automatically when the device powers on. After the device powers on, it connects to the internet and obtains its WAN IP address, gateway, and name-server server information using DHCP. Then it uses the call-home feature to connect to a cloud-based staging server. The staging server validates the VOS device's owner (generally either an enterprise or a service provider) and redirects the device to the enterprise's or service provider's staging Controller node, which completes the activation process. The VOS device communicates with the staging Controller node over an IPsec IKE connection. For this initial connection, authentication is done using public key infrastructure (PKI). Each VOS device has a Versa signed certificate, and the private key is stored in the device's Trusted Platform Module (TPM) chip. After the initial staging process, you can replace this signed certificate with one that is signed by your certificate authority (CA).

For global ZTP to work, you must provide Versa Networks with the serial numbers of all your VOS devices and the FQDN or IP address of the staging Controller node. Versa Networks then creates an inventory entry for the VOS device, which is used by the Versa Networks prestaging server to validate the device when it powers on. If you know the FQDN or IP address of the post-staging Controller node, you can provide this information instead, to skip the provider prestaging step (Step 2 below).

Note that global ZTP is supported only in VOS releases that have not reached end of life (EOL) or end of support (EOS). For more information, see Versa Networks Software Release Lifecycle and End-of-Life Policy.

Using global ZTP to activate a VOS device occurs in three steps, as illustrated in Figure 1:

1. Versa Networks prestaging—When the VOS device powers on, it connects to the Versa Networks staging Controller node. Based on the information in the inventory, the Versa Networks staging Controller node validates the VOS device and redirects it to the staging Controller node of the enterprise or service provider. The VOS device then reboots.
2. Provider prestaging—The enterprise or service provider claims the device, prompts for authentication using two-factor authentication, and redirects the VOS device to its staging Controller node. The VOS device then reboots.
3. Provider staging and post-staging—The enterprise or service provider authenticates the VOS devices using preshared keys (PSK) or public key infrastructure (PKI), and then the VOS device onboards customers (tenants). Then, IKE sessions are established between the provider and tenants. If you skipped the provider prestaging step, you claim the device here: you are prompted for authentication using two-factor authentication before tenants are onboarded. Note that the staging process takes only a few minutes, so rekeying the IKE and IPsec keys during this process is not necessary. However, after staging completes, IKE and IPsec generate new keys to use for the control and data path connections.

Figure 1: Global ZTP

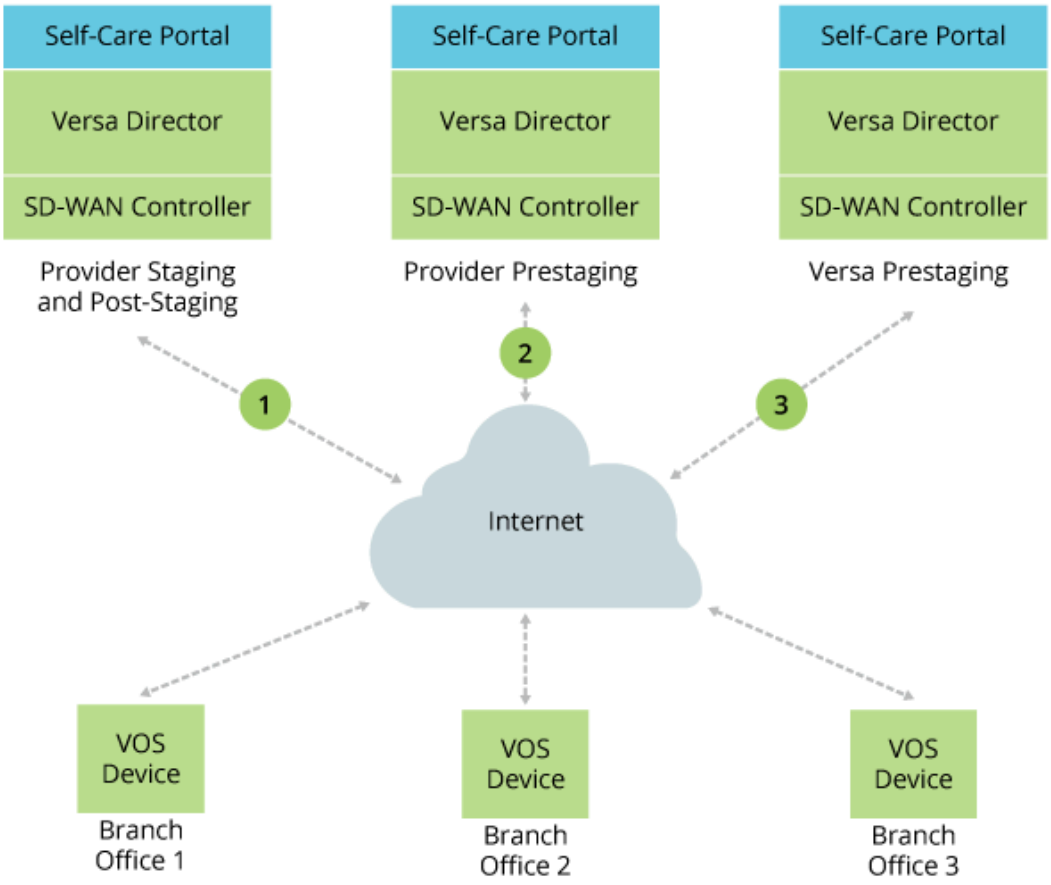
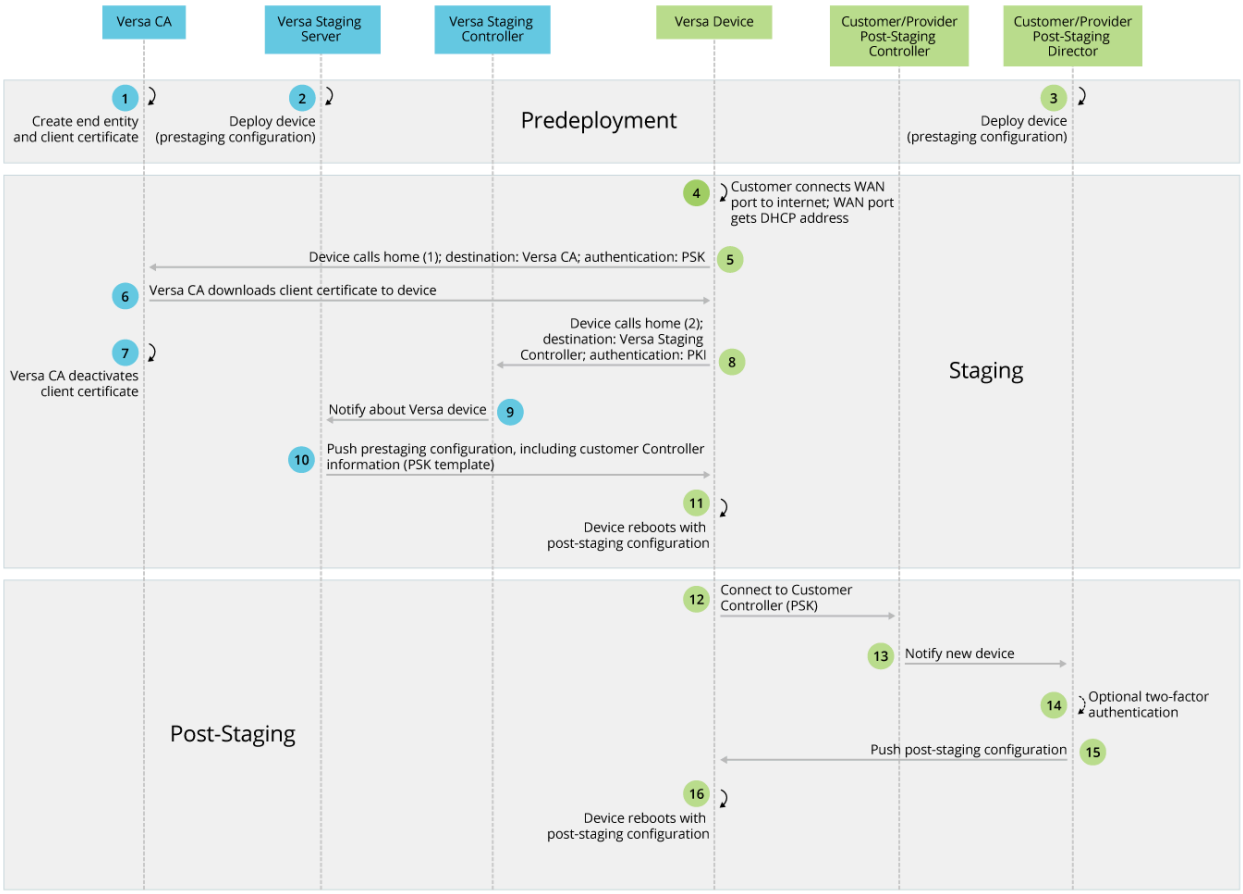


Figure 2 illustrates the device activation flow.

Figure 2: Versa Networks Device Activation Call Flow



To activate VOS devices using global ZTP:

1. Ensure that you have created a public Controller node for the VOS devices to connect to. After the VOS device boots, it connects to the Versa Networks cloud-hosted staging Controller node.
2. Log in to the cloud-hosted Versa Director.
3. Select the Configuration tab in the top menu bar.
4. Select Templates > Device Templates in the horizontal menu bar.
5. Select one of the following standard templates to use to associate bind data with the VOS devices you are activating:

   - Versa Prestaging—Select if the device uses another prestaging Controller node. This template includes bind data for the global tenant ID, preshared key authentication parameters for the prestaging Controller node, and the IP address of the prestaging Controller node.
   - Versa Staging—Select if the device uses a post-staging Controller node whose IP address you know. This template includes bind data for the global tenant ID, preshared key authentication parameters for the staging Controller node, and the IP address of the staging Controller node.
   - Versa Staging FQDN—Select if the device uses a post-staging Controller node whose FQDN you know. This template includes bind data for the global tenant ID, preshared key authentication parameters for the staging Controller node, and the FQDN of the staging Controller node.

Note: For the Versa Prestaging, Versa Staging, and Versa Staging FQDN templates, you can customize them for a provider if desired. To do so, create a different device group and associate the template with it. You might want to do this if a provider does not use the default local authentication parameter for all its branches or if a provider uses different local authentication parameters at different branches.

- Versa Dummy Post-Staging—This is a placeholder template for devices that do not need to perform post-staging from this Director node with this Controller node.

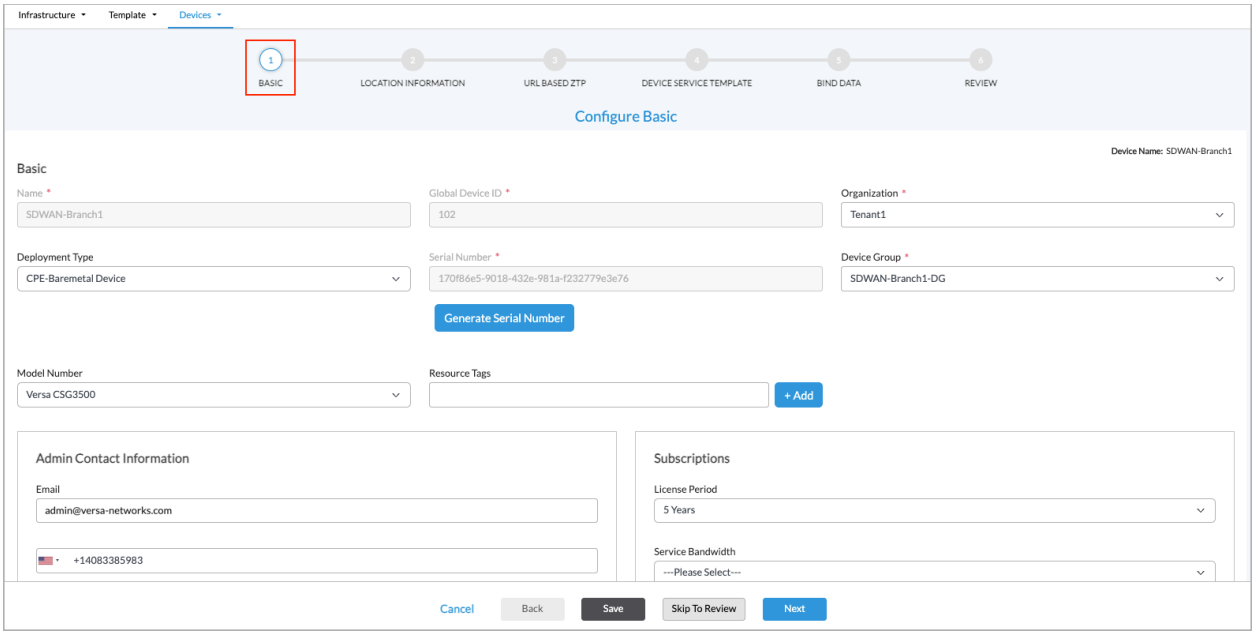
6. Select Devices > Device Groups in the horizontal menu bar.
7. Select one of the following standard device groups to use for the VOS devices you are activating:

   - Versa Prestaging DG—Select if the devices use another prestaging Controller node.
   - Versa Staging DG—Select if the devices use a post-staging Controller node whose IP address you know.
   - Versa Staging FQDN DG—Select if the devices use a post-staging Controller node whose FQDN you know.

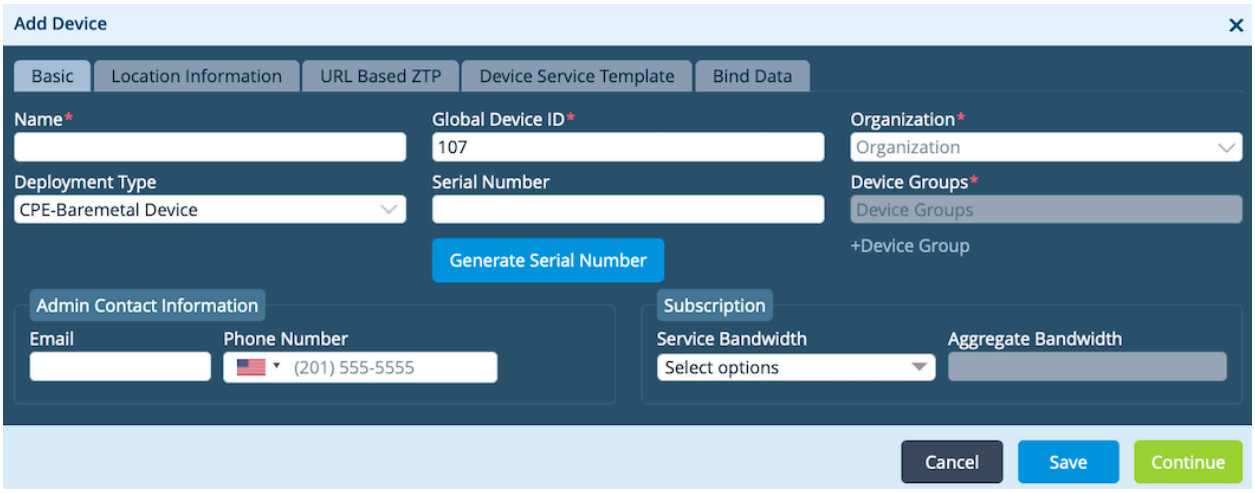
   To view the configuration of the device group, click the name of the group. The Edit Device Group popup window displays the configuration.

8. Select the Workflows tab in the top menu bar.
9. Click the + Add icon. The Add Device popup window displays.

   For Releases 22.1.3 and later:

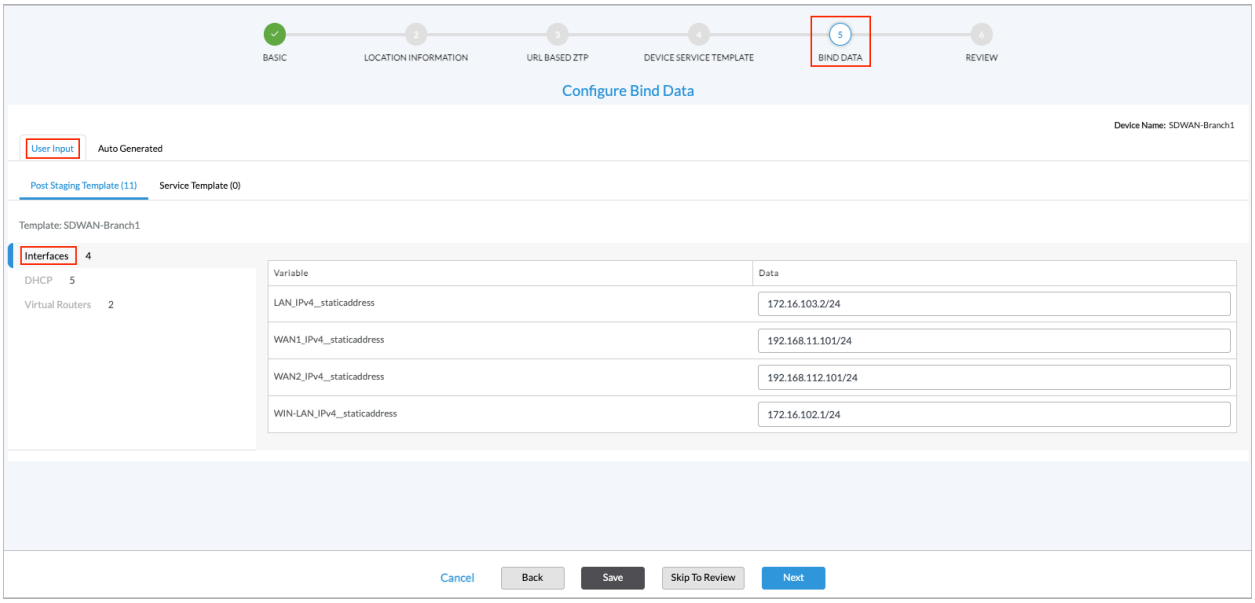


   For Releases 21.2.3 and earlier:

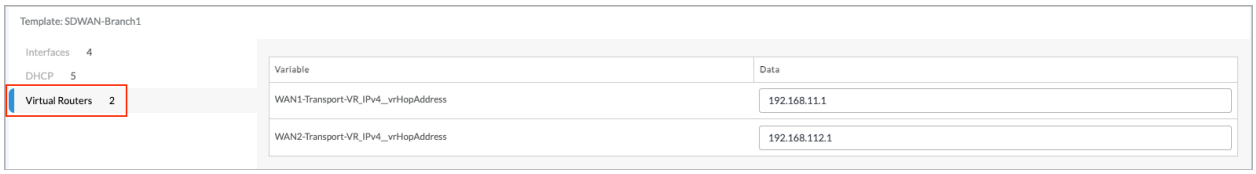


10. Select the Basic tab and enter the serial number of the VOS device as the chassis ID, or click Generate Serial Number to automatically generate a serial number. Note that the device manufacturer provides Versa Networks with a list of serial numbers of the VOS devices that it ships to a provider.
11. Select the Bind Data tab and then select the User Input tab.

    a. For Releases 22.1.3 and later:



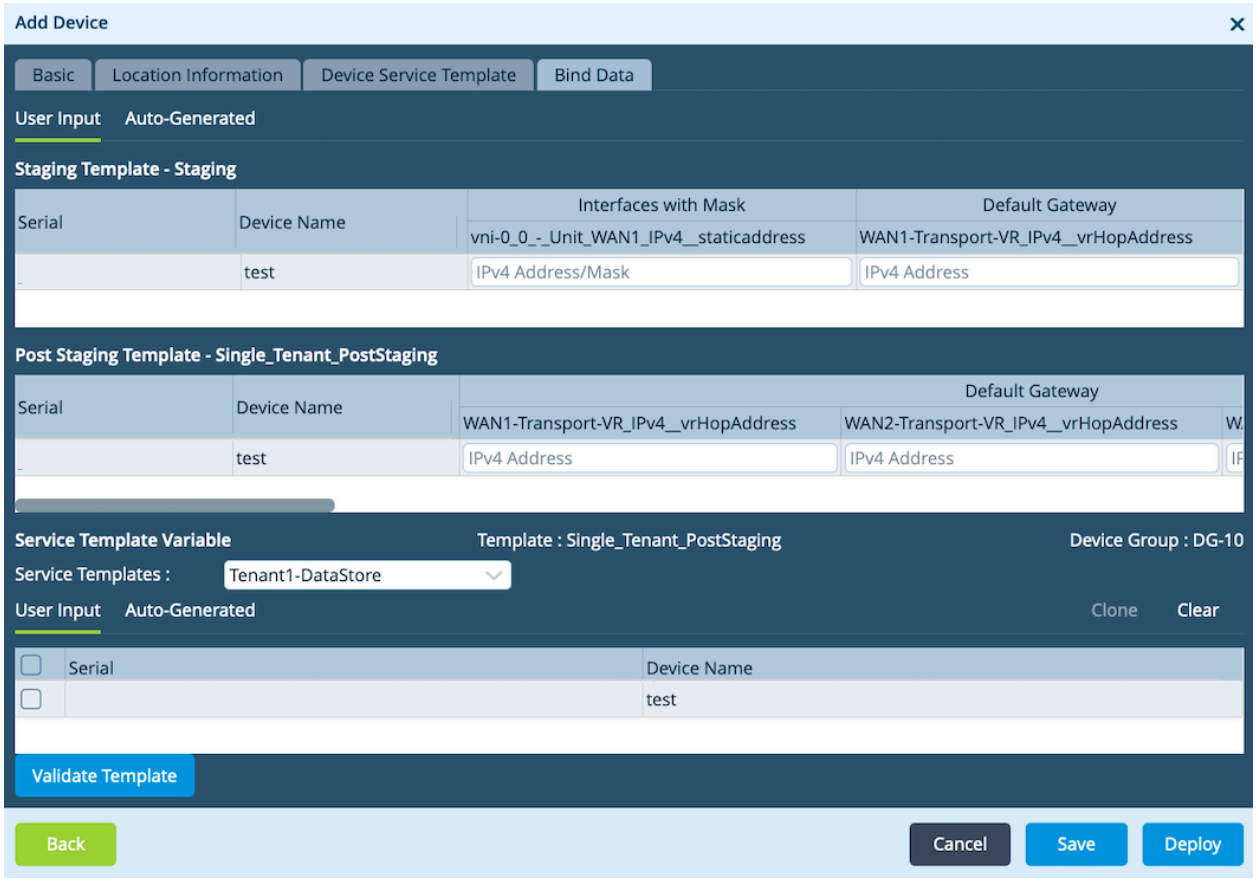
    1. Click the Post-Staging Template tab, then enter the IPv4 prefix of the interface to use.
    2. Click the Virtual Routers tab, then IPv4 address of the default gateway to use to connect to the staging Controller node.



3. Select the Review tab, review and make any necessary edits, then click Deploy.

b. For Releases 21.2.3 and earlier:

1. Select the Bind Data tab and then select the User Input tab. Enter the IPv4 prefix of the interface and the IPv4 address of the default gateway to use to connect to the staging Controller node.
2. Click Deploy.



When the activation of the VOS device completes, the Tasks window reports the status.

Use URL-Based ZTP To Activate VOS Devices

With URL-based ZTP, a site administrator activates a VOS device after receiving an email that includes a link to the staging and post-staging Controller node. The administrator connects to the device using a laptop or mobile phone and

clicks the link, and then the Controller node completes the device activation. On the Versa Director, you configure the staging Controller node and the contact information for the onsite installer. You can also access the URL from the Director node using REST API calls.

URL-based ZTP decouples a particular hardware device (that is, a particular chassis ID) from a branch location. This means that you can activate any hardware that is running an appropriate version of VOS software. The URL-based ZTP process also allows device activation to be performed using a post-staging Controller node, so you can skip the Versa Networks or provider prestaging process.

You configure URL-based ZTP for a device group.

Before you set up URL-based ZTP, note the following:

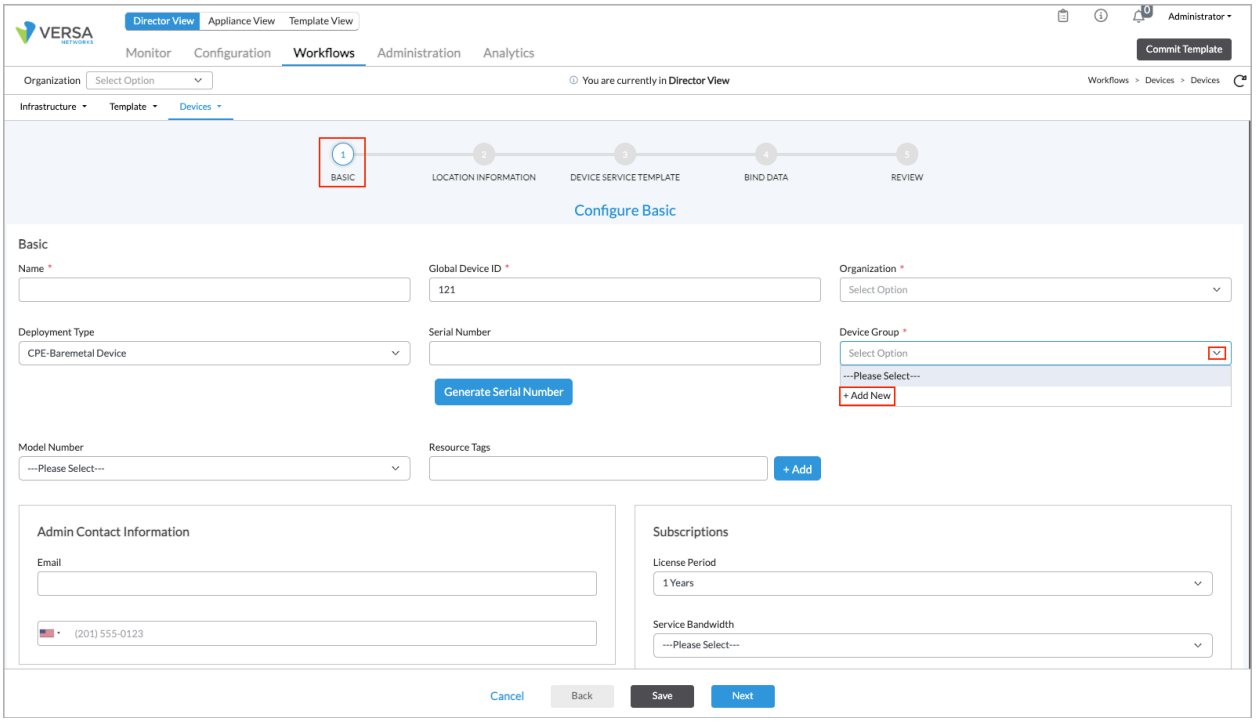
- ZTP uses ports 0 and 2 as the WAN ports and ports 1 and 3 as the LAN ports. For CSG700 Series appliances, ZTP uses ports 0 and 1 as the WAN ports and ports 2 and 3 as the LAN ports.
- To use URL-based ZTP on a bare-metal device, run the default configuration script.
- To use URL-based ZTP on a virtual machine (V), load the default-device.cfg file.
- By default, the VOS device runs a DHCP server on its LAN port.

Configure URL-Based ZTP

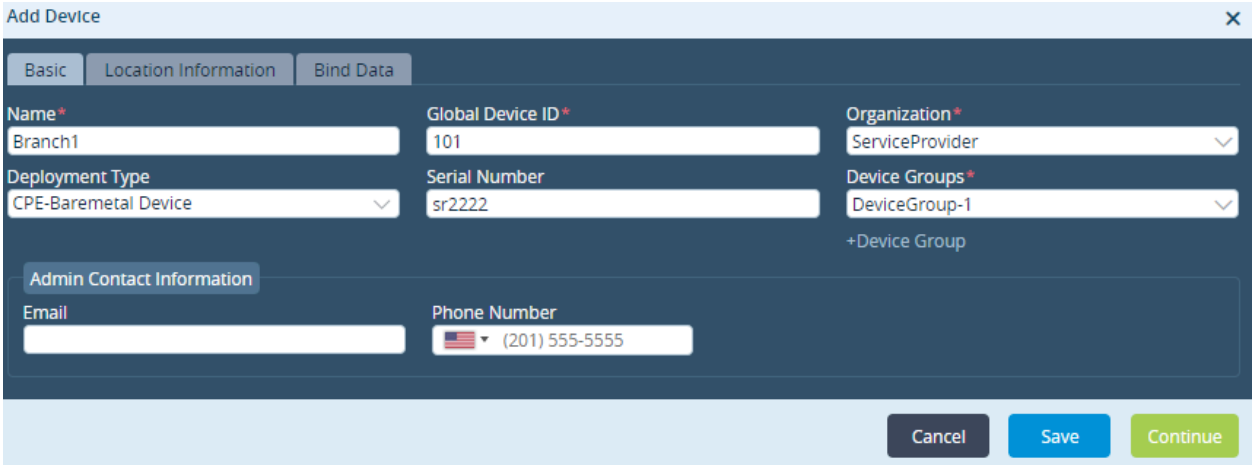
To create a device group that includes a URL-based ZTP configuration:

1. In Director view, select the Workflows tab in the top menu bar.
2. Select Devices > Devices in the left menu bar.
3. Click the + Add icon.

   For Releases 22.1.3 and later, the following screen displays with Step 1, Basic, selected by default.



For Releases 21.2.3 and earlier, the Add Device popup window displays.



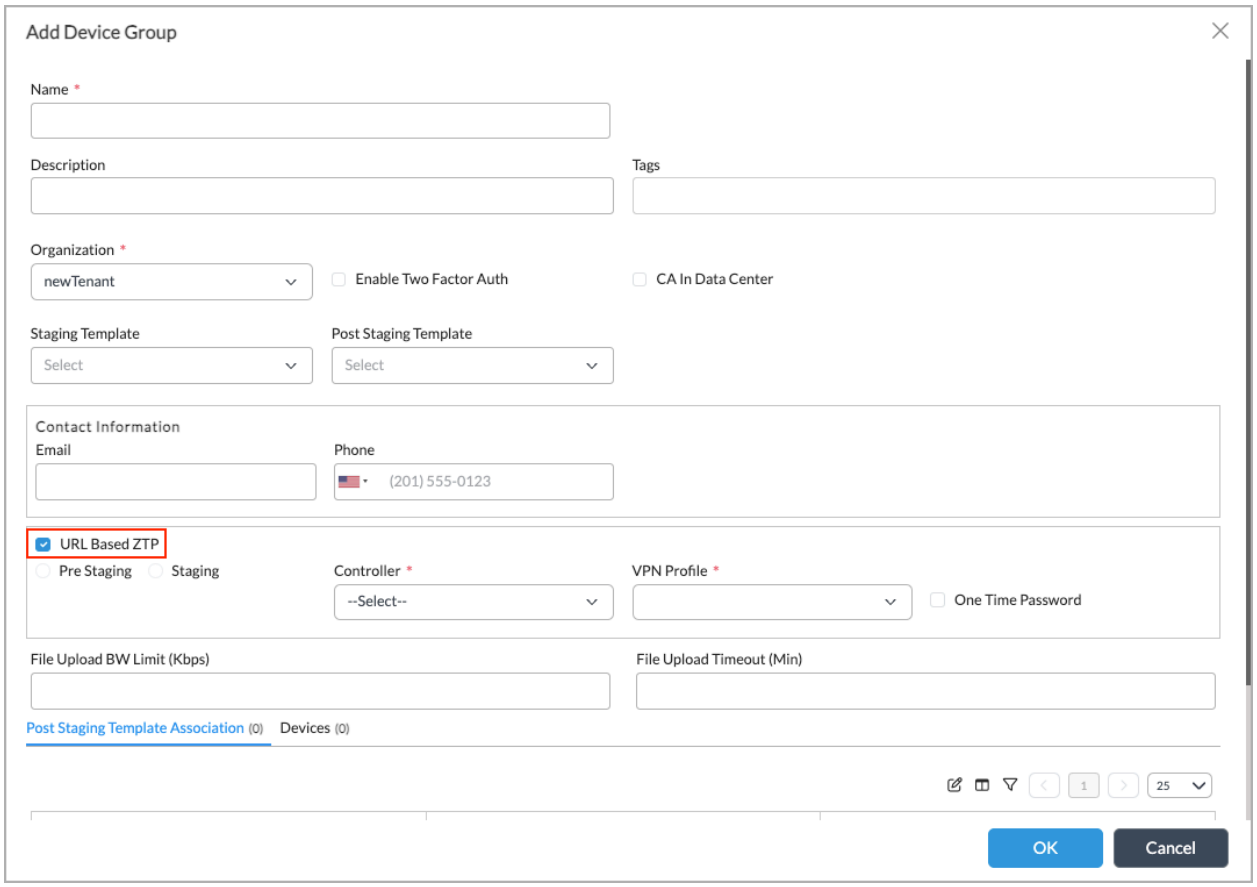
4. Select the Basic tab, and enter information for the following fields.

Field	Description
Name (Required)	Enter a name for the device. *Value:* Text string from 1 through 127 characters *Default:* None
Global Device ID (Required)	Enter the identifier of the device. This value is populated automatically with the next available number. You can change it to a different available

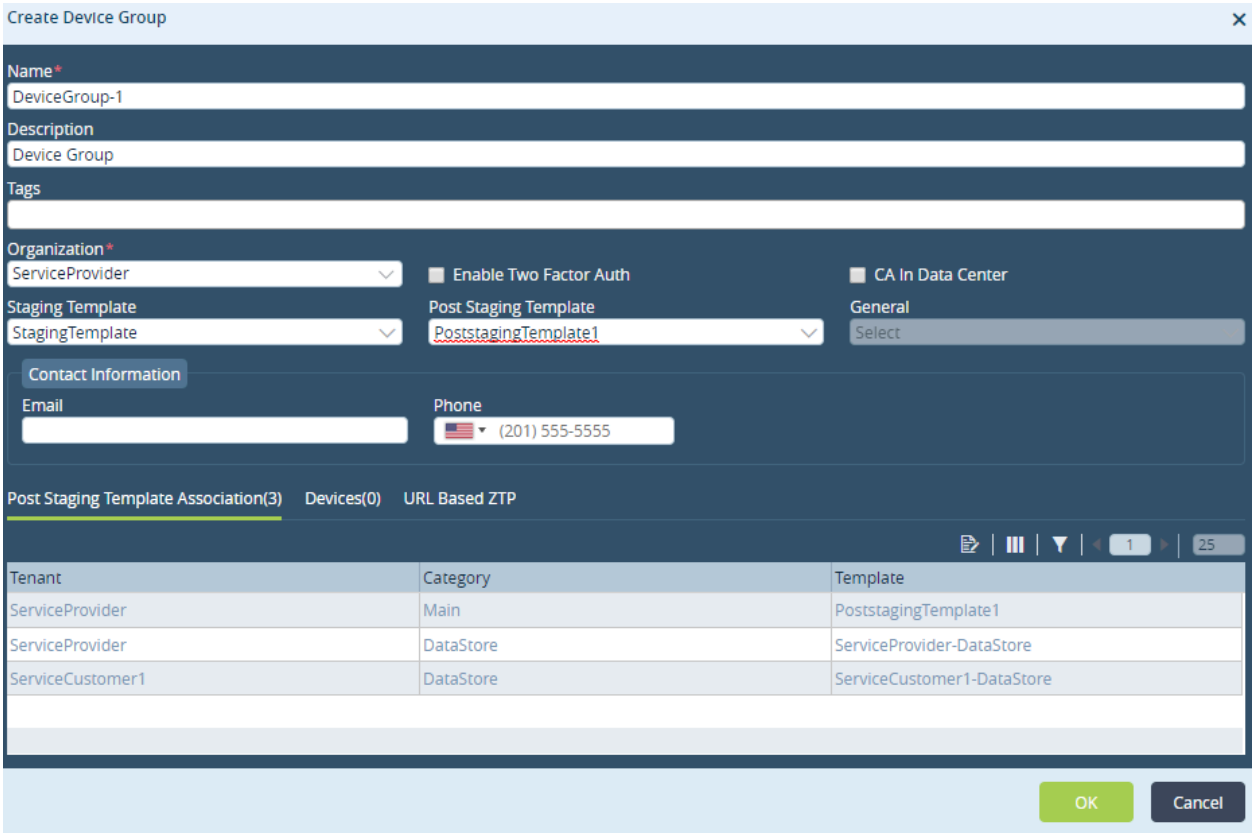
Field	Description
	value from 1 through 31.
Organization (Required)	Select the organization to which this device belongs.
Deployment Type (Required)	Select the type of deployment: ◦ CPE-Bare-metal Device ◦ CPE-Public Cloud
Serial Number	Enter the chassis number of the VOS device. This value must be unique. For Releases 22.1.3 and later, you can click Generate Serial Number to automatically generate a serial number.
Device Groups (Required)	Select the device group to which the device belongs. For the purposes of this procedure, click +Device Group (for Releases 21.2.3 and earlier; for Releases 22.1.3 and later, click + Add New in the Device Group field) and create a new device group, as described in the next step.
Admin Contact Information (Group of Fields)	Enter information about the administrator for the VOS device.
◦ Email	Enter the email address of the administrator associated with the device.
◦ Phone Number	Enter the phone number of the administrator associated with the device.

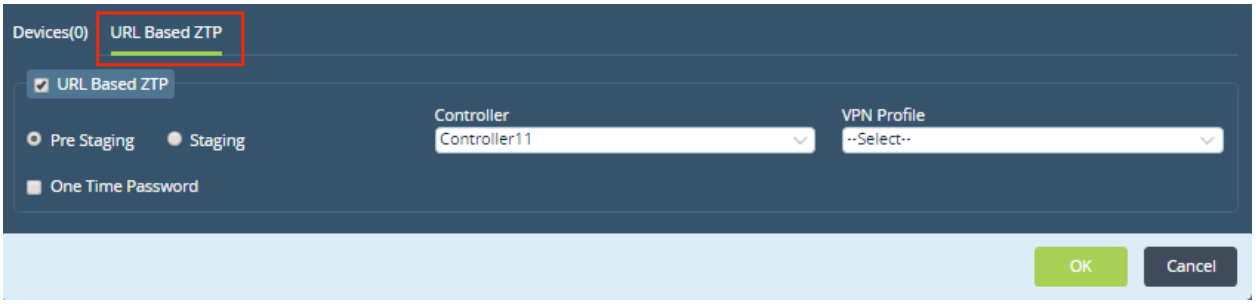
5. Click +Device Group.

   For Release 22.1.3 and later, the Add Device Group screen displays:



For Releases 21.2.3 and earlier, the Create Device Group popup window displays:





6. Select URL-Based ZTP and configure the parameters to enable URL-based ZTP. Enter information for the following fields.

Field	Description
URL-Based ZTP	Click to enable URL-based ZTP.
Prestaging	Click to enable URL-based ZTP during the prestaging state.
Staging	Click to enable URL-based ZTP during the staging state.

Field	Description
Controller	Select the Controller node to use as the staging and post-staging Controller node to activate the VOS devices. A link to this Controller node is sent in email to the site installer. If you upgraded the Director and Controller nodes that were present before the upgrade and they are not lists, check the Controller node status: 1. Log in to the Director shell, and enter the following commands: > Admininstrator@Director> **cli** > Admininstrator@Director> **config** > Admininstrator@Director% **set provider appliances appliance** *controller-uuid* **staging-controller** 2. If the staging-controller value is false for a Controller node that should display in the URL ZTP Controller node list, set the value to true: > Admininstrator@Director% **set show provider appliances appliance** *controller-uuid* **staging-controller true** 3. Repeat Step 2 for each Controller node that should display in the list. 4. Commit the changes: > Admininstrator@Director% **commit** Note: The Controller node either must belong to an organization to which the tenant user has access or must be associated with at least one organization that belongs to the device group's organization or parent organization.
VPN Profile	Select the IPsec VPN tunnel to use to reach the staging and post-staging Controller node. In the VPN profile, you define whether the IKE connection between the Controller node and the VOS device uses preshared keys (PSK) or public key infrastructure (PKI).

Field	Description
	If no VPN profile displays in the list for the selected Controller node, do the following: 1. Log in to the Director shell, and enter the following commands: > Admininstrator@Director> **cli** > Admininstrator@Director> **config** 2. Display the provider organization of the selected Controller node: > Admininstrator@Director% **show devices device SDWAN-Controller1 config system sd-wan site provider-org** 3. Based on the name of the Controller organization displayed in the output of Step 2, display a list all VPN profiles: > Admininstrator@Director% **show devices device *controller-name* SDWAN-Controller1 config orgs org-services** *controller-org-from-previous-step* **ipsec vpn-profile vpn-type controller-staging-sdwan** 4. If the output of the **show devices** command in Step 3 does not display any VPN profiles, contact Versa Networks Customer Support.
One-Time Password	Select to create a password to use only during the URL-based ZTP process.

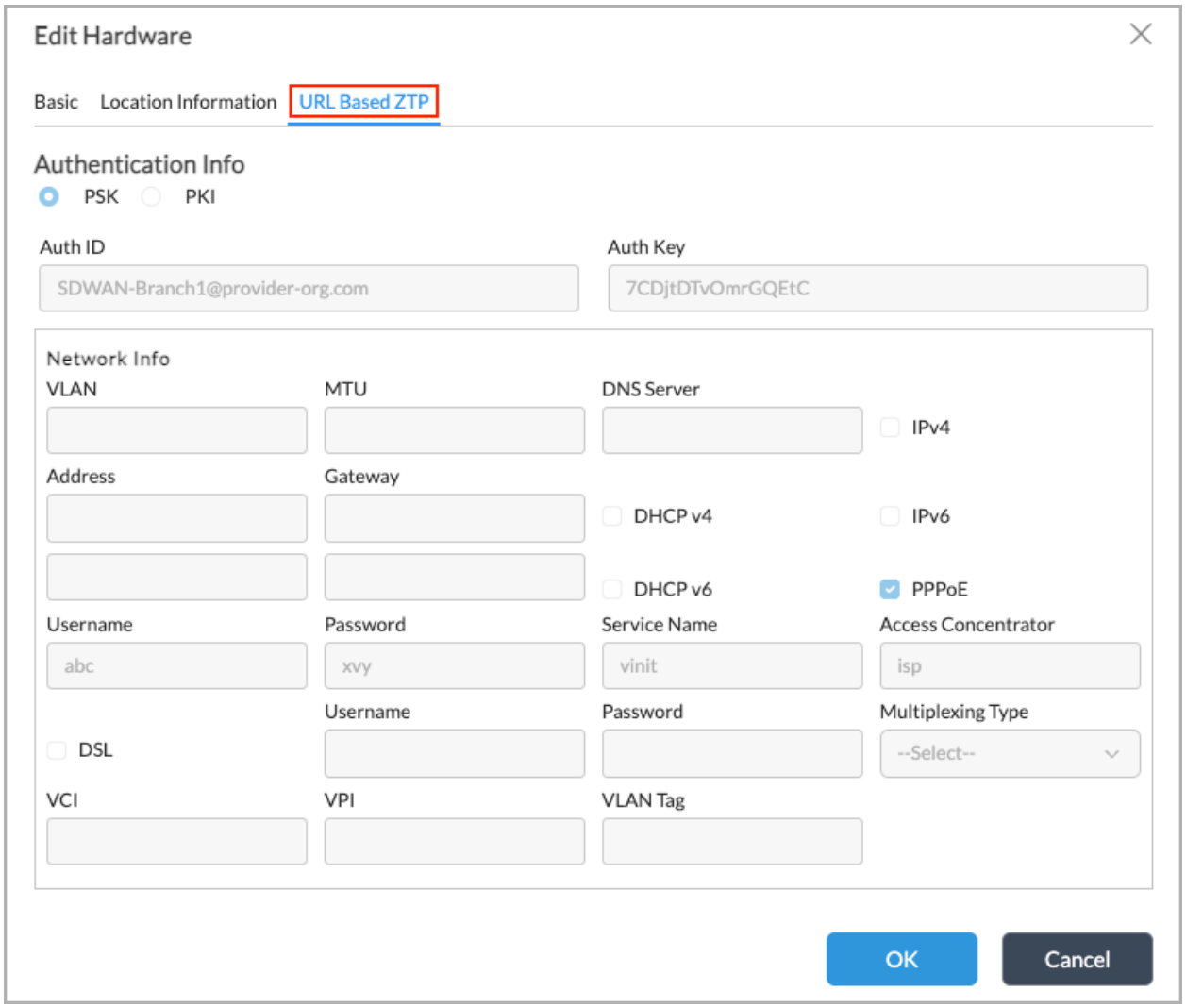
7. Click OK.

Edit ZTP URL Parameters

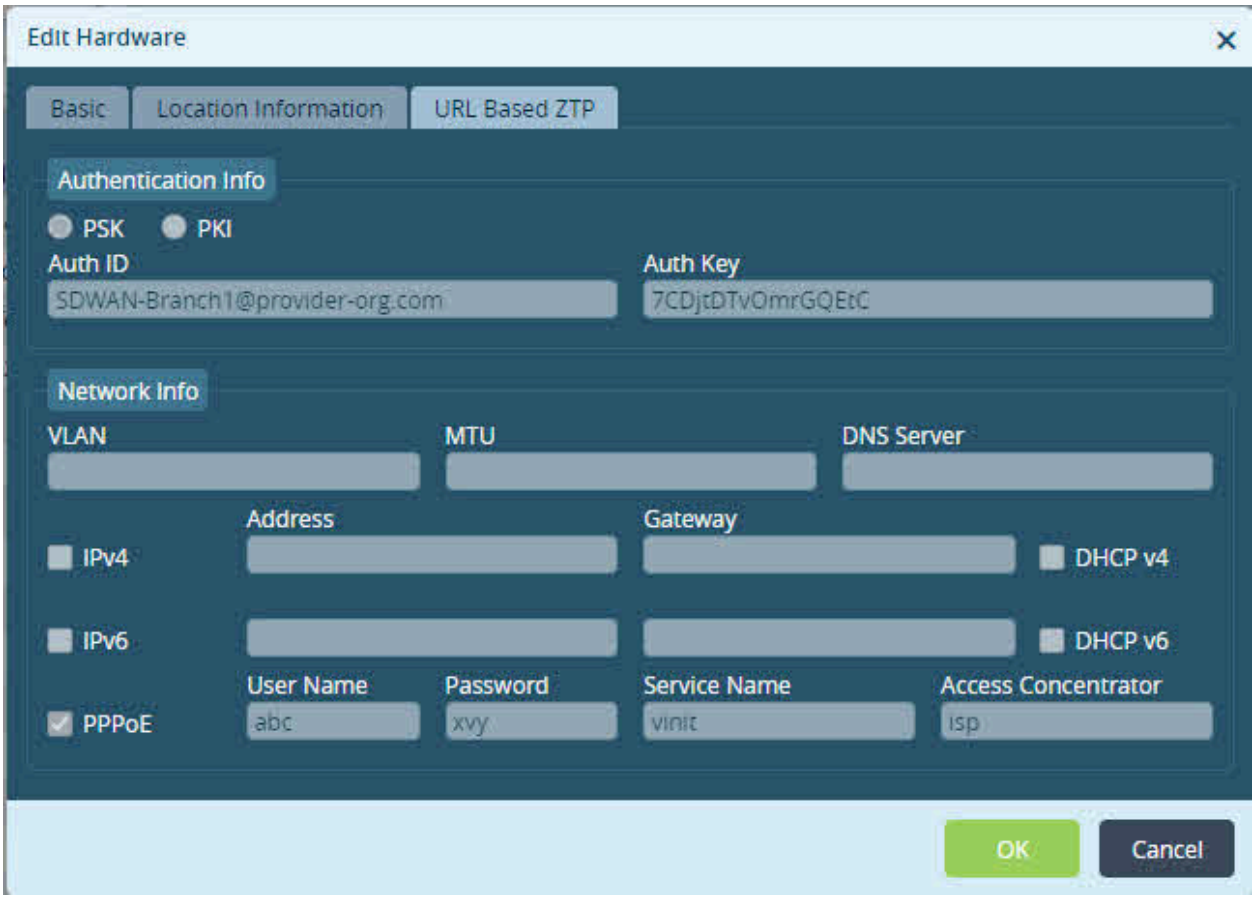
After you have deployed a VOS device, you can edit the parameters related to URL-based ZTP:

1. In Director view, select the Administrator tab in the top menu bar.
2. Select Inventory > Hardware in the left menu bar.
3. Select a VOS device from the main pane. The Edit Hardware popup window displays.

   For Releases 22.1.3 and later:



For Releases 21.2.3 and earlier:



4. Select the URL-Based TCP tab, and make the desired changes.
5. Click OK.

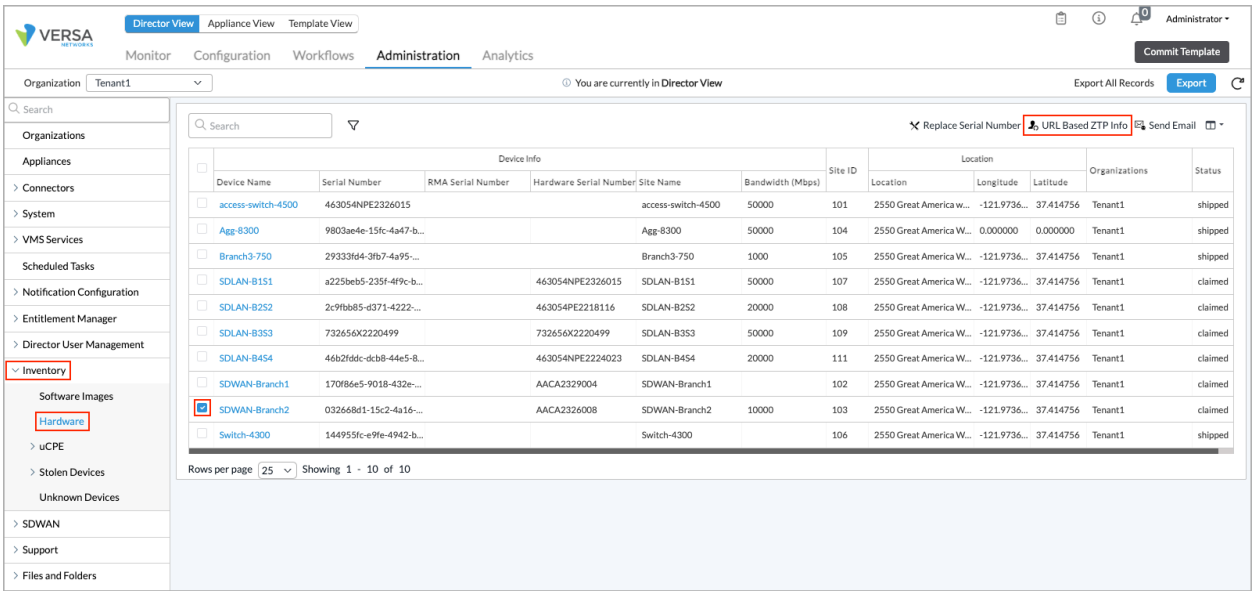
Access the ZTP URL To Activate a VOS Device

To access the URL to use for ZTP, use one of the following options:

- Connect from the AMQP server that you configured on Versa Director. Note that after you onboard and deploy the VOS device, the URL is posted to the AMQP server.
- Query the URL using the following RESTful API call, where *x.x.x.x* is the IP address of your Versa Director. For example:

  > **http://*x.x.x.x*:9182/vnms/sdwan/device-url-mappings/device-url-mapping/Branch2**

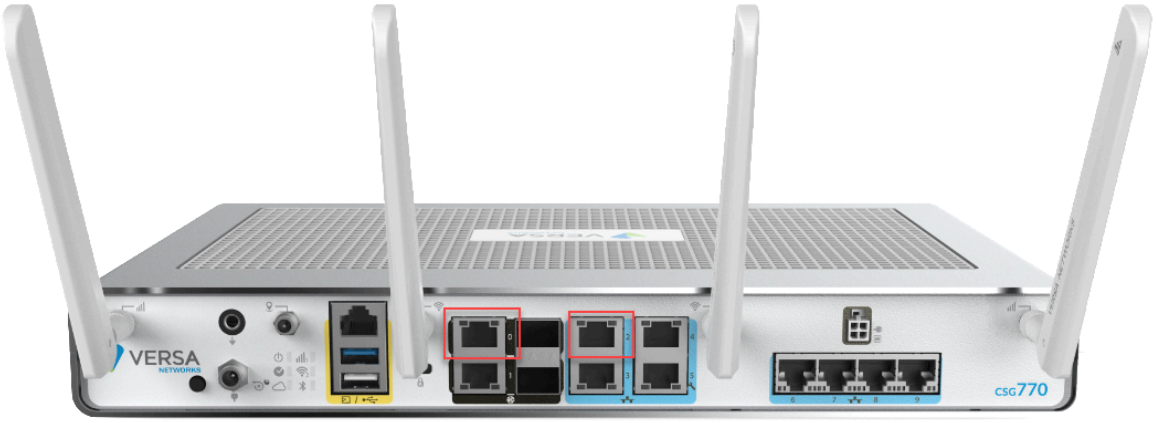
- Copy the URL from the Versa Director Administration > Inventory > Hardware window. On this window, select a VOS device and click the URL-Based ZTP Info icon:



Activate a VOS Device

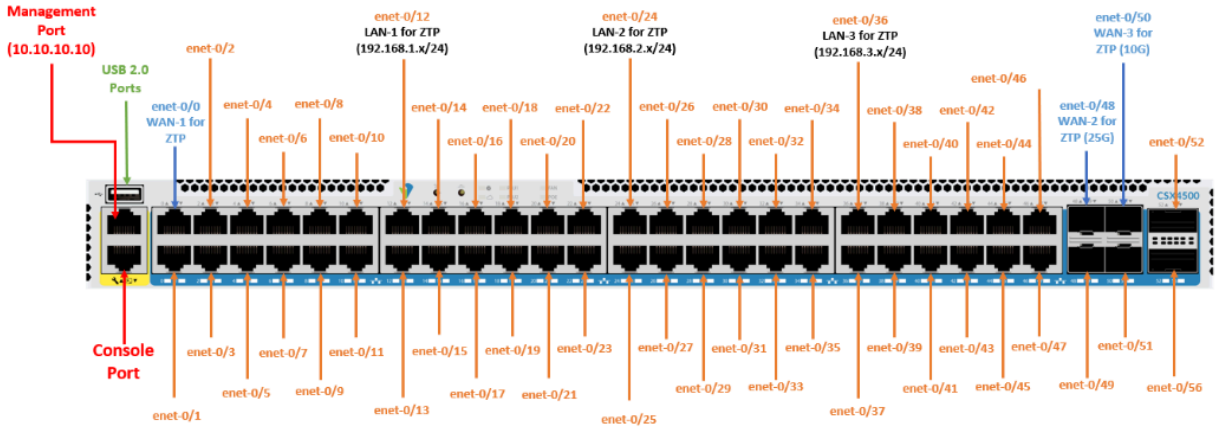
To activate a VOS device using URL-based ZTP:

1. Ensure that ICMP is allowed on the VOS device's WAN ports. ICMP is required because, as part of the activation process, the VOS device sends ICMP probes to the Controller node's WAN port to ensure network reachability.
2. If WiFi is enabled on the VOS device, connect to the device from an iPhone or Android device, and skip to Step 4.
3. Otherwise, connect a laptop to the LAN port 2 on the VOS device.
4. Connect the device to the internet:
   - To connect an SD-WAN device, connect WAN port labeled 0 to the internet.

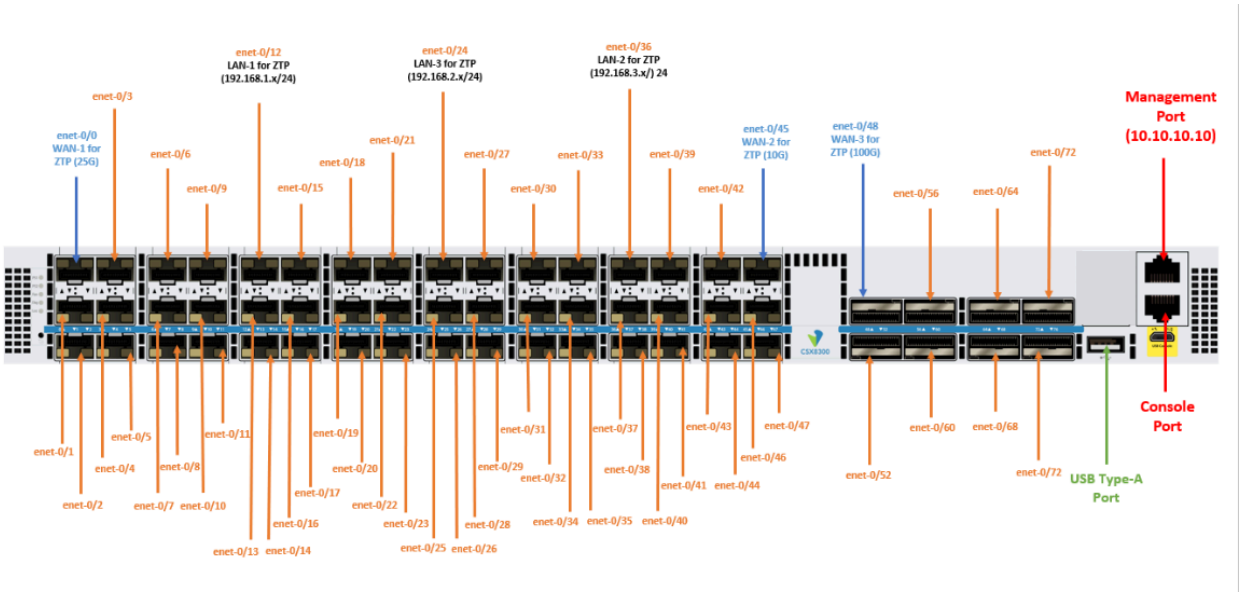


- To connect an SD-LAN device, use the ports indicated for your switch:

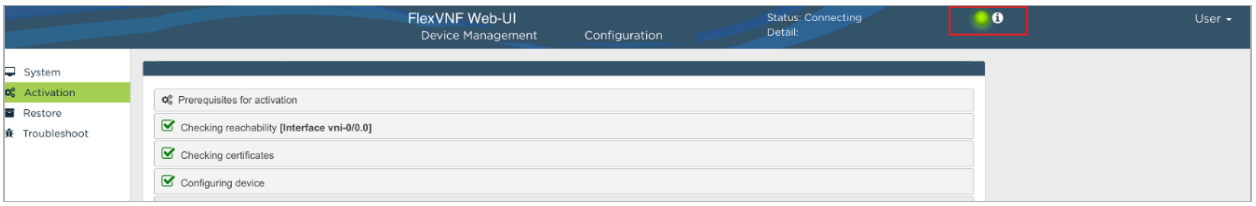
  CSX4300 and CSX4500 switches—The default WAN port for ZTP is enet-0/0 WAN-1 (1G). For multigig speeds, you can select enet-0/48 WAN-2 (25G), or enet-0/50 WAN-3 (10G), as shown below.



  CSX8300 switches—The default WAN port for ZTP is enet-0/0 WAN-1 (25G). You can also select enet-0/45 WAN-2 (10G) or enet-0/48 WAN-3 (100G), as shown below.



5. Click the link in the device activation email that you received. The VOS (FlexVNF) Web-UI screen displays.
6. Check the status light in the top menu bar.



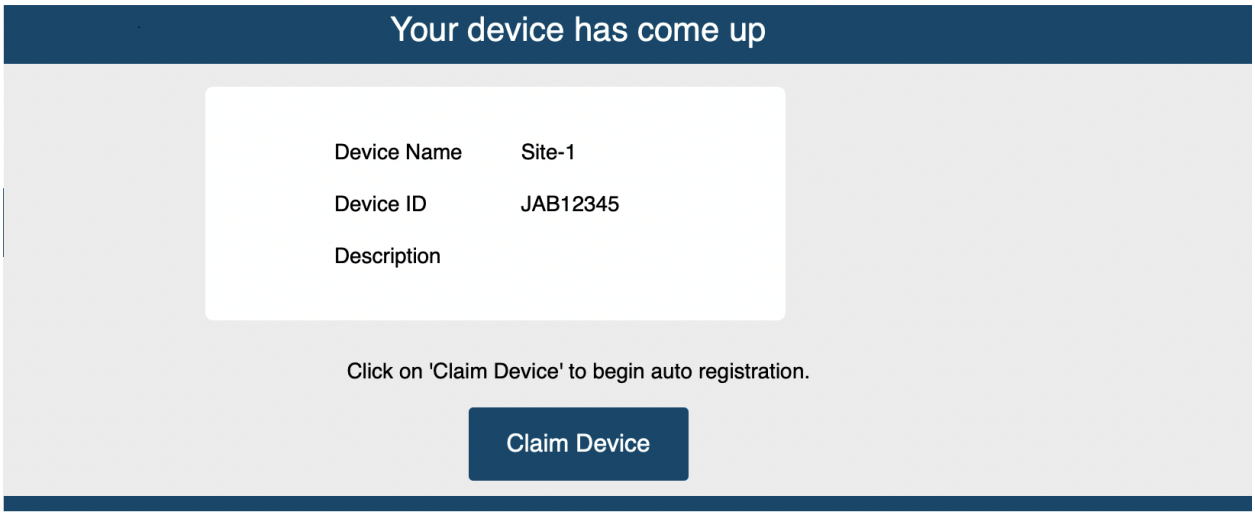
If the light is green, proceed to the next step.

If the light is amber, the device configuration was changed and the device no longer has the factory-default settings. As a result, the device might not have been onboarded properly using URL ZTP. To resolve this issue, connect to the device console and issue the following command from the CLI. This command resets the device to the factory-default configuration so that you can use URL-based ZTP and global ZTP.

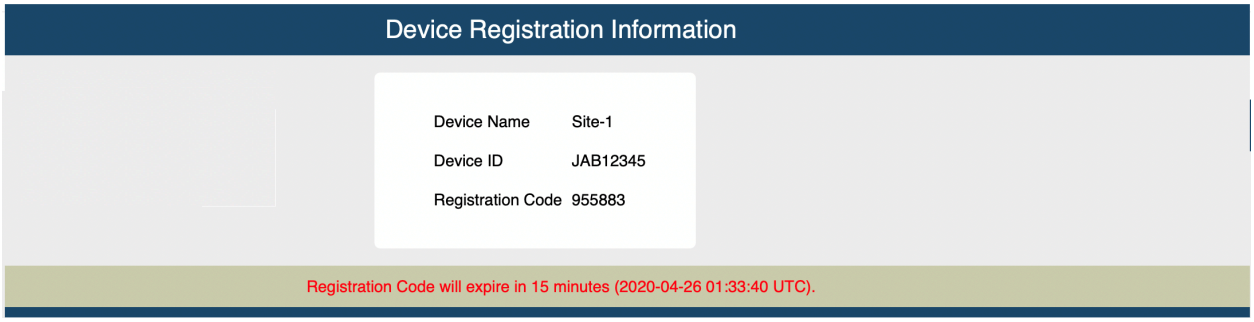
```
request system load-default
```

7. In the Device Management tab, click Start Activation to start the ZTP activation of the VOS device. The VOS device then does the following:
   a. Check for internet connectivity.
   b. Fetch valid certificates, and if PKI authentication is selected, check the certificates
   c. Connect to the configured staging Controller node and receive its configuration.

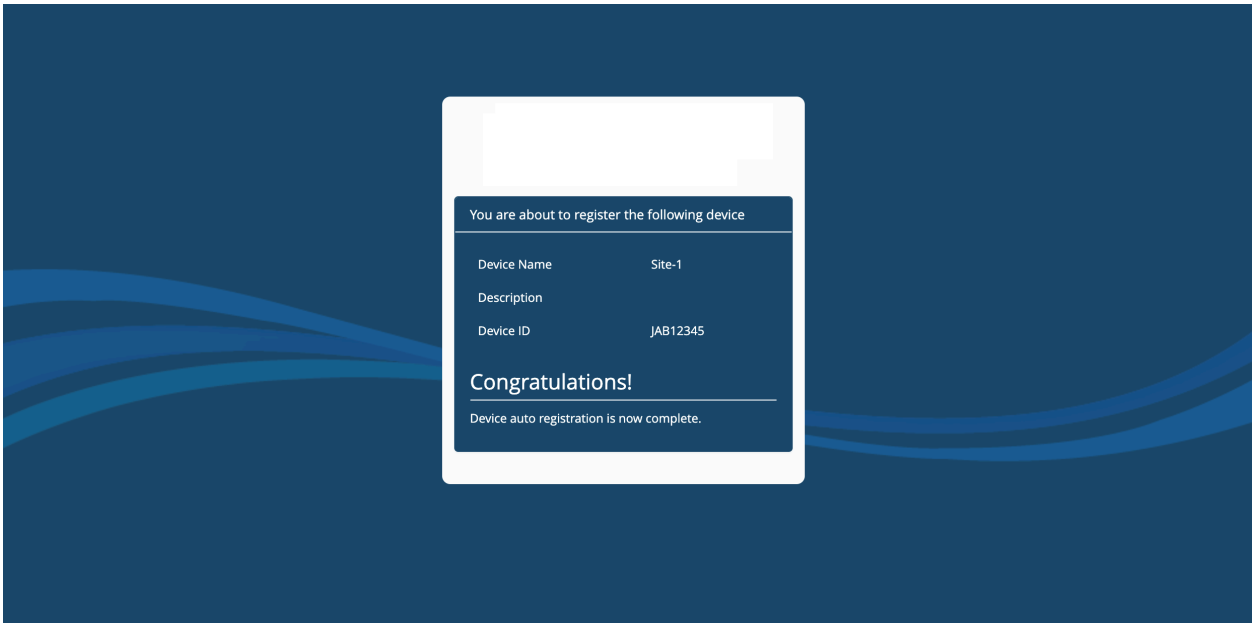
8. If two-factor authentication is enabled, claim the VOS device:
   a. When the device boots for the first time, click Claim Device.



b. After you claim the device, you receive the device registration code either in an email or as a text message to a mobile phone, depending on the configuration:



c. Enter the registration code.

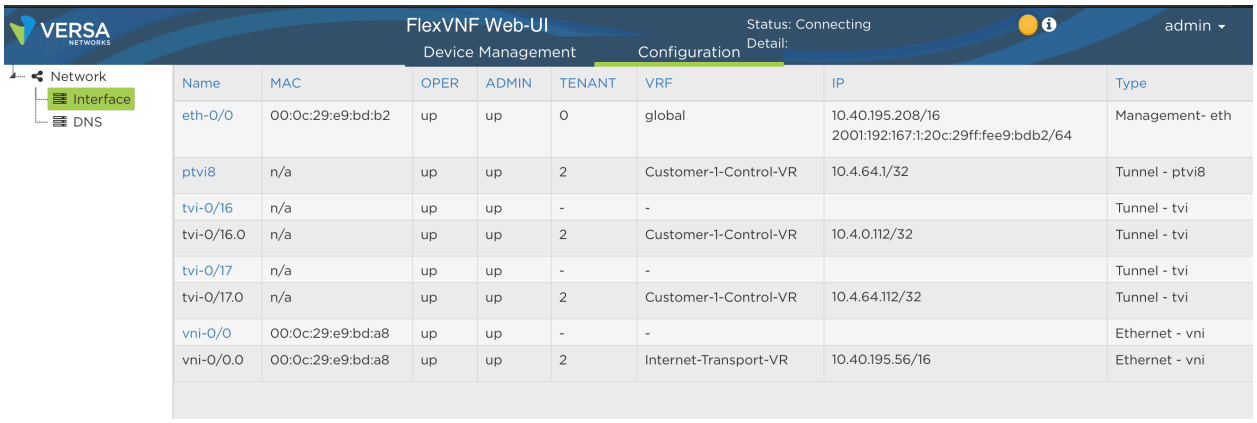


9. When the ZTP process completes, the VOS device reboots.

```
admin@prague-cli> show interfaces brief
NAME       MAC                OPER  ADMIN  TENANT  VRF                          IP
-------------------------------------------------------------------------------------------
eth-0/0    00:90:0b:4a:7c:a0  up    up     0       global                       10.192.74.100/16
tvi-0/0    n/a                up    up     -       -
tvi-0/0.0  n/a                up    up     1       Versa-Provider-Control-VR
tvi-0/1    n/a                up    up     -       -
tvi-0/1.0  n/a                up    up     1       Versa-Provider-Control-VR
vni-0/0    00:90:0b:4a:7c:a1  up    up     -       -
vni-0/0.0  00:90:0b:4a:7c:a1  up    up     1       WAN1-Transport-VR            10.113.1.1/24
vni-0/0.1  00:90:0b:4a:7c:a1  up    up     1       WAN1-Transport-VR
vni-0/1    00:90:0b:4a:7c:a2  up    up     -       -
vni-0/1.0  00:90:0b:4a:7c:a2  up    up     1       global                       192.168.0.1/24
vni-0/2    00:90:0b:4a:7c:a3  down  down   -       -
vni-0/3    00:90:0b:4a:7c:a4  down  down   -       -
vni-0/4    00:90:0b:4a:7c:a5  down  down   -       -

[ok][2017-01-20 01:15:24]
admin@prague-cli>
System message at 2017-01-20 01:15:31...
Commit performed by admin via http using rest.
admin@prague-cli>
System message at 2017-01-20 01:15:38...
Commit performed by admin via http using rest.
admin@prague-cli>
System message at 2017-01-20 01:15:46...
Commit performed by admin via http using rest.
admin@prague-cli>
System message at 2017-01-20 01:16:27...
Commit performed by admin via ssh using netconf.
admin@prague-cli>
System message at 2017-01-20 01:16:30...
Commit performed by admin via console using cli.
```

10. On the Director node, verify that the VOS device has been activated.
11. If desired, configure static IP addresses and DNS servers in the VOS Web-UI screen. To do this, select the Configuration tab:



Name	MAC	OPER	ADMIN	TENANT	VRF	IP	Type
eth-0/0	00:0c:29:e9:bd:b2	up	up	0	global	10.40.195.208/16 2001:192:167:1:20c:29ff:fee9:bdb2/64	Management- eth
ptvi8	n/a	up	up	2	Customer-1-Control-VR	10.4.64.1/32	Tunnel - ptvi8
tvi-0/16	n/a	up	up	-	-		Tunnel - tvi
tvi-0/16.0	n/a	up	up	2	Customer-1-Control-VR	10.4.0.112/32	Tunnel - tvi
tvi-0/17	n/a	up	up	-	-		Tunnel - tvi
tvi-0/17.0	n/a	up	up	2	Customer-1-Control-VR	10.4.64.112/32	Tunnel - tvi
vni-0/0	00:0c:29:e9:bd:a8	up	up	-	-		Ethernet - vni
vni-0/0.0	00:0c:29:e9:bd:a8	up	up	2	Internet-Transport-VR	10.40.195.56/16	Ethernet - vni

Debug URL-Based ZTP

If you are a site administrator, follow these steps to debug URL-based ZTP:

1. Ensure that Port 1 is configured as the eth0 interface.
2. Ensure that a WAN IP address is configured on Port 2.
3. Ensure that the default gateway in the global routing instance is reachable through the WAN port.
4. On Port 3, the LAN IP is received via DHCP. Use http://192.168.1.1:80 to access the device or directly use the generated URL.
5. Paste the URL in the browser to start the bootstrap process.

You can monitor the progress on Versa Director.

Prepare for a Demo of URL-Based ZTP

If you are showing a demo of URL-based ZTP, follow these steps to set up the VOS device:

1. Install a new .bin file on the VOS device. Doing this is not required if you are performing the demo on a newly shipped device.
2. Install the factory-default configuration. To do this, run the /opt/versa/scripts/versadevice-factoryreset.sh script on the VOS device. Doing this allows the laptop that you connect to the VOS device to access the internet. Doing this is not required if you are performing the demo on a newly shipped device.
3. Check that the interfaces on the VOS device are operational:

```
admin connected from 10.0.0.27 using ssh on versa-flexvnf
admin@versa-flexvnf-cli> show interfaces brief
NAME       MAC               OPER  ADMIN  TENANT  VRF    IP
------------------------------------------------------------------------
eth-0/0    00:90:0b:43:10:42  up    up     0    global
vni-0/0    00:90:0b:43:10:43  up    up     -    -
vni-0/0.0  00:90:0b:43:10:43  up    up     1    global  10.0.0.23/16
vni-0/1    00:90:0b:43:10:44  up    up     -    -
vni-0/1.0  00:90:0b:43:10:44  up    up     1    global  192.168.1.1/24
 [ok][2016-08-19 14:50:55]
```

Use the CLI To Activate VOS Devices

To automatically activate a VOS device from the CLI, run the /opt/versa/scripts/staging.py script.

The following is an example of the options you specify when running the script on an SD-WAN device:

```
admin@VNF:/$ sudo /opt/versa/scripts/staging.py -l SDWAN-branch@nms-org.com \
-r controller-staging@nms-org.com -c 10.10.10.10 -w 0 -s 10.10.10.20/24 -g 10.10.10.10
```

This example includes the following options:

- Name of the VOS device to activate (–l SDWAN-branch@nms-org.com)
- Name of the Controller node to authenticate the VOS device (–r controller-staging@nms-org.com)
- IP address of the Controller node (–c 10.10.10.10)
- WAN port to use to reach the internet, here, port 0 (–w 0)
- Static route to configure (–s 10.10.10.20/24)
- Gateway IP address (–g 10.10.10.10)

Specify the –h option to list all available options for this script:

```
admin@VNF:/$ sudo /opt/versa/scripts/staging.py -h
[sudo] password for admin:
usage: staging.py [-h] [-l LOCAL_ID] [-r REMOTE_ID] [-c CONTROLLER] [-d] [-w {0,1,2,3}] [-v VLAN]
[-s STATIC] [-g GATEWAY]
Set up branch staging configuration
Optional arguments:
-h, --help                                    Show this help message and exit
-l LOCAL_ID, --local-id LOCAL_ID              Local ID string/email
-r REMOTE_ID, --remote-id REMOTE_ID           Remote ID string/email
-n SERIAL_NUMBER, --serial-number SERIAL_NUMBER    Serial number
-c CONTROLLER, --controller CONTROLLER  Controller    IPv4 address/FQDN
-c6 CONTROLLER6, --controller CONTROLLER6  Controller    IPv6 address/FQDN
-t {prestaging,staging}, --staging {prestaging,staging}    Staging type (default=staging)
-wpt {vni,enet}, --wan-port-type {vni,enet}    WAN port type [vni | enet] (default=vni)
-w {0,1,2,3}, --wan-port {0,1,2,3}            WAN port number
-v VLAN, --vlan VLAN                          VLAN ID
-s STATIC, --static STATIC                    Static IPv4/mask for WAN link
-s6 STATIC6, --static6 STATIC6                Static IPv6/mask for WAN link
-g GATEWAY, --gateway GATEWAY                 Default gateway IP address
-g6 GATEWAY6, --gateway6 GATEWAY6             Default gateway IPv6 address
-d, --dhcp                                    Use DHCP for WAN link
-d6, --dhcp6                                  Use DHCPv6 for WAN link
-a, --slaac                                   Use SLAAC for IPv6 WAN link
-gt GLOBAL_TENANT_ID, --global-tenant-id GLOBAL_TENANT_ID   Global Tenant ID
-lk LOCAL_PSK, --local-psk LOCAL_PSK          IPsec Key (default=1234)
-rk REMOTE_PSK, --remote-psk REMOTE_PSK       IPsec Key (default=1234)
-lb LOOPBACK, --loopback LOOPBACK             IPv4/mask for loopback link; used for staging
-dsl, --dsl_intf                              Use DSL interface for staging
-vci DSL_VCI, --dsl_vci DSL_VCI               VCI value, mandatory for DSL
```

```
-vpi DSL_VPI, --dsl_vpi DSL_VPI                          VPI vlaue, mandatory for DSL
-multiplex DSL_MULTIPLEX, --dsl_multiplex DSL_MULTIPLEX     Multiplex type, mandatory for DSL; multiplex
type can either be llc or vcmux
-vtag DSL_VLAN_TAG, --dsl_vlan_tag DSL_VLAN_TAG            VLAN ID for DSL line
-p, --pppoe                                        Use PPPoE interface for staging
-pu PPPOE_USER, --pppoe_user PPPOE_USER                  PPPoE username, mandatory for PPPoE
-pp PPPOE_PASSWORD, --pppoe-password PPPOE_PASSWORD        PPPoE password, mandatory for
PPPoE
-ps PPPOE_SERVICE, --pppoe-service PPPOE_SERVICE          PPPoE service name
-pa PPPOE_ACCESS_CONCENTRATOR, --pppoe-access-concentrator PPPOE_ACCESS_
CONCENTRATOR
                                        PPPoE access concentrator
-wu WWAN_USER, --wwan_user WWAN_USER                     WWAN username
-wp WWAN_PASSWORD, --wwan-password WWAN_PASSWORD          WWAN password
-wapn WWAN_APN, --wwan-apn WWAN_APN                      WWAN APN name
-wpin WWAN_PIN, --wwan-pin WWAN_PIN                      WWAN SIM pin
-lmode {auto,full-duplex,half-duplex}, --link-mode {auto,full-duplex,half-duplex}
                                        Link mode for the interface [auto | half-duplex | full-duplex]
-lspeed {auto,10m,100m,1g}, --link-speed {auto,10m,100m,1g} Link speed for the interface [auto |10m |100m |1g]
-t1e1 {0/0,0/1,0/2,0/3}, --t1e1-iface {0/0,0/1,0/2,0/3}     Use T1E1 interface for staging [0/0 | 0/1 | 0/2 | 0/3 ]
-t1e1-type {t1,e1}, --t1e1-type {t1,e1}                  T1E1 type (default=t1)
-t1e1-clk-src {internal,external}, --t1e1-clock-source {internal,external}
                                        T1E1 clock source
-encap {ppp,hdlc,frame-relay}, --encapsulation {ppp,hdlc,frame-relay}
                                        Encapsulation for T1E1 [ppp | hdlc | frame-relay] (default=ppp)
-dlci DLCI_NUMBER, --dlci-number DLCI_NUMBER              DLCI number for frame-relay encapsulation
-auth {psk,cert}, --auth-type {psk,cert}                 Authentication type [psk | cert] (default=psk)
-bla BGP_LOCAL_AS, --bgp-local-as BGP_LOCAL_AS           BGP local autonomous system number
-bpa BGP_PEER_AS, --bgp-peer-as BGP_PEER_AS              BGP peer autonomous system number
-bpi BGP_NEIGHBOR, --bgp-neighbor BGP_NEIGHBOR            BGP peer IP address
```

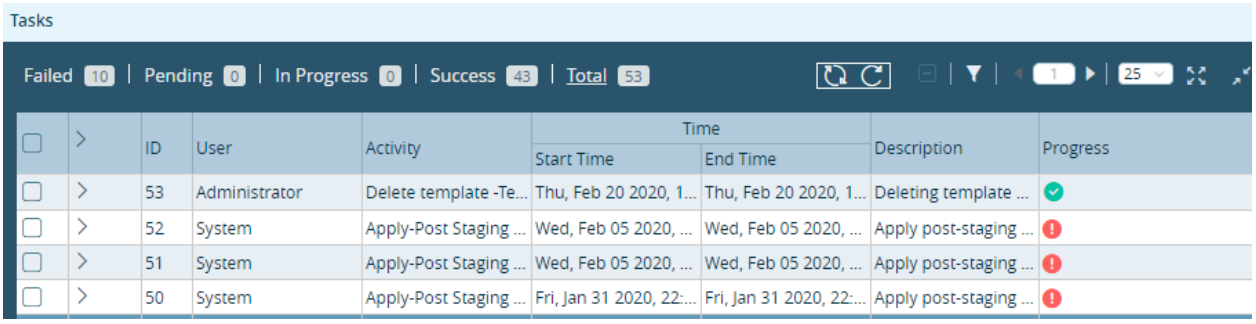
To run the script on an SD-LAN device, you must also include the following options, which are shown in the command below:

- Ethernet LAN interface (–wpt enet)—Append this option to the WAN port you are using to connect to the internet. The example below uses port 0, so the option is–w 0 –wpt enet.
- VLAN (–v)—The example below uses VLAN 4091 (–v 4091).
- Port group (–pg) and port group speed (–pgspeed)—For CSX8300 switches, the default port speed is 25 GB. The example below uses port group 0 and sets the speed for ZTP to 10 GB, so the options are –pg 0 and –pgspeed 4x10G.

```
admin@VNF:/$ sudo /opt/versa/scripts/staging.py -l SDLAN-branch@nms-org.com -r controller-
staging@nms-org.com \
-c 10.10.10.10 -w 0 -wpt enet -s 10.10.10.20/24 -g 10.10.10.10 -pg 0 -pgspeed 4x10G -v 4091
```

If you want to use two-factor authentication in the device activation process, enable it as described in Use URL-Based ZTP To Activate a VOS Device, above.

To verify that the VOS device has been deployed, check the Tasks window in Versa Director:



Use a USB Storage Drive To Activate a VOS Device

For Releases 21.2 and later.

If you have physical access to a VOS device, you can stage the SD-WAN CPE device by inserting a USB storage drive into the device. The USB storage drive must contain a file named staging.params, which contains input parameters for the staging.py script. The USB storage drive can optionally contain a VOS package file and certificates. All these files must be at the root (top level) of the USB drive. They cannot be in subdirectories.

When you install the USB storage drive into the VOS device, the device automatically reads the file and configures itself based on the SD-WAN parameters specified in the staging.params file.

The staging.params file contains the parameters required as input for the staging.py script, in a key-value format. The following example shows an example of the minimum configuration required to configure any device:

```
dhcp
local-id=local@my-company.com
remote-id=remote@remote-site.com
controller=10.1.2.3
```

To ensure that a specific device is being staged, also include the device's service number in the staging.params file:

```
serial-number=number
```

The keywords in the staging.params file directly map to the long-form command-line arguments of the staging.py script, which are shown in Use the CLI To Activate VOS Devices, above. To check the staging.py script options supported in the current version of the VOS software, issue the following command:

```
$ vsh show-staging-params
```

In the staging.params file, lines starting with a # are treated as comments and are skipped, and leading spaces are removed. The file can also be in DOS format.

If the USB drive contains a VOS package file (a file whose name has the format versa-flexvnf-*xxx*-*yyy*-*zzz*.bin) or an OS SPack file (a file whose name has the format versa-flexvnf-osspack-*xxxxx*.bin), these files are copied to the appropriate locations on the VOS device.

Note that to activate a VOS device from a USB drive, the device's configuration must be empty or it must be the factory-default configuration. To delete the configuration from the VOS device, issue the **request erase config-file** command from the device's CLI. If the VOS device has the factory-default configuration but has not been staged, the activation process automatically stages the device using the configuration information provided in the staging parameters.

Configure VOS Devices and ZTP Automatically Using Cloud-Init

When you instantiate a VOS device in a virtual environment, such as KVM, OpenStack, or a cloud, you can use the cloud-init functionality on the VOS device to automatically onboard the device immediately after you finish installing it. Cloud-init is an industry-standard multidistribution method for cross-platform cloud instance initialization. It is supported across all major public cloud providers, provisioning systems for private cloud infrastructure, and bare-metal installations.

If you do not use cloud-init when you install a VOS device as a VM in the cloud or in a virtualization environment, you must manually configure the VOS device after the installation and then you must perform the staging for ZTP manually. If you use cloud-init, you can pass configuration and staging information to the VOS device, and this information is executed when the device first boots. All three operations—installation, configuration and onboarding—are performed automatically.

The following is an example of a cloud-init file you can use to configure the eth0 interface on a VOS device and to stage the VOS device after it boots. Note that you must retain all the spaces at the end of each line for the file to work. JAML is very sensitive to spaces, which serve as an indication of the next action.

```
cloud_init_modules:
   - write-files
   - set_hostname
   - update_hostname
   - users-groups
   - ssh
write_files:
- content: |
   # This file describes the network interfaces available on your system
   # and how to activate them. For more information, see interfaces(5).
   # The loopback network interface
   auto lo
   iface lo inet loopback
   # The primary network interface
   auto eth0
   iface eth0 inet static
   address 192.168.0.230
   netmask 255.255.255.0
   gateway 192.168.0.1
path: /etc/network/interfaces
- content: |
   #!/bin/bash
   logger running staging script
   sudo /opt/versa/scripts/staging.py -l SDWAN-Branch@bk.com -r controller-1-staging@bk.com
permissions: "0755"
```

```
path: /home/admin/versa.sh
cloud_final_modules:
- runcmd
- scripts-user
runcmd:
- /home/admin/versa.sh
```

Supported Software Information

Releases 20.2 and later support all content described in this article, except:

- Releases 21.2 and later support using a USB storage drive to activate a VOS device.
- Releases 22.1.3 and later support configuring and activating an SD-WAN VOS device to manage Layer 2 access and core switches.

Additional Information

Configure Basic Features