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## Configure uCPE on a VOS Device

 For supported software information, click [here](#).

The Versa Networks universal CPE (uCPE) solution is an open platform that allows you to deploy third-party vendor virtualized network functions (VNFs) along with the Versa Operating System™ (VOS™) device in customer branches or hub sites.

When you configure service chaining with a VNF other than a Versa Network VNF, you cannot use forward error correction (FEC), packet replication, or per-packet load balancing.

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## Configure uCPE

The following are minimum requirements to enable a uCPE hypervisor on a VOS device:

- You can enable a uCPE hypervisor only on bare-metal devices and not on virtual machines (VMs). For information about the white-box appliances that support uCPE, see [Versa SD-WAN White-Box Appliances](#).
- Minimum number of host CPUs: 8
- Minimum amount of host RAM: 16 GB
- Minimum host hard-disk capacity: 128 GB

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## Install Hypervisor Packages

Before you configure a uCPE on a VOS device, you must install hypervisor packages. Installing the hypervisor packages creates the OVS bridges and interfaces vni-0/300 through vni-0/307.

To install hypervisor packages:

1. Ensure that all services on the CPE device are started.
2. On the CPE device, install the hypervisor packages.

```
| admin@Branch-c2-uCPE-cli> request system hypervisor enable no-confirm
```

This command installs hypervisor packages and reboots the system. Note that you must install the hypervisor packages before you push the service chain template to the uCPE. Otherwise, the guest VNF cannot start.

3. Verify that the hypervisor packages have been installed:

```
[admin@uCPE-4: ~] sudo virsh version
```

The following example output is for VOS devices running Ubuntu Trusty, Version 14.04:

```
[admin@Site1-CPE-1: ~] sudo virsh version
[sudo] password for admin:
Compiled against library: libvirt 4.0.0
Using library: libvirt 4.0.0
Using API: QEMU 4.0.0
Running hypervisor: QEMU 2.12.1
```

The following example output is for VOS devices running Ubuntu Bionic, Version 18.04:

```
[admin@uCPE-4: ~] sudo virsh version
[sudo] password for admin:
Compiled against library: libvirt 4.0.0
Using library: libvirt 4.0.0
Using API: QEMU 4.0.0
Running hypervisor: QEMU 2.11.1
```

4. Verify that the uCPE interfaces vni-0/300 through vni-0/307 have been created and mapped to the VOS switch:

```
admin@Branch-c2-uCPE-cli> show interfaces brief | grep UCPE
admin@Branch-c2-uCPE-cli> show interfaces statistics | grep UCPE
```

For example:

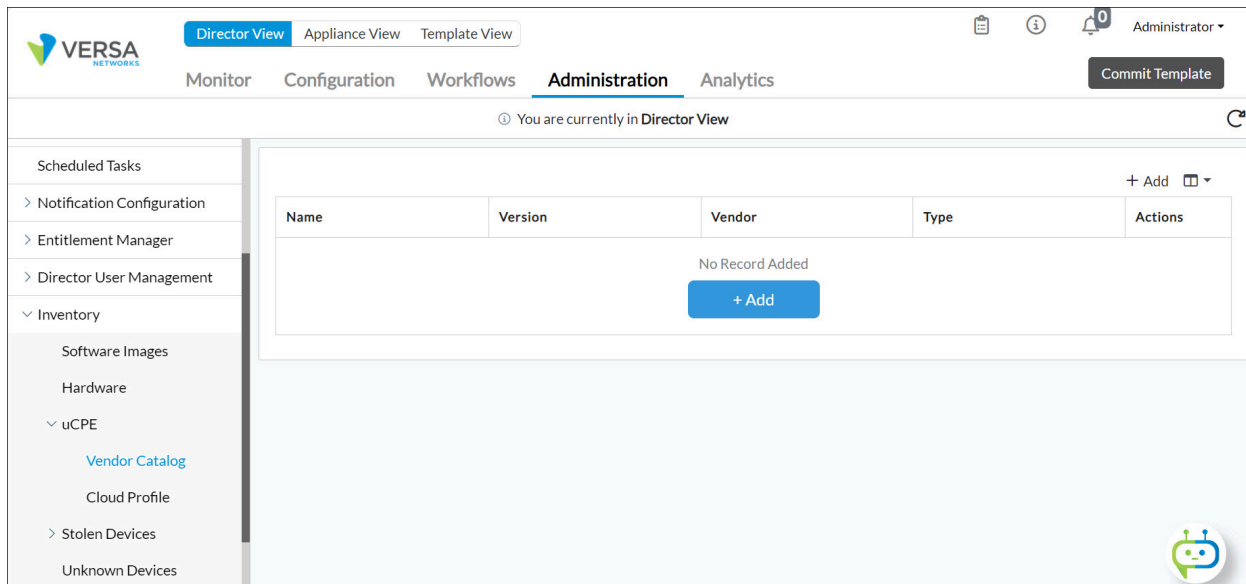
```
admin@SITE6-CPE2-cli> show interfaces statistics | grep UCPE | tab
vni-0/300 4 ServiceProvider-Control-VR UCPE-MGMT1 0 0 0 0 0 0 0
0 0 0
vni-0/300.0 4 ServiceProvider-Control-VR UCPE-MGMT1 0 0 0 0 0 0 0
0 0 0
vni-0/301 4 ServiceProvider-Control-VR UCPE-MGMT2 0 0 0 0 0 0 0
0 0 0
vni-0/301.0 4 ServiceProvider-Control-VR UCPE-MGMT2 0 0 0 0 0 0 0
0 0 0
vni-0/302 2 Customer1-LAN-VR UCPE-PORT1 0 0 0 0 0 0 0 0
0 0
vni-0/302.0 2 Customer1-LAN-VR UCPE-PORT1 0 0 0 0 0 0 0 0
0 0
vni-0/303 2 Customer1-LAN-VR UCPE-PORT2 0 0 0 0 0 0 0 0
0 0
vni-0/303.0 2 Customer1-LAN-VR UCPE-PORT2 0 0 0 0 0 0 0 0
0 0
vni-0/304 4 ServiceProvider-Control-VR UCPE-PORT3 0 0 0 0 0 0 0 0
0 0
vni-0/304.0 4 ServiceProvider-Control-VR UCPE-PORT3 0 0 0 0 0 0
0 0 0
vni-0/305 4 ServiceProvider-Control-VR UCPE-PORT4 0 0 0 0 0 0 0 0
0 0
vni-0/305.0 4 ServiceProvider-Control-VR UCPE-PORT4 0 0 0 0 0 0
0 0 0
vni-0/306 0 UCPE-PORT5 0 0 0 0 0 0 0 0
```

|           |   |            |   |   |   |   |   |   |   |   |   |
|-----------|---|------------|---|---|---|---|---|---|---|---|---|
| vni-0/307 | 0 | UCPE-PORT6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| vni-0/308 | 0 | UCPE-PORT7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| vni-0/309 | 0 | UCPE-PORT8 | 0 | 0 | 0 | 0 | 0 | 0 |   |   |   |

## Create a Vendor Catalog

To create a third-party VNF to the VOS vendor catalog:

1. In Director view, select the Administration tab in the top menu bar.
2. Select Inventory > uCPE > Vendor Catalog in the left menu bar.



3. Click + Add to create a new vendor catalog. In the Image popup window, enter information for the following fields.

Image

Vendor Catalog

Name \*

Vendor \*

Fortinet

Manage Vendors

Product \*

---Please Select---

Description

Manage Products

Version

VNF Image

File Type \*

qcow2

☐ Compressed

Choose File

N...n

VNF Flavor

Memory (MB)

Disc Size (GB)

CPU Count

☐ Secondary Disk Needed (GB)

OK

Cancel

[https://docs.versa-networks.com/Secure\\_SD-WAN/01\\_Configuration\\_from\\_Director/Common\\_Configuration/Configure\\_uCPE...](https://docs.versa-networks.com/Secure_SD-WAN/01_Configuration_from_Director/Common_Configuration/Configure_uCPE...)


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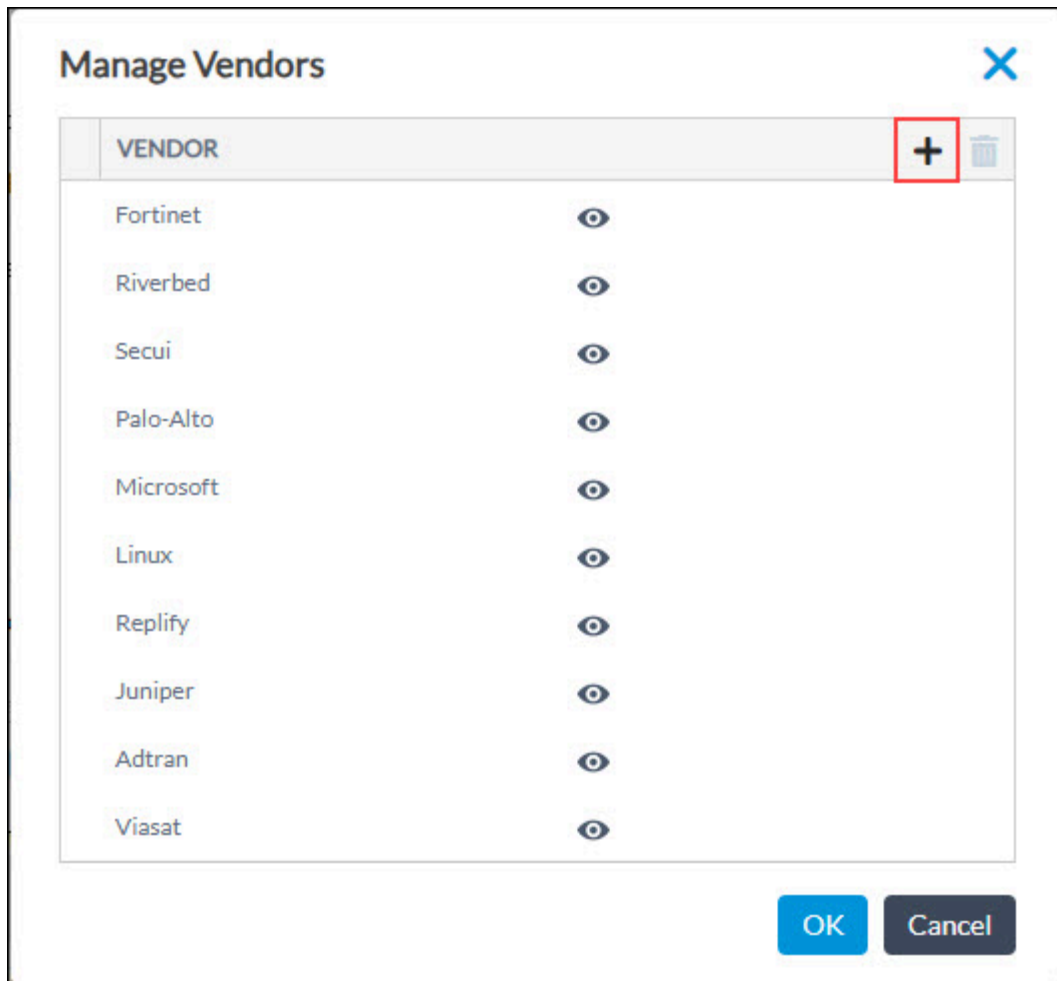
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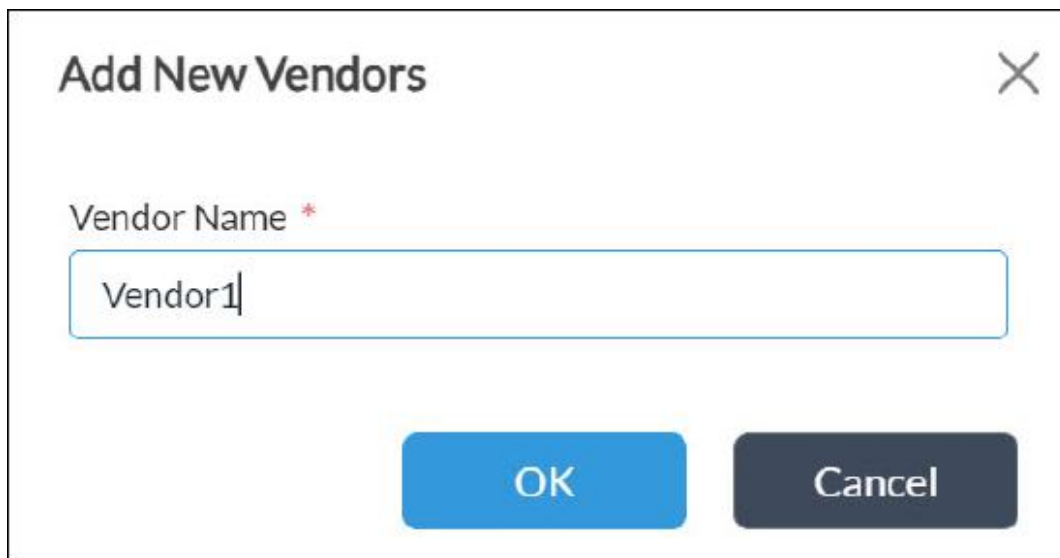
| Field                            | Description  |
|----------------------------------|--|
| Vendor Catalog (Group of Fields) |  |
| ◦ Name                           | Enter a name for the uCPE that you are adding to the VOS device  |
| ◦ Vendor                         | <p>Select the supported vendor:</p> <ul style="list-style-type: none"> <li>◦ Fortinet</li> <li>◦ Riverbed</li> <li>◦ Secui</li> <li>◦ Palo Alto</li> <li>◦ Microsoft</li> <li>◦ Linux</li> <li>◦ Replify</li> <li>◦ Juniper</li> <li>◦ Adtran</li> <li>◦ Viasat</li> </ul> |
| ◦ Manage Vendors                 | Click to create a vendor. For more information, see Steps 3 through 5.   |
| ◦ Product                        | Select the vendor's product.   |
| ◦ Description                    | Enter a description for the uCPE.  |
| ◦ Manage Products                | Click to create a product for a vendor. For more information, see Step 6.  |
| ◦ Version                        | Enter the uCPE version for the vendor.   |
| VNF Image (Group of Fields)      |  |
| ◦ File Type                      | Select the VNF image file type. Currently, only qcow2 file type is supported.  |
| ◦ Choose File                    | Select the qcow2 file to upload.   |
| ◦ Compressed                     | Click if the file needs to be compressed. When selected, Director compresses and saves the file in the directory. When Director pushes the image to VOS, it transfers the compressed file into the CPE and decompresses the file before starting the uCPE                  |

| Field                        | Description  |
|------------------------------|--|
|                              | VNF creation task.   |
| VNF Flavor (Group of Fields) |  |
| ◦ Memory                     | Enter the memory capacity of the product, in megabytes (MB).     |
| ◦ Disk Size                  | Enter the disk size available in the product, in gigabytes (GB). |
| ◦ CPU Count                  | Enter the number of CPUs available in the product.               |
| ◦ Secondary Disk Needed      | Click if an additional disk is required, in gigabytes (GB).      |

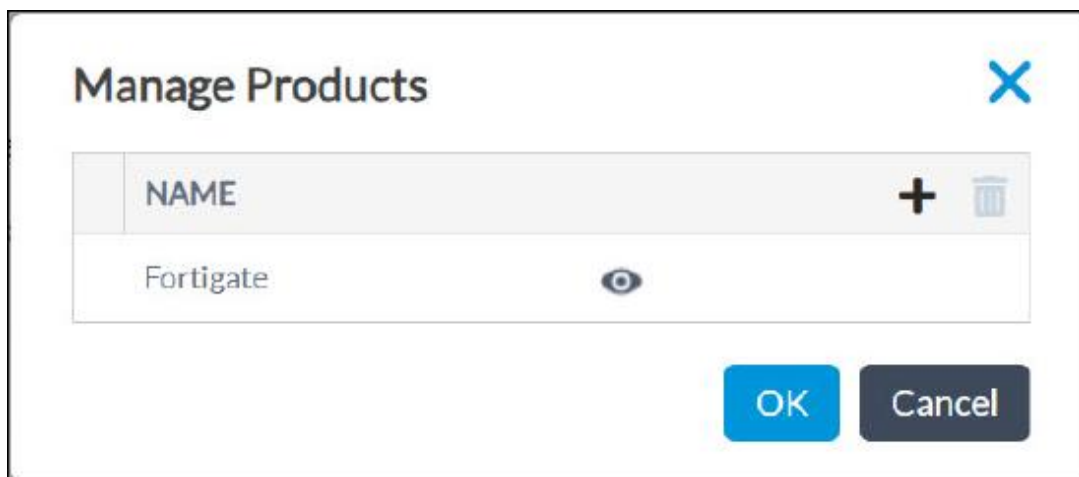
- To create a new vendor, click Manage Vendors under Vendor. In the Manage Vendors popup window, click the  icon.



4. In the Add New Vendors popup window, enter vendor name and click OK.




5. To create a vendor product, click Manage Products under Product. In the Manage Products popup window, click the **+** icon.



5. In the Add New Product popup window, enter information for the following fields.




Add New Product


Product Name \*

Details

Service Function \*

---Please Select---


Memory (MB) \*

CPU Count \*

Disk Size (GB) \*

☐ Secondary Disk

OK

Cancel

| Field            | Description  |
|------------------|--|
| Product Name     | Enter a name for the product.  |
| Details          | Enter product details.   |
| Service Function | Select the type of product: <ul style="list-style-type: none"> <li>Firewall</li> </ul> |

| Field          | Description   |
|----------------|---|
|                | <ul style="list-style-type: none"> <li>◦ Next-generation firewall</li> <li>◦ WAN optimizer</li> <li>◦ Others</li> </ul> |
| Memory         | Enter the memory capacity of the product, in megabytes (MB).  |
| CPU Count      | Enter the number of CPUs available in the product.  |
| Disk Size      | Enter the disk size available in the product, in gigabytes (GB).  |
| Secondary Disk | Click if an additional disk is required.  |

7. Click OK.


## Create a Cloud Profile

*For Releases 20.2 and later.*

When a VM or guest VNF instantiates, you can push the configuration to the VM using a cloud profile. To create a cloud-init file, you upload a file that contains either user-specific or custom data that defines the common configuration tasks to perform when the guest VNF instantiates.

The qcow2 image brings up a guest VNF, and the cloud-init profile configures the VNF when it instantiates.

To create a cloud-init profile:

1. Create a file that contains the user or custom data, and save the file on a local host.
2. In Director view, select the Administration tab in the top menu bar.
3. Select Inventory > uCPE > Cloud Profile in the left menu bar.
4. Click the  Add icon. In the Create Cloud Profile popup window, enter information for the following fields.

Create Cloud Profile

Name \*

Description

Organization \*

---Please Select---

File

Choose File

No file chosen

OK

Cancel

| Field        | Description   |
|--------------|---|
| Name         | Enter a name for the cloud-init profile.  |
| Description  | Enter a text description for the cloud-init profile.                                  |
| Organization | Select the organization to which the profile belongs.                                 |
| File         | Select the file on your local system that contains the user or custom data to upload. |

- Click Ok. The main pane displays the cloud profile.

## Create a Service-Chain Template

You use service-chain templates to onboard third-party VNFs into the uCPE device and then to create a workflow that chains the VNFs in an ordered fashion. You can select third-party VNFs from the catalog and chain them. This workflow creates a service-chain service template, which you can associate with a uCPE device template.

You create a service-chain template for a specific VNF. When you push this template to the device, the VNF on the uCPE device is instantiated.

Releases 21.1.1 and later support multiple tenants and multiple VRFs. You can service-chain selected VNFs to multiple


[https://docs.versa-networks.com/Secure\\_SD-WAN/01\\_Configuration\\_from\\_Director/Common\\_Configuration/Configure\\_uCPE...](https://docs.versa-networks.com/Secure_SD-WAN/01_Configuration_from_Director/Common_Configuration/Configure_uCPE...)

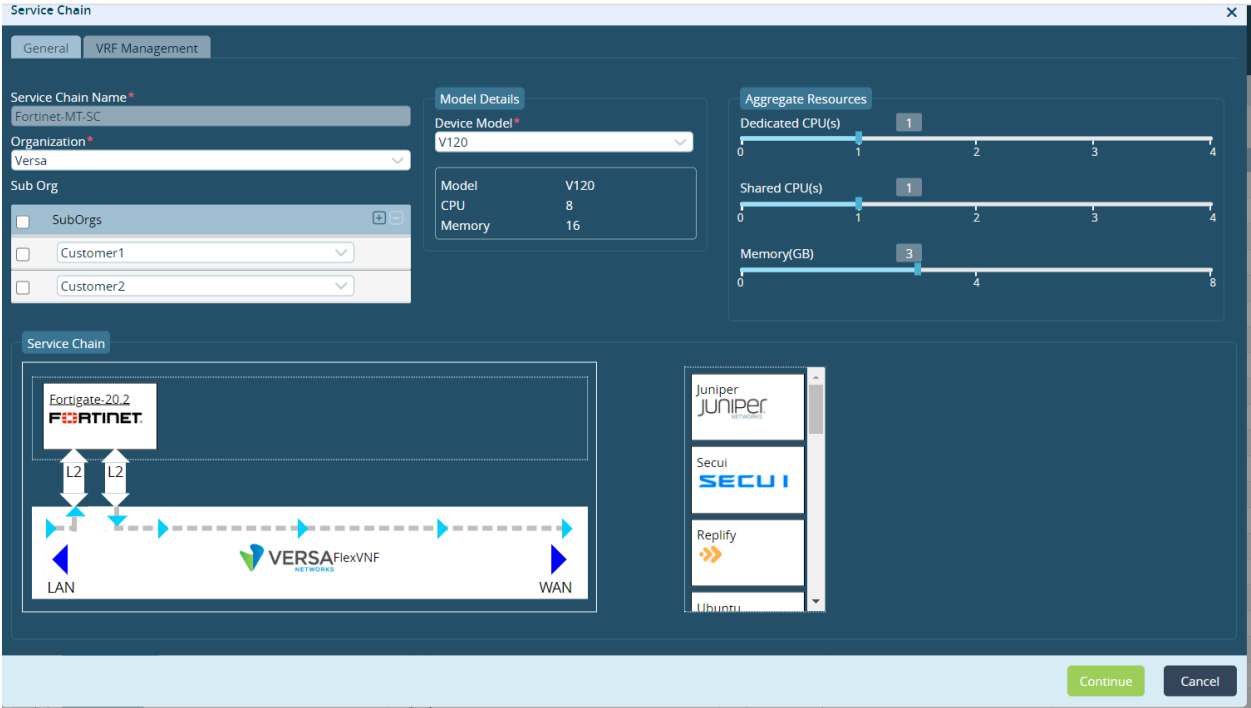
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VRFs with different VLAN-based subinterfaces that you have created on both the VOS device and the VNF. You configure each VLAN data subinterface under the selected VRF.


To configure a VOS service-chain template:

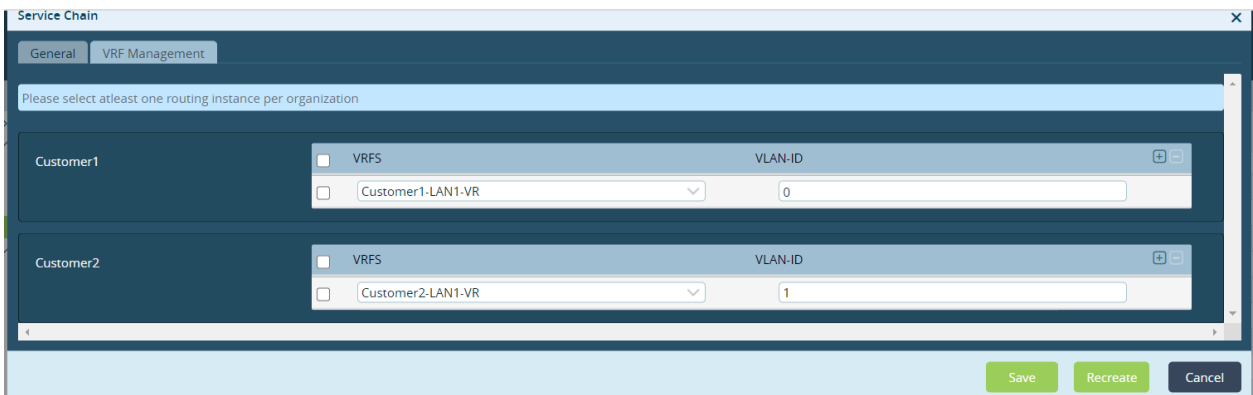
1. In Director view, select the Workflows tab in the top menu bar.
2. Select Template > Service Chains in the left menu bar.
3. For Releases 21.1.1 and later, create the service chain and then continue with Step 5. For Releases 21.1.0 and earlier, skip to Step 4.
  - a. Click the  Add icon to create a new service chain.
  - b. In the Service Chain popup window, select the General tab, and enter information for the following fields. Note that the screenshot here shows an example configuration for a device that is running multiple organizations, and it shows the provider organization and service-chain VNFs for the selected suborganization. (If a device is running only one organization, skip to Step 3d.)



| Field                         | Description   |
|-------------------------------|---|
| Service Chain Name (Required) | Enter a name for the service chain.   |
| Model Details (Required)      | Select the device model. When you select a model, the Aggregated Resources group of fields display detail about the model's resources, such as CPU and memory capacity. The total resources available for the device model define the CPU and |


| Field  | Description  |
|--|--|
|  | memory you can reserve for the guest VNFs.   |
| Aggregate Resources (Group of Fields)                            |  |
| <ul style="list-style-type: none"> <li>Dedicated CPUs</li> </ul> | Enter the number of CPUs to allocate as dedicated and shared. For example, if four CPUs are available, you can have two be dedicated CPUs and two be shared CPUs. If you change the number to three dedicated CPUs, the scroll bar for shared CPUs automatically adjusts to 1. |
| <ul style="list-style-type: none"> <li>Memory</li> </ul>         | Enter the amount of memory to allocate.  |
| Organization   | Select the provider organization to which the service chain belongs.   |
| Suborganization (Table)  | If the device is running a service provider and multiple suborganizations, select the organizations to service-chain to the VNFs.  |
| Service Chain  | Select the guest VNF from the vendor catalog listed on the right side, and drag and drop it to the Versa FlexVNF (VOS device) box. This configuration chains the third-party VNF to the VOS device.  |

- c. Select the VRF Management tab. The left column lists all the suborganizations that you selected in the General tab. For each suborganization, select at least one VRF per tenant, ensuring that the VLAN IDs are unique across all the VRFs. Service-chain workflows create subinterfaces based on the VLAN ID, and they associate these subinterfaces with the VRFs. For proper data-traffic communication, you must also configure the same set of subinterfaces in the VNFs. To add VRFs, click the  Add icon and select the VRF from the drop-down. Then, continue with Step 5.




- d. If the device is running only one organization, when you Select the General tab in the Service Chain popup window, a screen similar to the following displays. Select the organization in the Organization drop-down, and configure the fields, as described in Step 3b. However, do not select any suborganizations.

The screenshot shows the 'Service Chain' configuration window with the 'General' tab selected. The 'Service Chain Name' is 'Fortinet-SC'. The 'Organization' is 'Customer1'. The 'Sub Orgs' section is empty. The 'Model Details' section shows 'Device Model' as 'V120', 'CPU' as '8', and 'Memory' as '16'. The 'Aggregate Resources' section has three sliders: 'Dedicated CPU(s)' set to 1, 'Shared CPU(s)' set to 1, and 'Memory(GB)' set to 3. The 'Service Chain' diagram shows a Fortinet device connected to a VersaFlexVNF device via L2 interfaces, with LAN and WAN ports. A list of providers is shown on the right: Juniper, Securi, Replify, and Ubuntu. The 'Continue' and 'Cancel' buttons are at the bottom right.

- e. Select the VRF Management tab. Because the device is running only one organization, the left column lists only that organization. For the organization, select one or more VRFs, ensuring that each VRF has a unique VLAN IDs. Service-chain workflows create subinterfaces based on the VLAN ID, and they associate these subinterfaces with the VRFs. To add VRFs, click the  Add icon and select the VRF from the drop-down. Note, however, that in most cases, you can select only one VRF with VLAN ID 0, which is a non-tagged interface between the VOS device and the VNF.

The screenshot shows the 'Service Chain' configuration window with the 'VRF Management' tab selected. A message at the top says 'Please select atleast one routing instance per organization'. Below this, there is a table with columns for 'VRFs' and 'VLAN-ID'. The 'VRFs' column has a dropdown menu showing 'Customer1-LAN1-VR'. The 'VLAN-ID' column has a text input field with '0'. The 'Save', 'Recreate', and 'Cancel' buttons are at the bottom right.

4. For Releases 21.1.0 and earlier, create the service chain, and then continue with Step 5:

- a. Click the  Add icon to create a new service chain.
- b. In the Service Chain popup window, enter information for the following fields.

[https://docs.versa-networks.com/Secure\\_SD-WAN/01\\_Configuration\\_from\\_Director/Common\\_Configuration/Configure\\_uCPE...](https://docs.versa-networks.com/Secure_SD-WAN/01_Configuration_from_Director/Common_Configuration/Configure_uCPE...)

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Service Chain Name \*

Organization \*

Please select one

Sub Org

Please select one

Routing Instance \*

Please select one

Model Details

Device Model

Please select one

Model

CPU 8

Memory 16

Aggregate Resources

Dedicated CPU(s)

Shared CPU(s)

Memory(GB)

Service Chain

Riverbed

riverbed

L2

L2

LAN

WAN

VERSANETWORKS

FlexVNF

Fortigate-20-2

FORTINET

JuniperVSRX

JUNIPER

MC-Windows

Windows

Secui

SECUI

Save

Create

Cancel

| Field  | Description   |
|--|---|
| Service Chain Name (Required)                                  | Enter a name for the service chain.   |
| Organization (Required)  | Select the organization to which the service chain belongs.   |
| Suborganization  | Select the suborganization to which the service chain belongs. The values in the drop-down list depend on the organization you select.  |
| Routing Instance   | Select the routing instance to use for the service chain instance.  |
| Model Details (Group of Fields)                                |   |
| <ul style="list-style-type: none"> <li>Device Model</li> </ul> | Select the device model. When you select a model, the Aggregated Resources group of fields displays details about the model's resources, such as CPU and memory capacity. The total resources |

| Field   | Description  |
|---|--|
|   | available for the device model define the CPU and memory that you can reserve for the guest VNFs.  |
| Aggregated Resources<br>(Group of Fields)   | Displays the total available CPU and memory resources. You can distribute the total available CPUs as either dedicated or shared CPUs.   |
| <ul style="list-style-type: none"> <li>▪ Dedicated CPUs</li> <li>▪ Shared CPUs</li> </ul> | Enter the number of CPUs to allocate as dedicated and shared. For example, if four CPUs are available, you can have two be dedicated CPUs and two be shared CPUs. If you change the number to three dedicated CPUs, the scroll bar for shared CPUs automatically adjusts to 1. |
| Service Chain   | Select the guest VNF from the vendor catalog listed on the right side, and drag and drop it to the Versa FlexVNF (VOS device) box. This configuration chains the third-party VNF to the VOS device.  |

5. Click the vendor box in the Service Chain popup window to modify the configuration of the guest VNF (uCPE) configuration. In the VNF Attributes popup window, enter information for the following fields.



VNF Attributes

Instance Name

Fortigate-20-2

Memory(MB)

1024

Secondary Disk Size

0

CPU Mappings

Exclusive CPU

CPU Count

1

Options

Auxiliary Interface

☐

Bypass On Fail

☒

Health Monitor

☒

Service Chain Type

Layer 2

Layer 3

User Data

FT-UserData

Custom Data

☒

File Name

File Location

FT-Test-Data-May2

/content/0000

Save

Cancel

| Field                     | Description   |
|---------------------------|---|
| Instance Name             | Enter a name for the instance.  |
| Memory                    | Enter the amount of memory to allocated to the VNF, in megabytes (MB).  |
| Secondary Disk Size       | Enter the size of the guest VNF's secondary disk, in megabytes (MB).  |
| CPU Mappings              | <p>Select the CPU mapping category, which is used to determine the number of CPUs to allocate for the guest VNF from the available host CPU:</p> <ul style="list-style-type: none"> <li>◦ Exclusive—Enter the number of CPUs to dedicate to the guest VNF.</li> <li>◦ Manual—Enter the CPUs to allocate for the guest VNF. Here, you map the physical core to the VNF core.</li> <li>◦ Shared—Enter the number of CPUs that the guest VNF can use. Also, if required, other guest VNFs can share the CPUs. This value is taken from the Shared CPU from the Aggregate Resources field.</li> </ul> |
| CPU Count                 | Select the number of CPUs. The number of available CPUs depends on the CPU mapping you select, and they are derived from the allocation done in Aggregate Resources field.  |
| Options (Group of Fields) |   |
| ◦ Auxiliary Interface     | Click if the VNF requires secondary management interface.   |
| ◦ Bypass On Fail          | Click to monitor the data path in the VNF. If the VNF fails to process the traffic, data traffic bypasses the VNF when the VNF is in the shutdown state.  |
| ◦ Health Monitor          | Click to run ICMP ping to the management interface of the VNF. The VOS devices generates an alarm to state whether the guest VNF is up or down.   |
| Service Chain Type        | <p>Select the service chain type:</p> <ul style="list-style-type: none"> <li>◦ Layer 2</li> <li>◦ Layer 3</li> </ul>  |

|             |  |
|-------------|--|
| User Data   | Select the user data file that contains the configuration. The drop-down list displays the files that you uploaded when you created the cloud-init file. You can select the user data file only for a particular organization.   |
| Custom Data | <p>Select the custom data file that contains configuration details. The drop-down list displays the files that you uploaded when you created the cloud-init file.</p> <p>The data in the file must be in a format that the VNF can interpret. For example, for Fortinet, you can use this setting to import the license key file. For Fortinet to interpret the license, the file format in the VNF must be specific for Fortinet.</p> |

6. Click Save to update the guest VNF configuration.
7. Click Save and Deploy to commit the service chaining of the third-party VNFs on the VOS device.

For a single-tenant scenario, the service-chain template that you create is for a single customer tenant only. Here, it is the customer tenant that performs communication management, and the management plane for the VMs and the DHCP server belong to the customer tenant.

To configure a service-chain template for a single-tenant deployment, enter the following information in the fields in the Service Chain popup window, as illustrated below for Releases 21.1.0 and earlier. The Service Chain popup window for Releases 21.1.1 and later is shown in Step 3d, above.

- In the Service Chain Name field, enter the name of the customer tenant service chain.
- In the Organization field, select the name of the customer tenant.
- Leave the Suborganization field empty.
- In the Routing Instance field, select the routing instance for the customer tenant's LAN VRs.

In a multitenant scenario, the service-chain template that you create belongs to the provider organization and is for the provider and the customer tenant. In this scenario, the provider performs communication management, and the management plane for the VMs and the DHCP server belong to the provider.

To configure a service-chain template for a multitenant deployment, enter the following information in the fields in the Service Chain popup window, as illustrated below for Releases 21.1.0 and earlier. The Service Chain popup window for Releases 21.1.1 and later is shown in Step 3d, above.

- In the Service Chain Name field, enter the name of the provider service chain.
- In the Organization field, select the name of the provider.
- In the Suborganization field, select the customer tenant.
- In the Routing Instance field, select the routing instance for the customer tenant's LAN VRs.

Service Chain Name\*

Fortigate-20-2-SC

Organization\*

Provider

Sub Org

Customer2

Routing Instance\*

Customer2-LAN1-VR

Model Details

Device Model\*

V120

Model

V120

CPU

8

Memory

16

Aggregate Resources

Dedicated CPU(s)

0 1 2 3 4

2

Shared CPU(s)

0 1 2 3 4

Memory(GB)

0 4 8

2

Service Chain

Fortigate-20-2

FORTINET

L2

L2

LAN

WAN

VERSA

FlexVNF

JuniperVSRX

JUNIPER

Replify

PaloAlto

paloalto

Fortinet

FORTINET

Save

Recreate

Cancel

## Associate a Service-Chain Template with a Device Template

To chain a network service with the VOS device:

1. In Director view, select the Configuration tab in the top menu bar.
2. Select Devices > Device Groups in the horizontal menu bar.
3. Select the name of a device group in the main pane. The Edit Device Group popup window displays, and the Post-Staging Template Association tab lists all the post-staging templates associated with the device group.

Edit Device Group

×

Name\*

New-MT-DG

Description

Tags

Organization\*

Provider

☐ Enable Two Factor Auth
 ☐ CA In Data Center

Staging Template

Select

Post Staging Template

uCPE-MT

General

Select

Contact Information

Email

Phone

▼

(201) 555-5555

Post Staging Template Association(5)

Devices(2)

URL Based ZTP


1

25

| Tenant    | Category  | Template             |
|-----------|-----------|----------------------|
| Provider  | Main      | uCPE-MT              |
| Provider  | DataStore | Provider-DataStore   |
| Customer2 | DataStore | Customer2-DataStore  |
| Provider  | general   | Provider-NFV-General |
| Provider  | uCPE      | Fortigate-20-2-SC    |

OK

Cancel

- Click the  Edit Post Staging Template Association icon to edit the post-staging templates. The Edit Post-Staging Template Association popup window displays.

**Edit Post Staging Template Association**

To arrange the order of the templates, drag the row or select a template and click on the arrow icons.

| Tenant                                | Category  | Template                 |
|---------------------------------------|-----------|--------------------------|
| <input type="checkbox"/> provider-org | Main      | Multi_Tenant_PostStaging |
| <input type="checkbox"/> provider-org | DataStore | provider-org-DataStore   |
| <input type="checkbox"/> Tenant1      | DataStore | Tenant1-DataStore        |
| <input type="checkbox"/> Tenant2      | DataStore | Tenant2-DataStore        |
| <input type="checkbox"/> Tenant3      | DataStore | Tenant3-DataStore        |
| <input type="checkbox"/> Tenant4      | DataStore | Tenant4-DataStore        |
| <input type="checkbox"/> Tenant5      | DataStore | Tenant5-DataStore        |
| <input type="checkbox"/> Tenant6      | DataStore | Tenant6-DataStore        |
| <input type="checkbox"/> Tenant7      | DataStore | Tenant7-DataStore        |
| <input type="checkbox"/> Tenant8      | DataStore | Tenant8-DataStore        |
| <input type="checkbox"/> Tenant9      | DataStore | Tenant9-DataStore        |
| <input type="checkbox"/> Tenant10     | DataStore | Tenant10-DataStore       |

OK Cancel

- Click the  Add icon. In the Add Post-Stating Template Association popup window, enter information for the following fields.

**Add Post Staging Template Association**

Tenant\*  Category\*  Template\*

OK Cancel

| Field     | Description           |
|-----------|-----------------------|
| Tenant    | Select the tenant.    |
| Category  | Select Service Chain. |
| Templates | Select the Template.  |

- Click OK. The Edit Post-Staging Template Association popup window lists the new service template.

| Tenant    | Category  | Template            |
|-----------|-----------|---------------------|
| Provider  | Main      | BranchHub2          |
| Provider  | DataStore | Provider-DataStore  |
| Customer1 | DataStore | Customer1-DataStore |
| Customer2 | DataStore | Customer2-DataStore |
| Customer3 | DataStore | Customer3-DataStore |
| Provider  | uCPE      | Riverbed-SC         |

7. Click OK.

## Add a uCPE Device to a Device Template

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 to add a device to the device template. The Add Device popup window displays.
4. In the Basic tab, enter information for the following fields.

Basic | Location Information | Bind Data

Name\*

Branch-UCPE

Global Device ID\*

115

Organization\*

Provider

Deployment Type

CPE-Baremetal Device

Serial Number

LSA18976539

Device Groups\*

New-MT-DG

+Device Group

Admin Contact Information

Email

Phone Number

(201) 555-5555

Subscription

Service Bandwidth

Aggregate Bandwidth

Cancel

Save

Continue

| Field            | Description  |
|------------------|--|
| Name             | Name of the device.  |
| Global Device ID | Global device ID of the device. The next available global ID number is appears automatically. You can change this number up to 16383, as needed. |
| Organization     | Organization to associate with the device  |
| Device Groups    | Name of the device group to add the device to.   |

5. In the Local Information tab, enter the address and geographical coordinates of the device.

[https://docs.versa-networks.com/Secure\\_SD-WAN/01\\_Configuration\\_from\\_Director/Common\\_Configuration/Configure\\_uCPE...](https://docs.versa-networks.com/Secure_SD-WAN/01_Configuration_from_Director/Common_Configuration/Configure_uCPE...)

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**Add Device**

Basic | Location Information | Bind Data

**Location**

Address 1:  Address 2:

City:  State:  Country:  Zip:

Latitude:  e.g. 45.781111 Longitude:  e.g. 145.781111

- In the Bind Data tab, select the User Input tab.

**Add Device**

Basic | Location Information | Bind Data

User Input | Auto-Generated

**Post Staging Template - uCPE-MT**

| Serial                      | Device Name | Customer2_dhcp_options_LAN2_DNS_Server__dhcpOptionsDnsServer | Customer2_LAN-PO |
|-----------------------------|-------------|--|------------------|
| <a href="#">LSA18976539</a> | Branch-UCPE | 8.8.8.8  | 192.168.15.2     |

**Service Template Variable** Template : uCPE-MT Device Group : New-MT-DG

Service Templates :

User Input | Auto-Generated

|                          | Serial | Device Name | DHCP                                      |   |
|--------------------------|--------|-------------|---|---|
| <input type="checkbox"/> |        |             | uCPE-MgmtIntf_Pool_Range_Begin_IP_apRa... | uCPE-MgmtIntf_Pool_Range_End_IP_apRa... |
| <input type="checkbox"/> |        | Branch-UCPE | 172.25.5.2                                | 172.25.5.5                              |

- In the Post-Staging Template tab, select the bind data values.
- In the Service Template Variable tab, select the template from the Service Templates drop-down list. Then enter DHCP information for the device.
- Click Validate Template.
- Click Save to add the device to the device template, or click Deploy to add the device to the device template and to activate the device.

---

## Onboard a uCPE using ZTP

To onboard a uCPE device, you use ZTP, as described in [Use URL-Based ZTP To Activate a VOS Device](#). During the ZTP process, the Director node copies the user data or custom data files to the uCPE device if you configure these in the template.

After the uCPE device is up, the Controller sends the post-staging notification to Versa Director. Versa Director then checks whether the qcow2 software image file is present in the /home/versa/images directory on the uCPE device. If this file is not present, Versa Director copies the file to the uCPE device. It then issues the command to start the uCPE device.

---

## Associate the Service-Chain Template with the uCPE

When you onboard the uCPE device using ZTP, no service-chain template is associated with the uCPE. To associate the service-chain template with the uCPE device:

1. Create service-chain templates for specific VOS devices.
2. Attach the service-chain template to the device group, and enter the bind-data in the device workflows.
3. Associate the template with the device on the Commit popup window.

For Releases 20.2 and later, you can allocate dedicated CPU and memory resources to the VOS devices from the host resources. To do this, you must reboot the device before you bring up any VMs so that the aggregate VNF resources configuration can take effect. To reboot the device, click the Reboot option on the Commit popup window when you commit the service chain template to the device. If you do not select Reboot, the VOS device does not accept the service chain template configuration.

Commit

Organization\*  
Capital-One
Template
Service Template

Select Template\*  
vaequinuxbranchflex001-Template
☒ Reboot
Auto Merge
Overwrite

Device Groups

|  | Devices                   | Device Type | Template State | Appliance State | Device Modified | Differences | Association |
|--|---------------------------|-------------|----------------|-----------------|-----------------|-------------|-------------|
|  | vaequinuxbranchflex001-DG |             |                |                 |                 |             |             |
|  |                           | Branch      | IN_SYNC        | IN_SYNC         | ✓               |             |             |

OK
Cancel

## Verify the uCPE Configuration

To verify that the uCPE has been created on the VOS device, in Director view, select the Administration tab in the top menu bar and select Appliances in the left menu bar. The dashboard lists the devices configured on the VOS device. Check that the uCPE is listed.

Monitor
Configuration
Workflows
Administration
Analytics

Organizations
Appliances
Connectors
System
Notification Config...
Entitlement Manager
Director User Mana...
Inventory
SDWAN

Total Appliances : 5

Search

|                          | Name                        | Mgmt. Address | Type       | Service Start ... | Software Version | Site ID | Organizations | Sna... | Status          |              |         |        |
|--------------------------|-----------------------------|---------------|------------|-------------------|------------------|---------|---------------|--------|-----------------|--------------|---------|--------|
|                          |                             |               |            |                   |                  |         |               |        | Config Synch... | Reachabil... | Service | Locked |
| <input type="checkbox"/> | <a href="#">Controller1</a> | 10.40.12.64   | Controller | Tue, Jun 19 2...  | 16.1-R2-S2.3     | 1       | uCPE,Versa    |        | ✓               | ✓            | Up      | 🔒      |
| <input type="checkbox"/> | <a href="#">UCPE-1</a>      | 10.1.192.101  | uCPE       | Tue, Jun 19 2...  | 16.1-R2-S2.3     | 101     | uCPE          |        | ✓               | ✓            | Up      | 🔒      |
| <input type="checkbox"/> | <a href="#">UCPE-2</a>      | 10.1.192.102  | uCPE       | Tue, Jun 19 2...  | 16.1-R2-S2.3     | 102     | uCPE          |        | ✓               | ✓            | Up      | 🔒      |
| <input type="checkbox"/> | <a href="#">UCPE-3</a>      | 10.1.192.103  | uCPE       | Tue, Jun 19 2...  | 16.1-R2-S2.3     | 103     | uCPE          |        | ✓               | ✓            | Up      | 🔒      |
| <input type="checkbox"/> | <a href="#">UCPE-4</a>      | 10.1.192.104  | uCPE       | Wed, Jun 27 2...  | 16.1-R2-S2.3     | 104     | uCPE          |        | ✓               | ✓            | Up      | 🔒      |

## Monitor Service-Chain Instances

To monitor service-chain instances from the Director GUI:


- In Director view, select the Monitor tab.
- Select Devices in the horizontal menu bar.

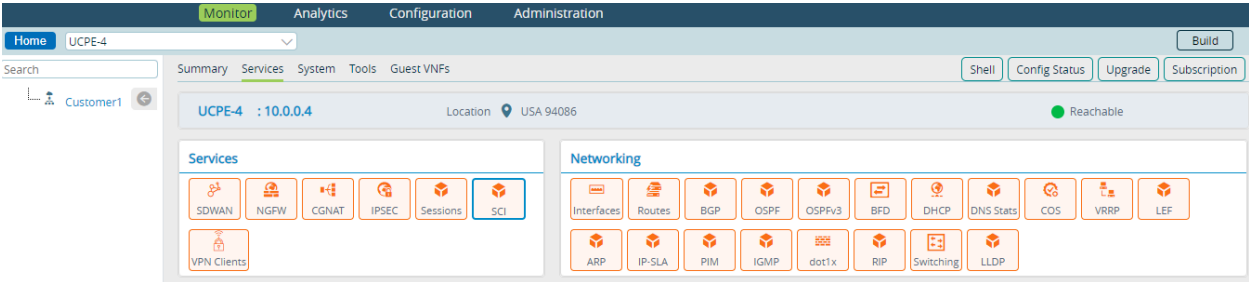
[https://docs.versa-networks.com/Secure\\_SD-WAN/01\\_Configuration\\_from\\_Director/Common\\_Configuration/Configure\\_uCPE...](https://docs.versa-networks.com/Secure_SD-WAN/01_Configuration_from_Director/Common_Configuration/Configure_uCPE...)

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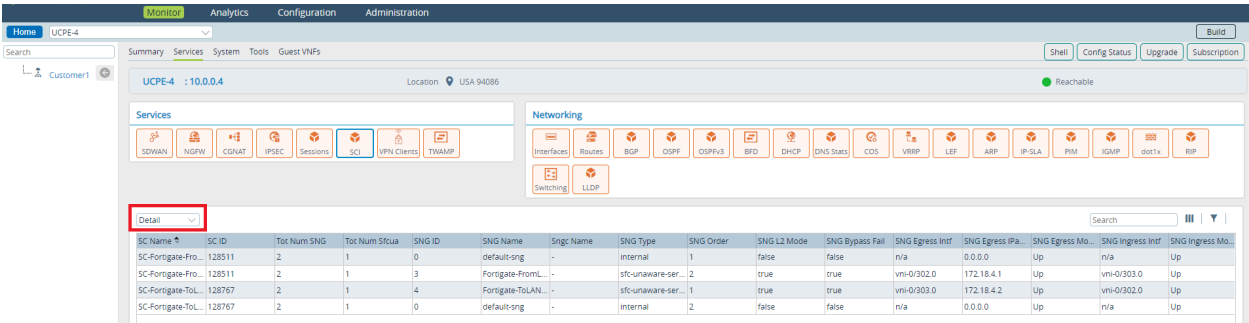
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3. Select a uCPE device in the main pane, and then click Services tab.

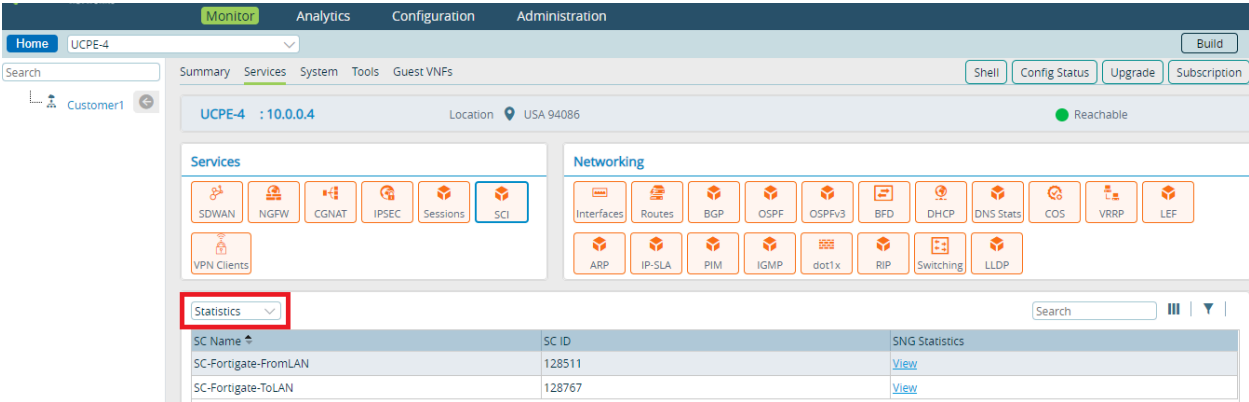
4. In the Services box, select the SCI  tab.



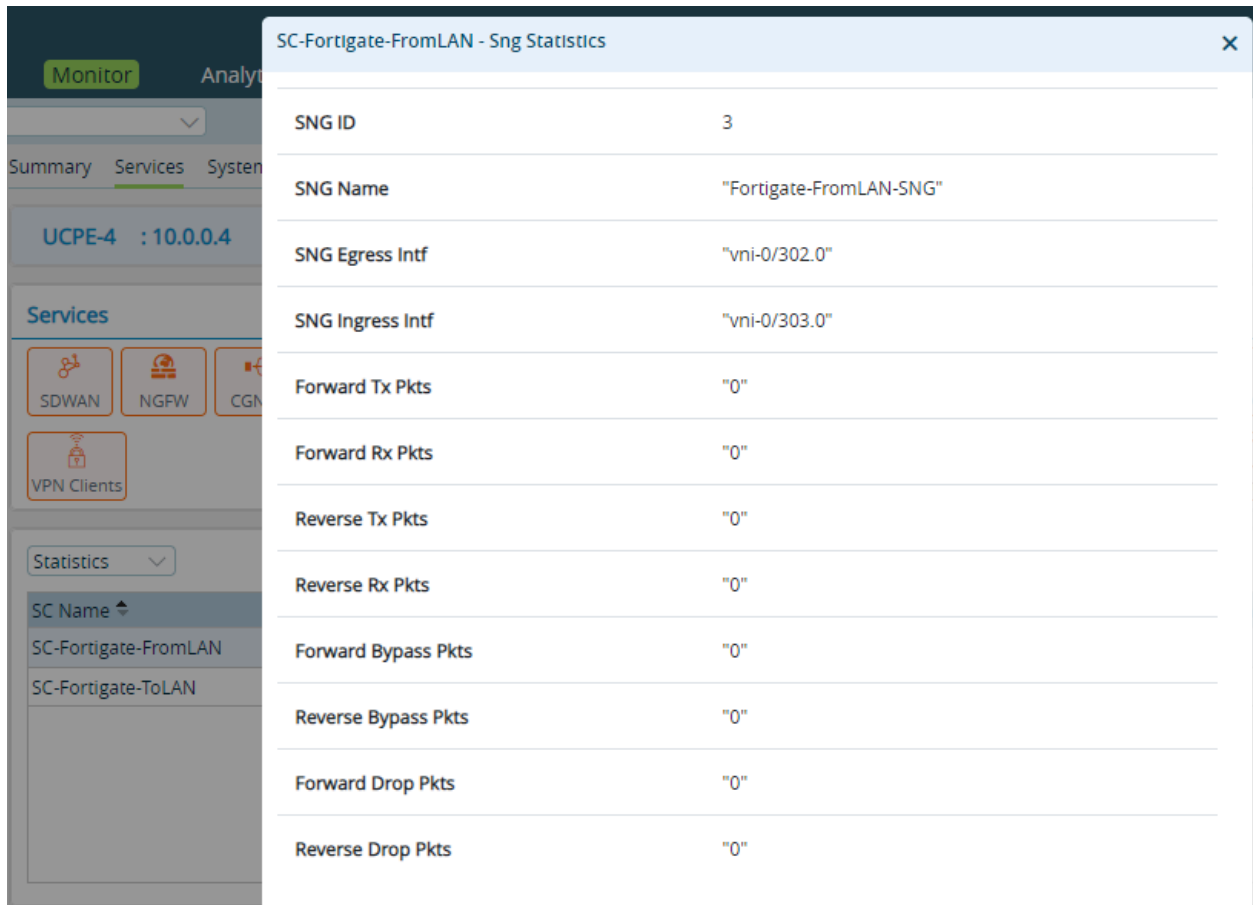
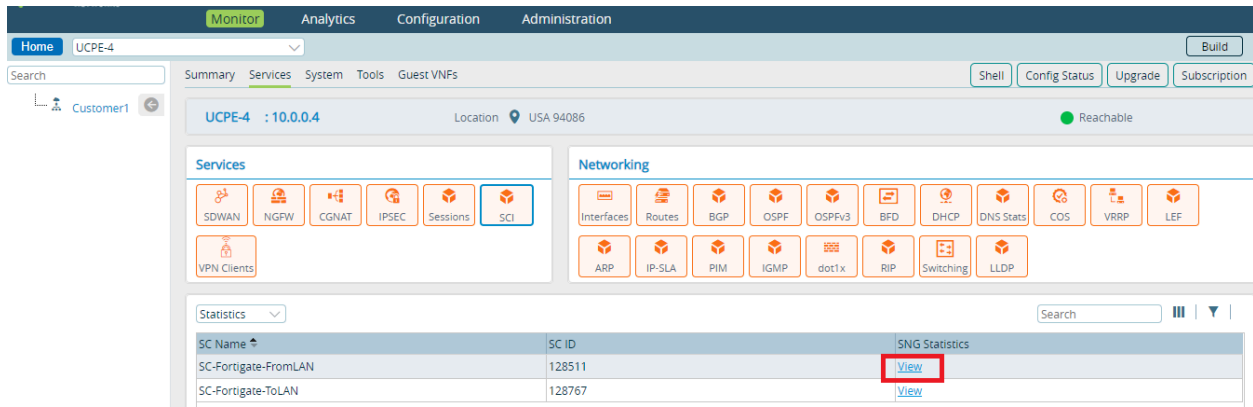
5. Select Detail in the drop-down list to view detailed information about the configuration of the service-chain instances.



6. Select Statistics from the drop-down list to view statistics about the data traffic on the service-chain instances.



7. Click View to display details about the data statistics for an individual service-chain instance.



To monitor service-chain instances from the Director CLI:

1. View brief information about the status of the service-chain instances:

```
admin@uCPE-4-cli> show orgs org-services customer-name service-chain-instances brief
          SNG          SNGC          SESSION
SC NAME    SC ID  ID  SNG NAME          NAME STATUS COUNT
-----
SC-Fortigate-FromLAN 128511 0  default-sng          - Up    -
```

[https://docs.versa-networks.com/Secure\\_SD-WAN/01\\_Configuration\\_from\\_Director/Common\\_Configuration/Configure\\_uCPE...](https://docs.versa-networks.com/Secure_SD-WAN/01_Configuration_from_Director/Common_Configuration/Configure_uCPE...)

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```

3 Fortigate-FromLAN-SNG - Up -
SC-Fortigate-ToLAN 128767 4 Fortigate-ToLAN-SNG - Up -
0 default-sng - Up -

```

2. View detailed information about the status of the service-chain instances, including the configuration of the bypass-on-fail option and the status of the egress and ingress monitors:

```

admin@uCPE-4-cli> show orgs org-services customer-name service-chain-instances detail SC-
Fortigate-FromLAN
Service Chain Details:
Name - SC-Fortigate-FromLAN
ID - 128511
Total SNGs - 2
External SNGs - 1

Service Node Group Details:
default-sng [0]
SNG Type - internal
SNG Order - 1
Cluster - -

Fortigate-FromLAN-SNG [3]
SNG Type - sfc-unaware-service-function
SNG Order - 2
Cluster - -
L2 Mode - true
Bypass on Fail - true
Egress Monitor - Up
Egress Interface - vni-0/302.0 [172.18.4.1]
Ingress Monitor - Up
Ingress Interface - vni-0/303.0 [172.18.4.2]

```

3. View brief statistics about data traffic on the service-chain instances:

```

admin@uCPE-4-cli> show orgs org-services customer-name service-chain-instances stats brief
SNG FWD FWD REV REV FWD REV FWD
REV
SC NAME SC ID ID SNG NAME EGRESS INGRESS TX RX TX RX
BYPASS BYPASS DROPS DROPS
-----
SC-Fortigate-FromLAN 128511 3 Fortigate-FromLAN-SNG vni-0/302.0 vni-0/303.0 1061 1061 1061
1061 0 0 0 0
SC-Fortigate-ToLAN 128767 4 Fortigate-ToLAN-SNG vni-0/303.0 vni-0/302.0 690 690 690 690
0 0 0 0

```

4. View detailed statistics about data traffic for individual service-chain instances:

```

admin@uCPE-4-cli> show orgs org-services customer-name service-chain-instances stats detail
Service Chain Statistics:
Name - SC-Fortigate-FromLAN
ID - 128511
Total SNGs -
External SNGs -

```

#### Service Node Group Statistics:

##### Fortigate-FromLAN-SNG [3]

Forward vni-0/302.0 ==> vni-0/303.0

To VNF From VNF

```
-----
Tx Packets   - 1061      Rx Packets   - 1061
Tx Bytes     - 89124     Rx Bytes     - 89124
Bypass Packets - 0
Bypass Bytes - 0
Drop Packets - 0
Drop Bytes   - 0
```

Reverse vni-0/303.0 ==> vni-0/302.0

To VNF From VNF

```
-----
Tx Packets   - 1061      Rx Packets   - 1061
Tx Bytes     - 89124     Rx Bytes     - 89124
Bypass Packets - 0
Bypass Bytes - 0
Drop Packets - 0
Drop Bytes   - 0
```

#### 5. Display statistics about traffic matching the service filter rules:

admin@uCPE-4-cli> **show orgs org-services** *customer-name* **service-filters default-classifier**

HIT

| CLASSIFIER         | RULE NAME                 | HIT  | COUNT    | LAST HIT |
|--------------------|---------------------------|------|----------|----------|
| default-classifier | ToVM-Mgmt                 | 6    | 00:00:06 |          |
|                    | FromVM-Mgmt               | 7758 | 00:00:45 |          |
|                    | FromVM                    | 0    | -        |          |
|                    | ToVM                      | 0    | -        |          |
|                    | FromLAN-Customer1-LAN1-VR | 10   | 00:00:53 |          |
|                    | ToLAN-Customer1-LAN1-VR   | 7    | 00:00:29 |          |

#### 6. Display brief flow-level service-chain statistics:

admin@uCPE-4-cli> **show orgs org** *customer-name* **sessions brief**

| VSN ID | VSN VID | SESS ID | SOURCE IP   | SOURCE APPLICATION | DESTINATION IP | DESTINATION PORT | PORT | PROTOCOL | NATTED | SDWAN         |
|--------|---------|---------|-------------|--------------------|----------------|------------------|------|----------|--------|---------------|
| 0      | 2       | 34982   | 10.0.0.4    | 10.1.128.1         | 1284           | 1234             | 6    | No       | No     | -             |
| 0      | 2       | 36764   | 172.25.4.2  | 208.91.112.52      | 3187           | 53               | 17   | No       | No     | dns/(predef)  |
| 0      | 2       | 36765   | 172.18.4.1  | 172.18.4.2         | 2696           | 2696             | 1    | No       | No     | -             |
| 0      | 2       | 36792   | 192.168.4.3 | 192.168.3.1        | 6004           | 6004             | 1    | No       | Yes    | icmp/(predef) |
| 0      | 2       | 36793   | 172.25.4.2  | 208.91.112.220     | 3187           | 53               | 17   | No       | No     | -             |
| 0      | 2       | 36795   | 10.0.254.52 | 10.0.255.255       | 137            | 137              | 17   | No       | No     | nbns/(predef) |
| 0      | 2       | 34992   | 192.168.3.3 | 192.168.4.3        | 27284          | 27284            | 1    | No       | Yes    | icmp/(predef) |
| 0      | 2       | 36794   | 10.0.199.36 | 10.0.255.255       | 138            | 138              | 17   | No       | No     | smb/(predef)  |

#### 7. Display detailed flow-level service-chain statistics:

[https://docs.versa-networks.com/Secure\\_SD-WAN/01\\_Configuration\\_from\\_Director/Common\\_Configuration/Configure\\_uCPE...](https://docs.versa-networks.com/Secure_SD-WAN/01_Configuration_from_Director/Common_Configuration/Configure_uCPE...)

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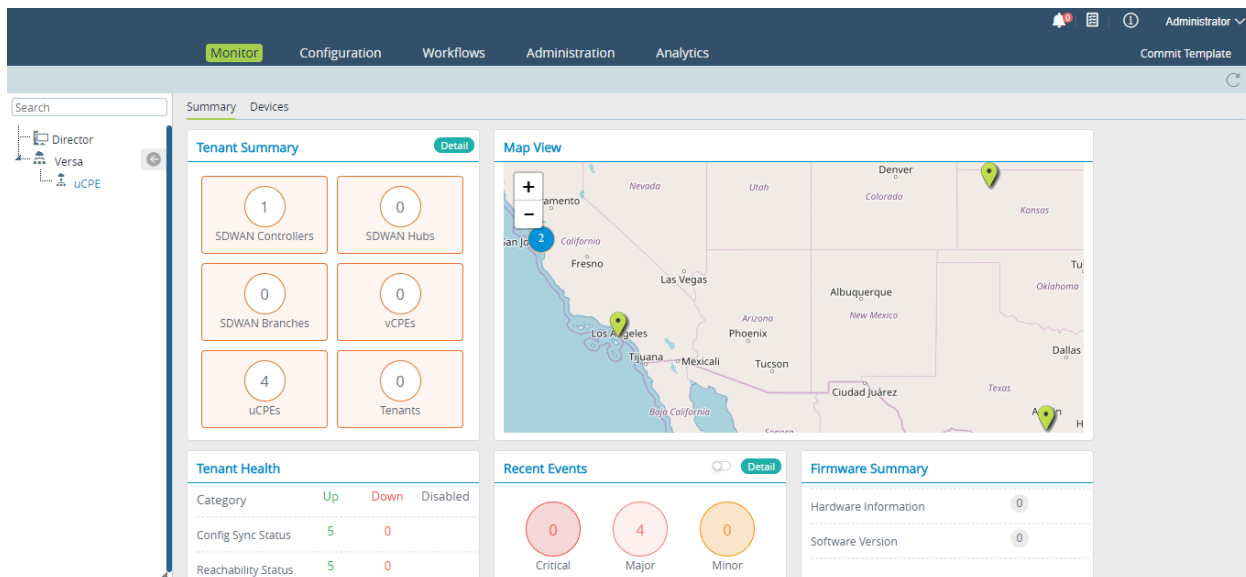
```
admin@uCPE-4-cli> show orgs org customer-name sessions extensive | select source-port 6004 |  
grep sng
```

```
sng-1 sng-name      Fortigate-FromLAN-SNG  
sng-1 forward-tx-pkts 102  
sng-1 forward-tx-bytes 8568  
sng-1 forward-rx-pkts 102  
sng-1 forward-rx-bytes 8568  
sng-1 reverse-tx-pkts 102  
sng-1 reverse-tx-bytes 8568  
sng-1 reverse-rx-pkts 102  
sng-1 reverse-rx-bytes 8568  
sng-1 forward-bypass-pkts 0  
sng-1 forward-bypass-bytes 0  
sng-1 reverse-bypass-pkts 0  
sng-1 reverse-bypass-bytes 0
```

## Monitor the uCPE

To monitor the uCPEs on a VOS device:

1. To view uCPE statistics, in Director view, select the Monitor tab in the top menu bar, and then select Organization > Devices > uCPE in the left menu bar.



2. Add a static route for the VOS device management prefix on the Director node to provide HTTP/HTTPS/SSH access to the Director node so that it can access the VOS devices to gather the information to display on the Monitor screen. These static routes are similar to the static routes configured on the Director node for the VOS device overlay subnet with the same next hop. The connection from the Director node to the VOS management interface is as follows: Director-Southbound ► Controller-Northbound ► Overlay Connection to Branch-Control-VR ► VOS Management. For more information, see [Configure Static Routes](#).
3. To view detailed information about a uCPE, select the Guest VNFs tab in the horizontal menu. The main pane

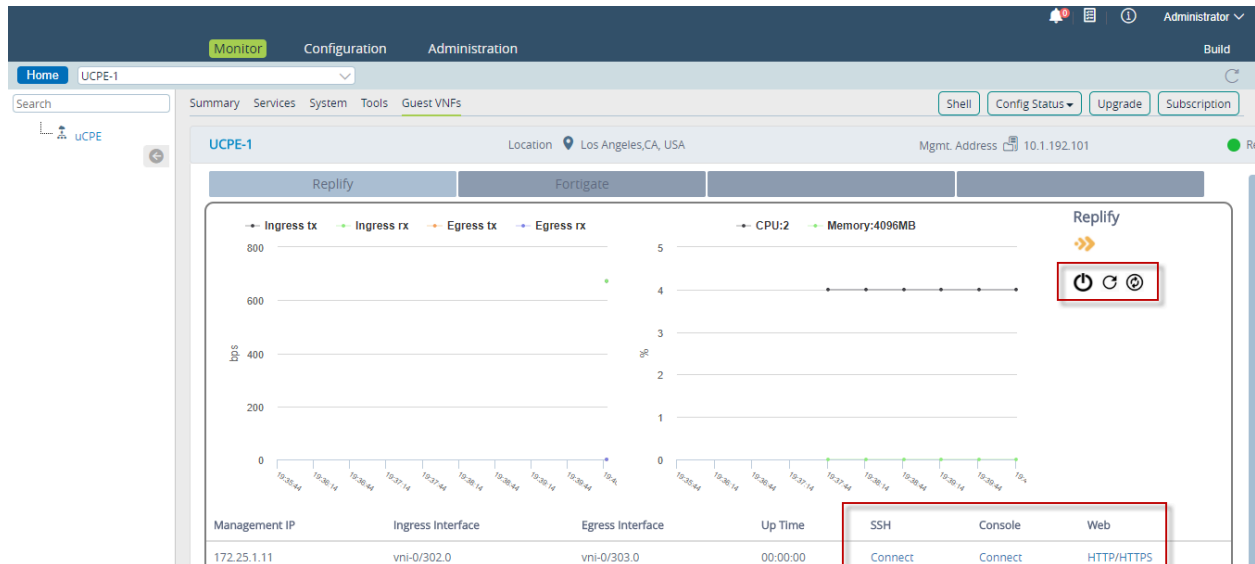
[https://docs.versa-networks.com/Secure\\_SD-WAN/01\\_Configuration\\_from\\_Director/Common\\_Configuration/Configure\\_uCPE...](https://docs.versa-networks.com/Secure_SD-WAN/01_Configuration_from_Director/Common_Configuration/Configure_uCPE...)

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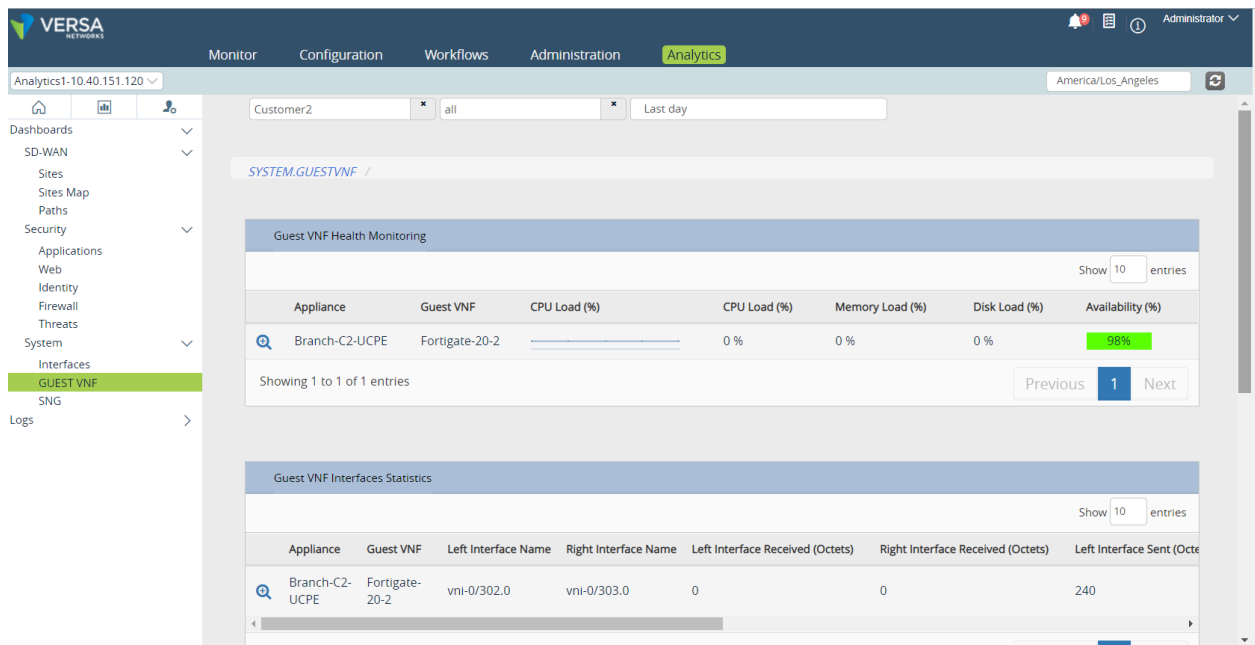
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displays two graphs: CPU and memory usage, in 30-second intervals, and ingress and egress transmit and receive statistics, in 30-second intervals. From the Guest VNFs tab, you can access the guest VNF VMs using SSH, the console, or HTTP/HTTPS. To do so, click the field at the bottom of the screen. For console access, the Director node opens TCP port 6080, and for HTTP and HTTPS it opens port TCP 9090. If your deployment has a firewall in front of the Director node, ensure that these ports are open. For AWS, open these ports in the security group associated with the Director node's management interface.



- To shut down, reset, and reboot the uCPE, and to connect to third-party VNFs using SSH, the console, or HTTP, in Director view, select the Analytics tab from the top menu bar, and then select Dashboards > System > Guest VNF in the left menu bar.



- To check the status of the VNFs running on the device:

**cli> show guest-vnfs virtual-machines info detail**

For example:

```
admin@Branch-uCPE-cli> show guest-vnfs virtual-machines info detail

Virtual Machine      Adtran
State                running
Uptime              9w0d03h
Creation Timestamp   2019-10-11 10:32:42.383208
Management IP       172.25.1.5
Management MAC      52:54:00:00:01:01
Number of CPUs      2
Memory             2048
VNC Port           5901
Management Interface vni-0/300.0
Auxiliary Interface n/a
Left Interface      vni-0/302.0
Right Interface     vni-0/303.0
Primary Volume
Disk Path           /home/versa/images/adtran.qcow2
Disk Format          qcow2
Secondary Volume
Disk Path           n/a
Disk Format          n/a
```

5. To start a VM in case you need to intervene manually:

**cli> request guest-vnfs virtual-machines *vm-name* start**

For example:

```
admin@uCPE-4-cli> request guest-vnfs virtual-machines vStream start
status success
result Start request sent
```

6. To verify the status of the VM:

**cli> request guest-vnfs virtual-machines *vm-name* start**

7. To shut down a VM in case you need to intervene manually:

**cli> request guest-vnfs virtual-machines *vm-name* shutdown force**

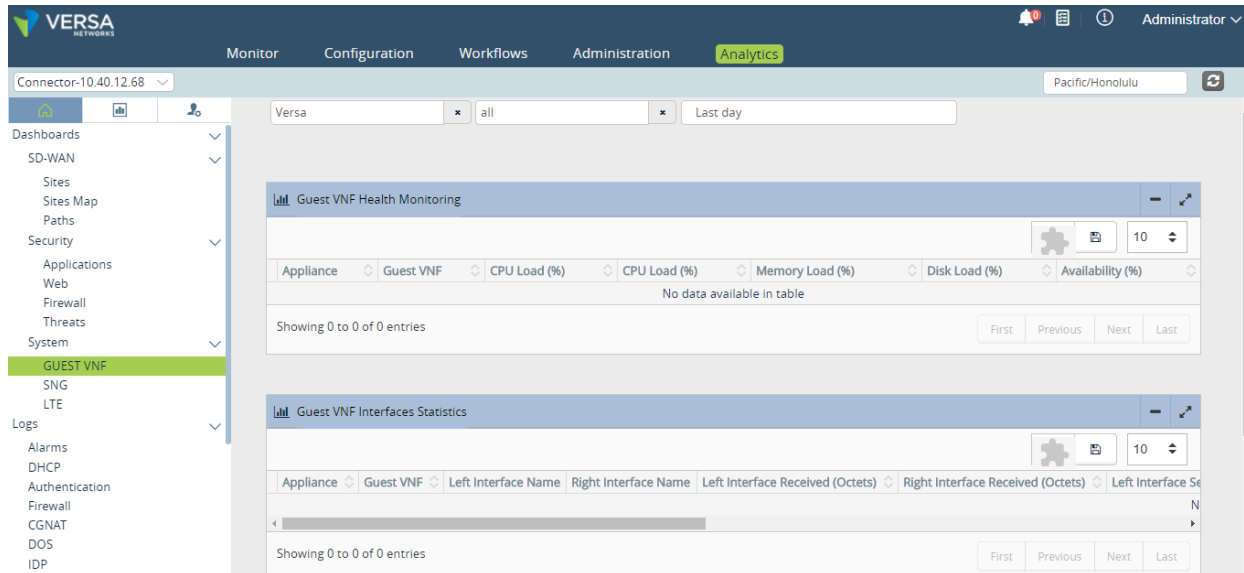
For example:

```
admin@uCPE-4-cli> request guest-vnfs virtual-machines vStream shutdown force
status success
result Shutdown request sent
```

---

## View the uCPE in Versa Analytics

To view uCPE information maintained on an Analytics node, in Director view, select the Analytics tab in the top menu bar, and then select Dashboards > System > Guest VNF.



---

## Troubleshoot uCPE

1. If Versa-virtmgr fails to start, try to start the service individually:

```
sudo initctl start versa-virtmgr
```

2. Versa-virtmgr depends on the versa-virtlogd and versa-virtlockd services. Check the status of these services in the vsh status output. If the services fail to come up, start them manually.

```
sudo service virtlogd start
sudo service virtlockd start
```

3. Try starting the versa-virtmgr service.

---

## Alarms Generated for uCPE

If you enable the health monitor when you configure the VMs, alarms are generated for the management reachability of the running VNFs when the management interface is not reachable. To view the alarms:

```
cli> show alarms last-n 205 | grep virtmgr
virtmgr guestVnfDown 2018-05-02T15:45:42-0 Provider: Guest VNF Adtran is down. Management
interface probe failure
virtmgr guestVnfUp 2018-05-02T15:47:12-0 Provider: Guest VNF Adtran is up. Management interface
probe success
```

---

[https://docs.versa-networks.com/Secure\\_SD-WAN/01\\_Configuration\\_from\\_Director/Common\\_Configuration/Configure\\_uCPE...](https://docs.versa-networks.com/Secure_SD-WAN/01_Configuration_from_Director/Common_Configuration/Configure_uCPE...)

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Alarms are generated for the data-path reachability between Versa VNF and the third-party VNF. Monitoring is triggered only if bypass-on-fail is generated under the org-level service-chain-instance. To view the alarms:

```
cli> show alarms last-n 200 | grep sfc
sfc  sngDown      2018-04-23T17:25:58-0 Customer2: Service Node Group Fortios-FromLAN-SNG is
down. Health monitor failure
sfc  sngUp        2018-04-20T15:34:31-0 Customer2: Service Node Group Fortios-FromLAN-SNG is up.
Health monitor success
```

---

## Supported Software Information

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

- For Releases 21.1.1 and later, you can configure multiple tenants and multiple VRFs in a service chain template.

---

## Additional Information

[Configure Service Chains](#)

[Solution Use Cases](#)

[Versa SD-WAN White-Box Appliances](#)