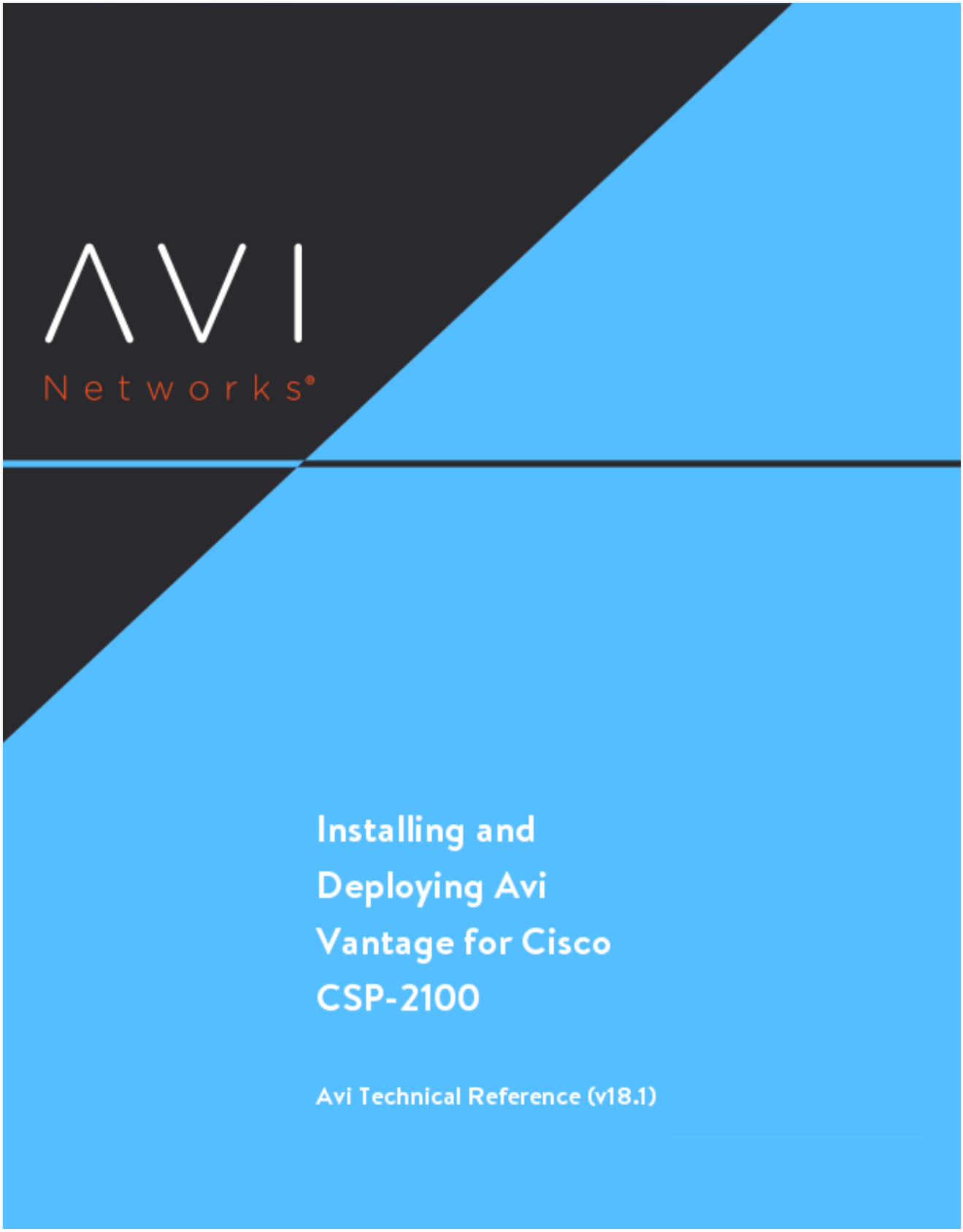


Installing and Deploying Avi Vantage for Cisco CSP-2100

Avi Technical Reference (v18.1)

Installing and Deploying Avi Vantage for Cisco CSP-2100 view online

Overview

This article describes how to install Avi Vantage on the Cisco CSP 2100 platform.

Related Reading

- Avi Vantage on Cisco CSP 2100 Sizing Guidelines

Notes:

1. Avi Networks recommends running CSP version v2.2.5 at a minimum.
2. Avi Networks recommends using VIRTIO as the disk type when configuring all Avi VNFs on CSP (Controllers and SEs)

Networking Interfaces of CSP 2100

The following table shows the names of physical interfaces (pNICs) on the CSP 2100, along with their supported speeds:

Name	Speed
enp1s0f0	1 Gbps
enp1s0f1	1 Gbps
enp4s0f0	1 Gbps
enp4s0f1	1 Gbps
enp4s0f2	1 Gbps
enp4s0f3	1 Gbps
enp7s0f0	10 Gbps
enp7s0f1	10 Gbps

The pNIC named enp1s0f0 can be connected to the management network. This provides access to the CSP dashboard. The 10-Gbps interfaces (enp7s0f0 and enp7s0f1) can be used as data NICs and must be connected to the corresponding data VLANs or trunk links.

Note: For VLAN trunking, the maximum number of VLANs that can be added to SRIOV VF NICs created from a single PF is 64.

CSP NIC Modes

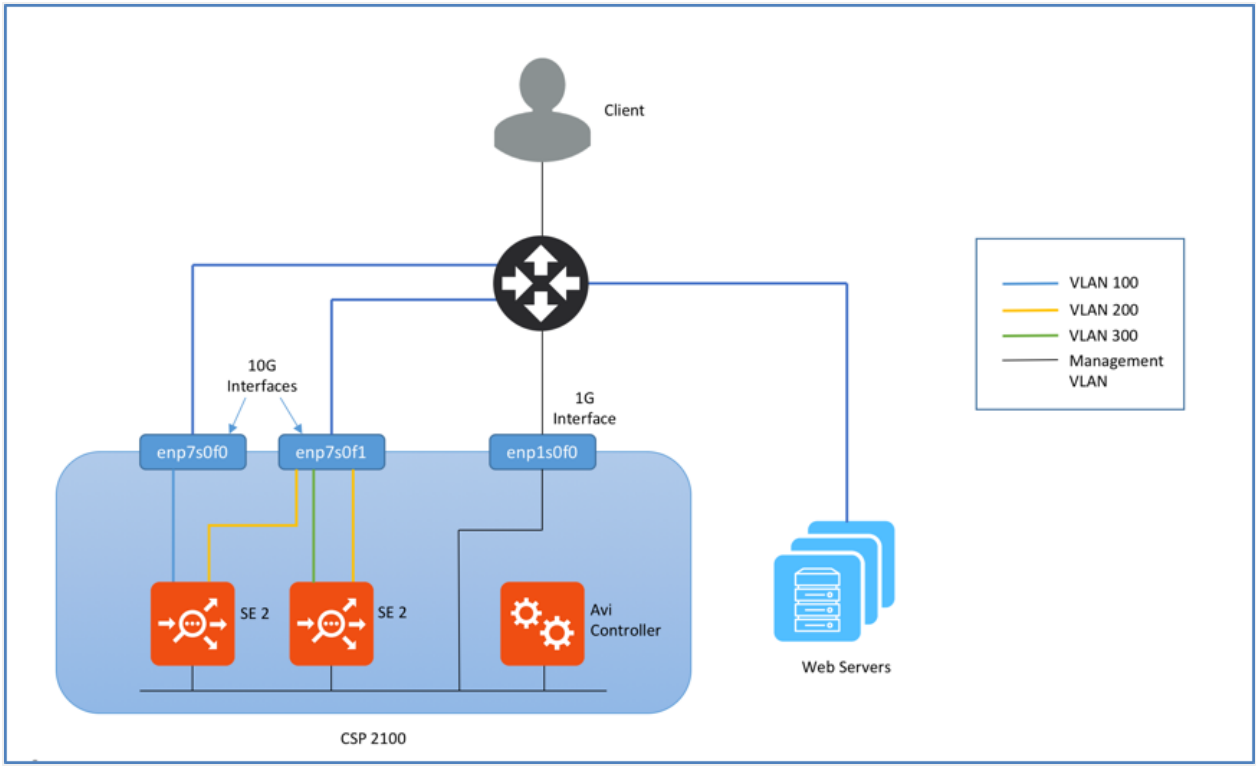
The following table explains 3 possible NIC mapping options on CSP and the corresponding performance implications.

```
<tr>
  <th>Mode
  </th>
  <th>Explanation
  </th>
```

```
  <th>Comments
  </th>
  <th>Drivers and Supported NICs<br>
  </th>
</tr>
<tr>
  <td>Access mode</td>
  <td>Traffic switched using OVS</td>
  <td>Allows physical NICs to be shared amongst VMs most generally,<br>but performance is generally lower due to soft s
  <td>NA
  </td>
</tr>
<tr>
  <td>Passthrough mode</td>
  <td>Physical NIC directly mapped to VM</td>
  <td>Physical NIC is dedicated to a VM.<br>
With 1x10 Gbps pNIC per VM, a maximum of 2 VMs or 4 VMs<br>can be created on a single CSP with 1 or 2 PCIe
dual-port<br>10-Gbps NIC cards. Provides best performance.</td>
  <td>
ixgbe-vf driver supports these NICs: 82599, X520, X540, X550, X552
<br><br>
i40e-vf driver supports these NICs:<br>X710, XL710
  </td>
</tr>
<tr>
  <td>SR-IOV mode</td>
  <td>Virtual Network Functions<br>created from physical NIC</td>
  <td>Allows pNICs to be shared amongst VMs without sacrificing performance, since packets are switched in HW.<br>Maxim
  <td>
ixgbe-vf driver supports these NICs (and bonding): 82599, X520, X540, X550, X552<br><br>
i40e-vf driver supports these NICs (bonding not supported): X710, XL710
  </td>
</tr>
```

Topology

The topology shown below consists of an Avi Controller and Avi Service Engines (SEs). To leverage the DPDK capabilities of the physical NICs, the SEs should be connected to the 10-Gbps enp7s0fx pNICs of the CSP 2100 in passthrough (PCIe) or SR-IOV mode. The SE can be connected to multiple VLANs on the pNICs? virtual functions (VF) in SR-IOV mode. The management network can be connected to the 1-Gbps pNIC.



Installing Avi Controller

A Note on numad Service

Summary

The numad service needs to be disabled. CSP servers running versions 2.2.4 and above *may* have numad disabled by default, but it's wise to check, and then take action if need be.

What is numad?

numad is a user-level daemon that provides placement advice and process management for efficient use of CPUs and memory. On CSP servers numad runs every 15 seconds, and scans all processes for candidates for optimization. To be a candidate, the criteria are:
1. There is more than 300 Mbytes of RAM usage.
2. CPU utilization is greater than 50% of one core.

What issue is numad causing on CSP?

On CSP numad takes each candidate process (which includes VNFs) and attempts to move either the process or its memory, so that they are on the same NUMA node (i.e., a physical CPU and its directly-attached RAM). On CSP servers, it is taking between 10 and 30 seconds to try to move memory between NUMA nodes. This is because it fails to move some pages from memory. This causes the VNFs which are being processed by numad to hang for that duration. All processes (which includes VNFs) will become a candidate for numad again once the holddown timer expires. Hence, this can cause repeated instability.

Note: Disabling numad is safe and has no adverse effects.

How Avi is affected?

Avi SEs have high background CPU utilization, even when passing no traffic. This makes the Avi SE VNF a candidate for `numad`, which hangs the Avi SE VNF. This leads to various issues such as:
1. Heartbeat failures 2. BGP peer flapping 3. Inconsistent performance

To disable `numad`

1. Install Cisco CSP software.
2. From the CSP CLI execute the following commands:

```
avinet-3# config terminal
Entering configuration mode terminal
avinet-3(config)# cpupin enable
avinet-3(config)# end
Uncommitted changes found, commit them? [yes/no/CANCEL] yes
Commit complete.
avinet-3#
```

Note: To disable `numad` if the CSP server is running a older version than v2.2.4, contact Cisco support.

Upload the Avi Controller Image

1. Log on to the CSP dashboard using a browser.
2. Navigate to Configuration > Repository.
3. Click on + sign, and browse to and select the Controller qcow2 image.
4. Click on Upload.

The Controller itself can have a day-zero YAML file before it is spun up. The YAML file needs to be imported into the repository prior to image creation. Ensure you have VNC access to the console. In a large deployment, this *might* require additional firewall rules.

Note: In a CSP cluster, multiple copies (equal to the number of cluster hosts) of the same image/YAML file may result. Consequently, when any deletions are required, all copies should be deleted. Typically, you would change a key (such as auth token) with the same filename and re-upload.

Avi Controller Metadata File

To configure the Controller management interface statically, the IP, netmask, and gateway information must be passed as a YAML file. The name of the metadata file must be in `avi_meta/*.yml` format.

For example, create a text file with name `avi_meta_controller.yml` with contents as:

```
avi.mgmt-ip.CONTROLLER: "10.128.2.20"
avi.mgmt-mask.CONTROLLER: "255.255.255.0"
avi.default-gw.CONTROLLER: "10.128.2.1"
```

Here `avi.mgmt-ip.CONTROLLER` is the management IP for Avi controller, `avi.mgmt-mask.CONTROLLER` is the network mask and `avi.default-gw.CONTROLLER` is the gateway IP address for the management network. Make sure to replace the IP address in the example with correct ones for your network.

Upload this metadata file to CSP repository as shown in 3.1.

Deploy the Avi Controller

This section describes how to deploy Avi Controller using both the CSP UI and the REST API.

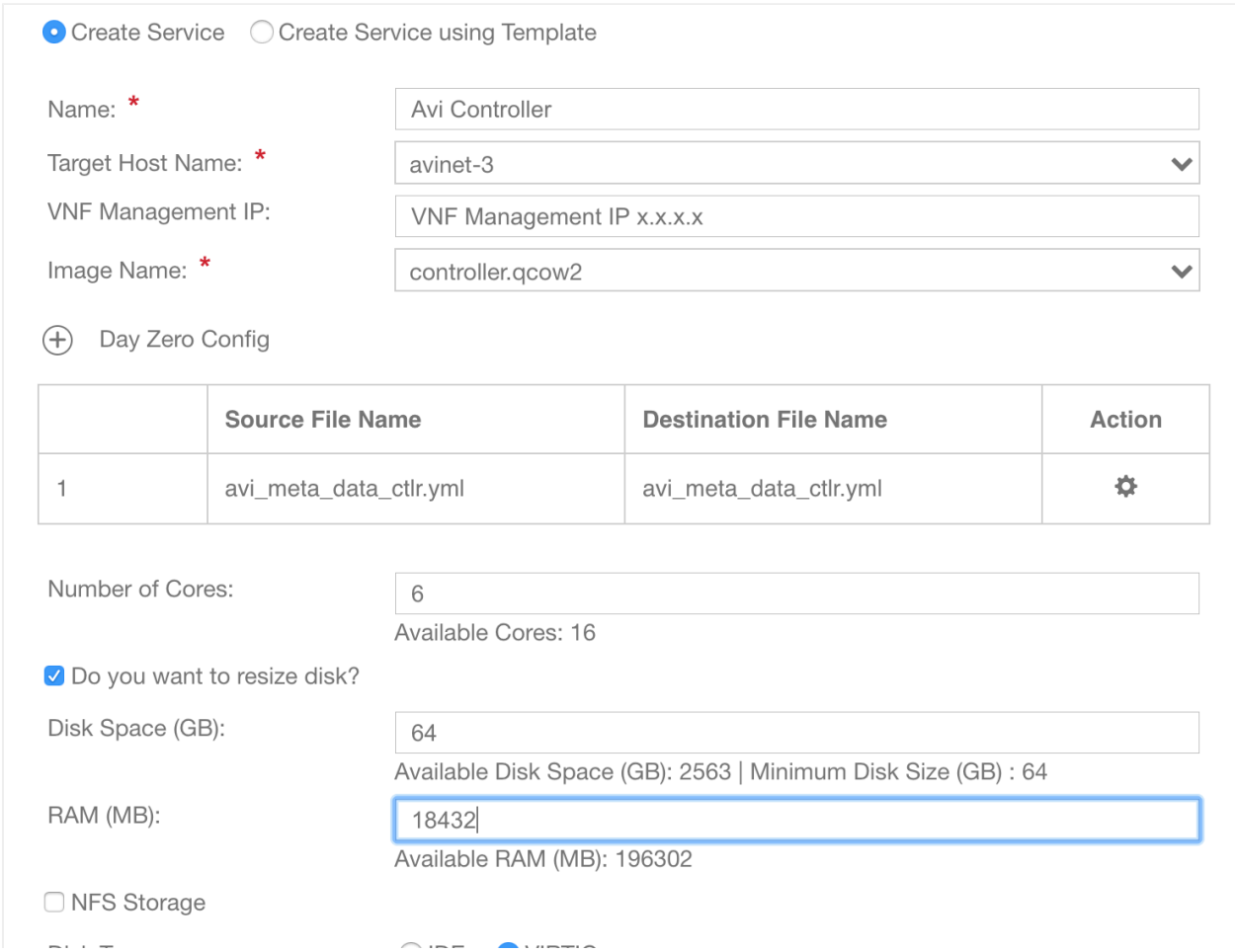
Deploy Using CSP UI

Use the following steps to deploy the Avi Controller using the CSP UI: 1. Navigate to Configuration > Services.

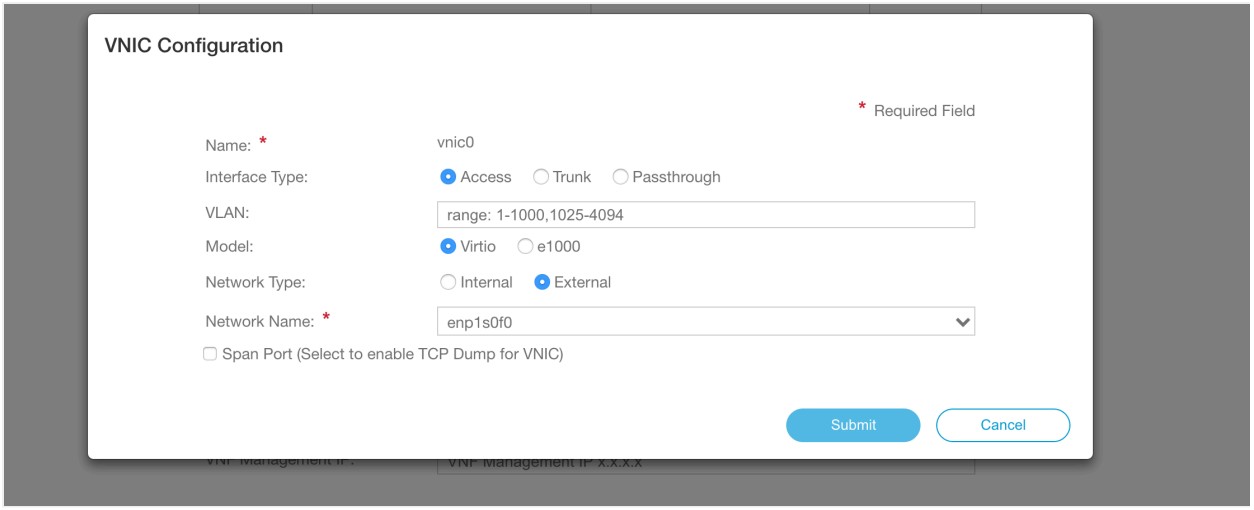
```
<a href="img/Picture1-1.png"><img class="aligncenter wp-image-23678 size-full" src="img/Picture1-1.png" width="870" hei
```

2. Click on +.

   Note: The disk size of any CSP image cannot be changed. To avoid deletion and recreation of the entire configuration, have an informed idea of deployment. Refer to System Requirements: Hardware and/or contact Avi for a recommendation.



3. Specify Avi Controller in Service Name field and press enter.
4. Click on Target Host Name and select the host from the list. In version CSP 2.1.0, on a CSP cluster, you can select the HA host name.
5. Leave the VNF Management IP field blank. This is set using the Day Zero Config.
6. Click on Image Name and select the controller.qcow2 image from the list.
7. Click on Day Zero Config drop-down and select Controller metadata file.
8. Set the resource values for Disk, CPU and RAM (minimum values shown above)
9. Click on + to add a vNIC and connect it to enp1s0f0 in access mode.



Note: If the management network is on a different VLAN, specify the VLAN number in the VLAN field, and click on VLAN Tagged to enable tagging.

10. (Optional) Specify a password for console login using VNC.
11. Click on Deploy.

Deploy Using REST API

CSP uses basic authentication for the REST API. Use the following `curl` command to create the Controller service:

```
curl -X POST --user csp-username:csp-password -H "Content-Type: application/json" -d '{
  "service":{
    "disk_size":"64",
    "name":"Controller",
    "power":"on",
    "iso_name":"controller.qcow2",
    "day0_filename":"avi_meta_controller.yml",
    "numcpu":6,
```

```
    "memory":18432,
    "vnics":{
      "vnic":[
        {
          "nic":"0",
          "type":"access",
          "tagged":"false",
          "network_name":"enp1s0f0"
        }
      ]
    }
  }
}' "https://


<csp-ip>
  /api/running/services/"
</csp-ip>
```

The CSP should reply with status code ?201 Created?.

To verify, get all installed services using following `curl` command:

```
curl -X GET --user csp-username:csp-password -H "Content-Type: application/json" "https://10.128.2.16/api/running/servi
```

Response:

```
{
  "service":[
    {
      "disk_size":"64.0",
      "name":"Controller-16-2",
      "power":"on",
      "iso_name":"controller.qcow2",
      "day0_filename":"avi_meta_controller.yml",
      "numcpu":6,
      "macid":65,
      "memory":18432,
      "vnics":{
        "vnic":[
          {
            "nic":0
          }
        ]
      },
      "uuid":"d8b977fe-42e7-48dd-a6a4-79f4ab5a8f0f"
```

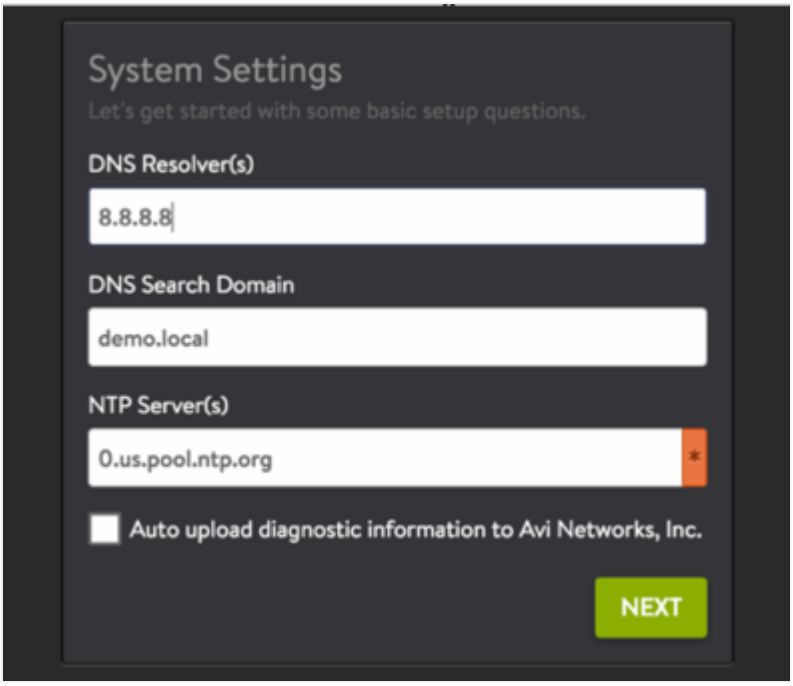
```
    }
  ]
}
```

Initial Setup of Avi Controller

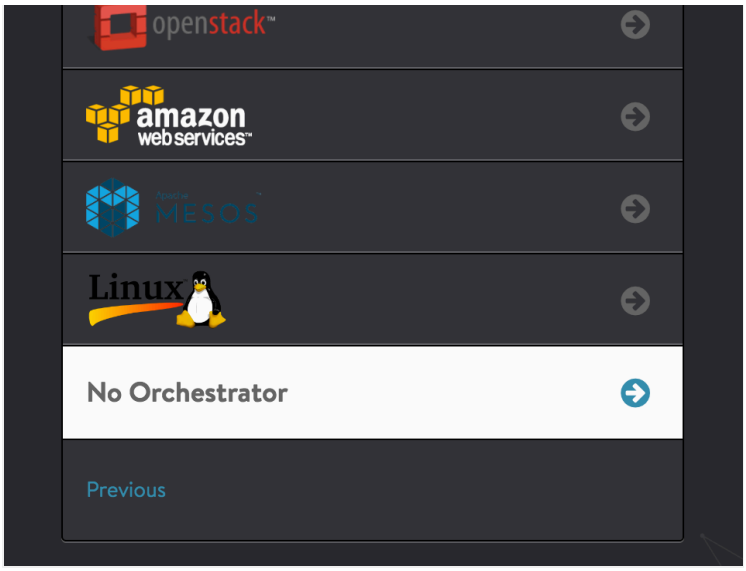
Use a browser to navigate to the Avi Controller IP address, and follow the below steps to perform initial setup: 1. Configure an administrator password.

```
<a href="img/Picture5.png"><img class="aligncenter wp-image-23655 size-full" src="img/Picture5.png" alt="Picture5" widt
```

2. Set DNS information.



3. Select No Orchestrator.



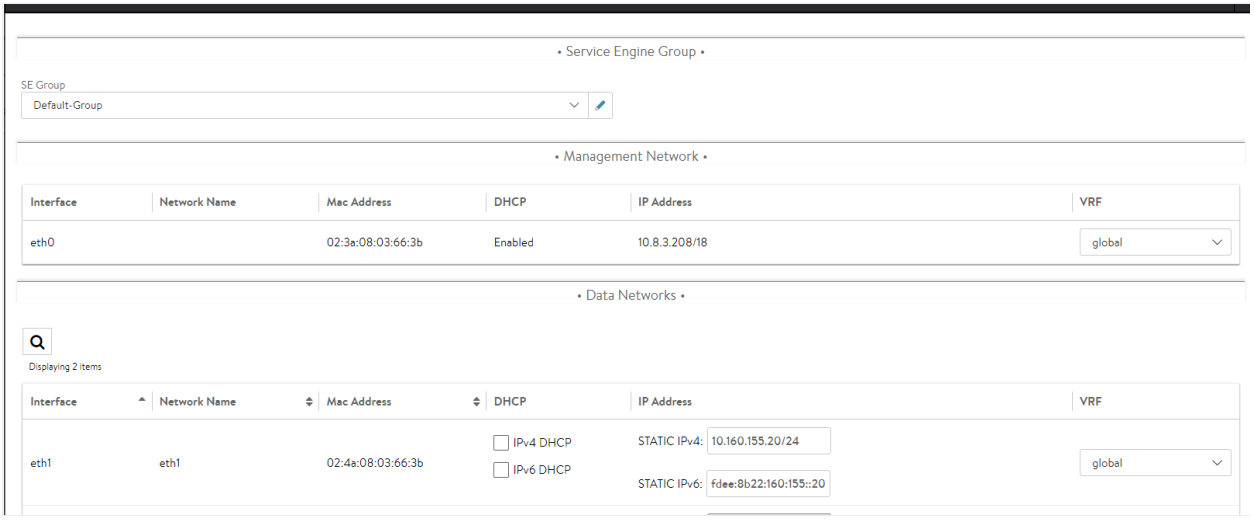
4. On Tenant Settings wizard page, select the appropriate option. Refer to Tenants Versus SE Group Isolation.

Deploying Avi Service Engine

This section walks through the workflow of deploying an Avi SE on CSP, with data NICs in SR-IOV passthrough mode.

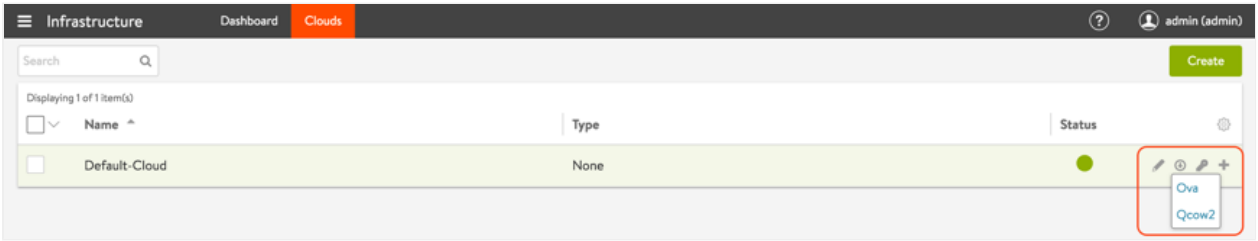
Notes:

- Not every deployment will use SR-IOV, but if it is, it must be configured on the CSPs beforehand (e.g., numVFs). A figure appearing in the Enable SR-IOV section of this article shows the number of VFs and the switch mode being set.
- Starting with Avi Vantage version 18.1, Avi Vantage supports IPv6 for SE data interfaces.



Uploading SE image

1. On the Avi Controller, navigate to Infrastructure > Clouds.
2. Click on the download icon on *Default Cloud* row and select Qcow2.



3. Upload *se.qcow2* to the CSP repository. (steps to upload).

Upload SE metadata file

To configure SE management interface statically, the IP, netmask and gateway information must be passed as a YAML file. The name of the metadata file must be in `avi_meta/*.yml` format.

For example, create a text file with name `avi_meta_se.yml` with contents as:

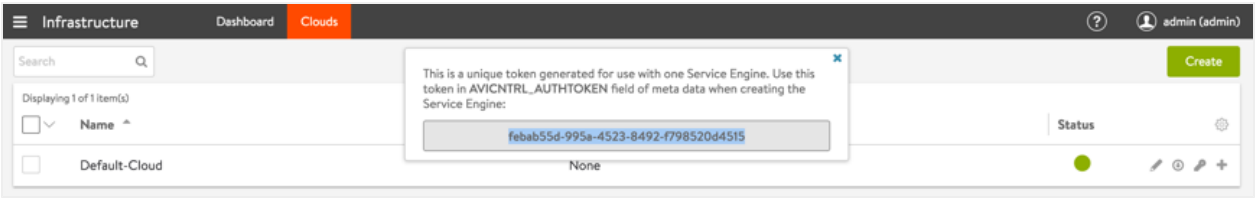
```
avi.mgmt-ip.SE: "10.128.2.18"
avi.mgmt-mask.SE: "255.255.255.0"
avi.default-gw.SE: "10.128.2.1"
AVICNTRL: "10.10.22.50"
AVICNTRL_AUTHTOKEN: "febab55d-995a-4523-8492-f798520d4515"
AVITENANT_UUID: 'tenant-f3fd4914-01e2-4fbf-b5bc-65b054700cee'
```

Here `avi.mgmt-ip.SE` is the management IP for Avi SE, `avi.mgmt-mask.SE` is the network mask and `avi.default-gw.SE` is the gateway IP address for the management network. `AVICNTRL` is the management IP of the Avi Controller. Make sure to replace the IP address in the example with correct ones for your network.

`AVITENANT_UUID` (optional) is the UUID of the tenant on the Avi Controller to which the SE must connect. ilf this field is omitted, the SE will connect to the `admin` tenant by default.

`AVICNTRL_AUTHTOKEN` is the authentication token used to authenticate SE-to-Controller communication. Follow these steps to generate the authentication token:

1. Navigate to Infrastructure > Clouds
2. Click on the key icon on the Default-Cloud row to view the authentication token key.



Note: The authentication token has a validity timeout of 1 hour by default.

3. Copy the authentication token.

Upload this metadata file to the CSP repository (steps to upload).

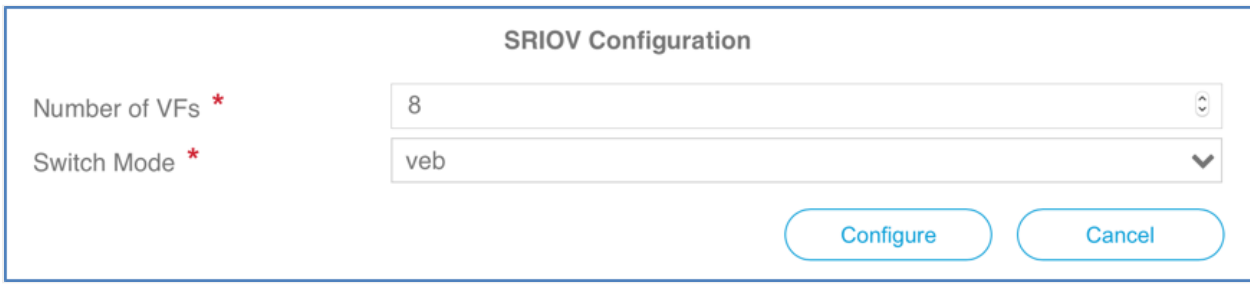
Enable SR-IOV

SR-IOV must be enabled on the CSP pNIC. Follow these steps to enable SR-IOV on `enp7s0f0`:

1. Navigate to Configuration > SRIOV Config
2. Click on the settings icon

for enp7s0f0.

3. Set the Number of VFs to the desired number.
4. Set Switch Mode to web.

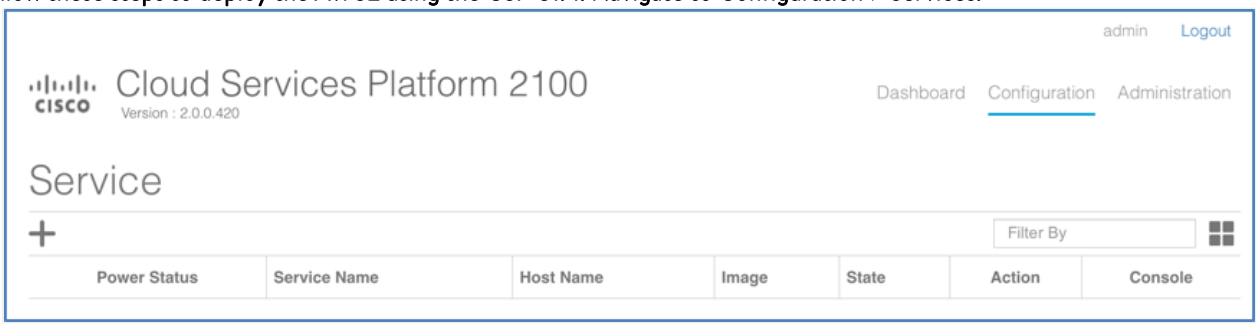


Note: In above example 8 VFs (virtual functions) are configured on the pNIC. The uer should configure this number to th of services that will share the pNIC. Cisco recommends to over-allocate VFs (maximum 32 on a 10G pNIC).

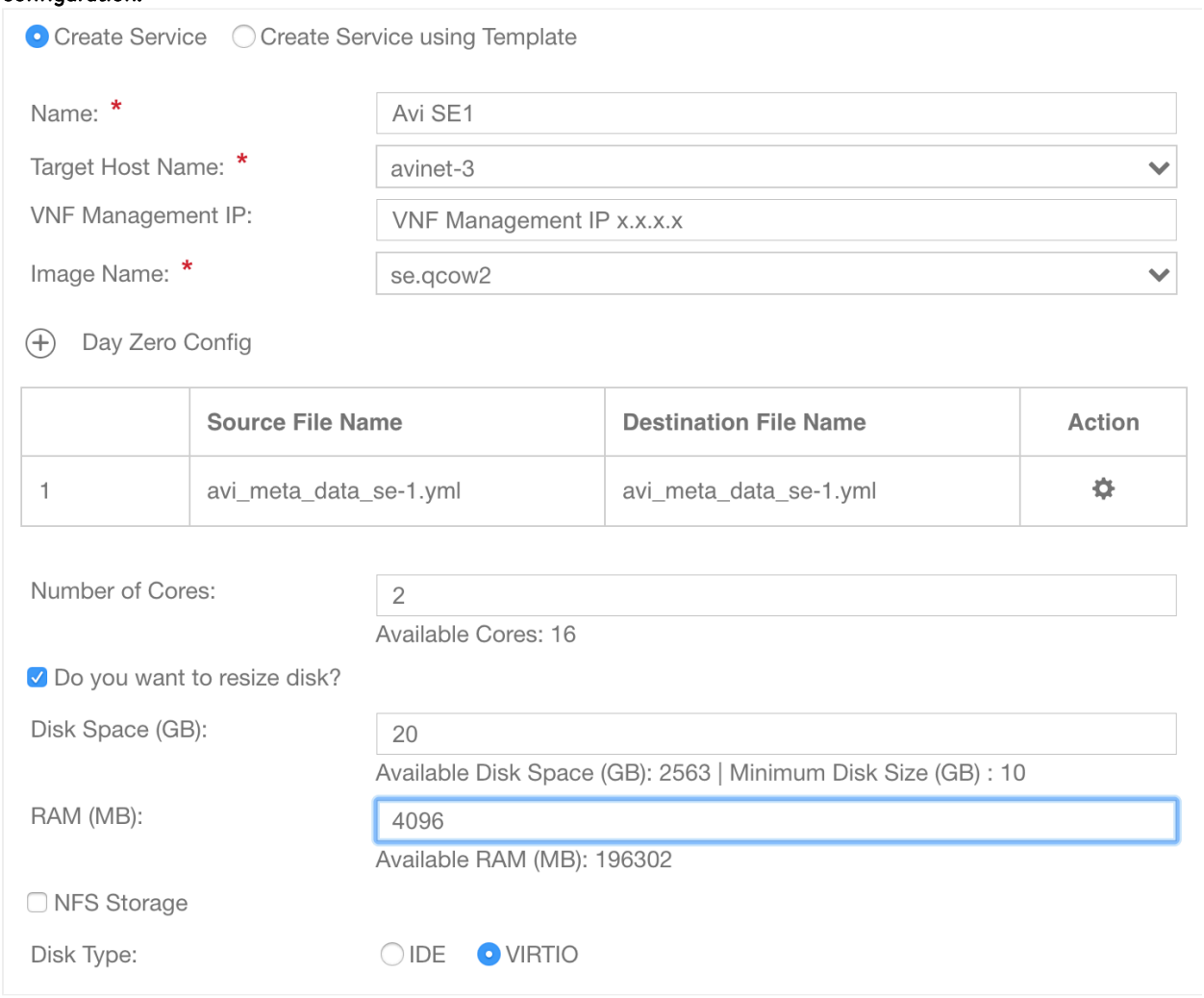
5. Repeat the above steps to configure enps0f1 for SR-IOV if required.

Deploy Avi SE in SR-IOV Mode

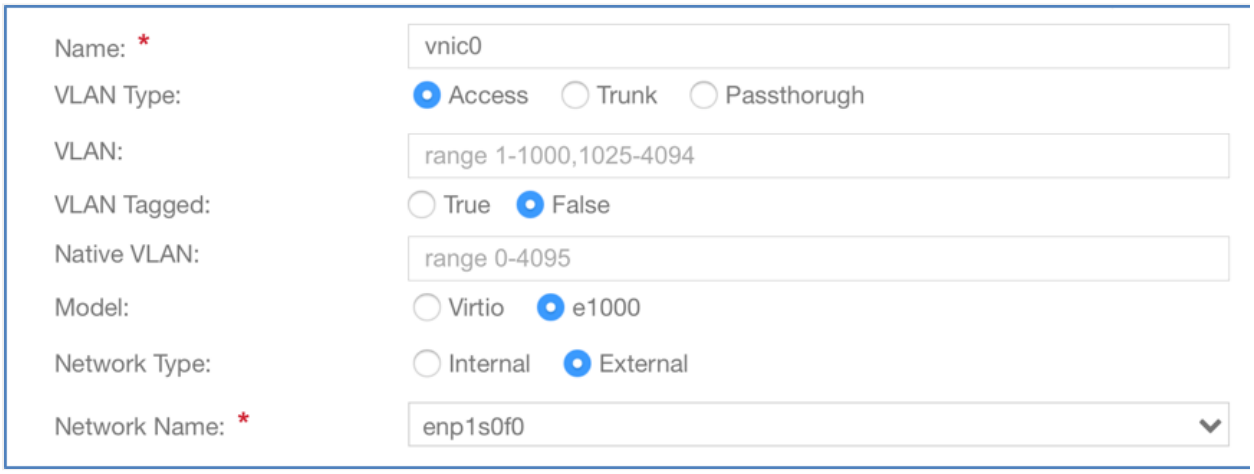
Follow these steps to deploy the Avi SE using the CSP UI: 1. Navigate to Configuration > Services.



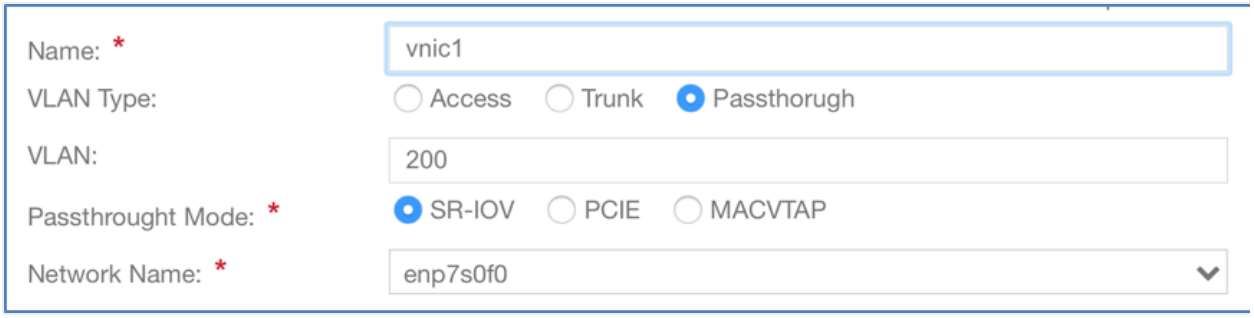
2. Click on +. Refer to System Requirements: Hardware for recommendations on a minimum production SE configuration.



3. Specify Avi SE1 in Service Name field and press enter.
4. Click on Target Host Name and select the host from the list.
5. Leave VNF Management IP field blank. This is set using the Day Zero Config.
6. Click on Image Name and select the se.qcow2 image from the list.
7. Click on Day Zero Config drop-down and select the SE metadata file.
8. Set the resource values for Disk, CPU and RAM (minimum values shown above).
9. Click on + to add a vNIC and connect it to enp1s0f0 in access mode.



10. Click on + to add a vNIC and connect it to enp7s0f0 in SR-IOV mode.



11. (Optional) Specify a password for console login using VNC.
12. Click on Deploy.
13. Verify the SE is able to connect to the Avi Controller by navigating to Infrastructure > Dashboard on Avi Controller UI (this may take a few minutes).

Related Articles

- Upgrading Avi Vantage Software
- Upgrades in an Avi GSLB Environment

Revision History

Edit Date	Applicable As Of Release	Summary
10Apr2018	All releases	As of 2Apr2018, Avi recommends CSP version 2.2.5