

# SAPC VNF Deployment Instruction for OpenStack

Ericsson Service-Aware Policy Controller

## INSTALLATION INSTRUCTION

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# Contents

<b>1</b>	<b>Overview</b>	<b>1</b>
1.1	General	1
1.2	ECM-OpenStack/OpenStack CLI	1
1.3	Accesses	1
<b>2</b>	<b>SAPC VNF Descriptor Generation</b>	<b>3</b>
2.1	Download the SAPC Virtual Delivery Package	3
2.2	Generate the SAPC VNF Descriptor	3
<b>3</b>	<b>Deploy the SAPC for Standalone</b>	<b>5</b>
3.1	Deployment with ECM	5
3.1.1	Flavors Addition	5
3.1.2	Upload the SAPC Images	11
3.1.3	Upload the SAPC OVF/HOT Package	15
3.1.4	Deploy the SAPC vAPP	18
3.2	Deployment with OpenStack CLI	24
3.2.1	Upload the SAPC HOT Package	24
3.2.2	Upload the SAPC Images CLI	25
3.2.3	Create Flavors	25
3.2.3.1	Create Flavors for OpenStack	25
3.2.3.2	Create Flavors for OpenStack Not Configured for CPU Pinning and NUMA Awareness	26
3.2.4	Deploy the SAPC Stack	26
3.3	Verify the SAPC Deployment	27
<b>4</b>	<b>Install Additional SAPC Instances</b>	<b>29</b>
4.1	Install Additional SAPC Instances from ECM	29
4.1.1	Customize the Additional SAPC Instance	29
4.1.2	Deploy Additional SAPC Instances	29
4.2	Install Additional Instances with OpenStack CLI	31
<b>5</b>	<b>Deploy the SAPC for Geographical Redundancy</b>	<b>33</b>
<b>6</b>	<b>Configure the SAPC</b>	<b>35</b>
6.1	SAPC Hardening after Deployment	35
6.2	Connectivity to External Networks	35
6.2.1	Configuration Example of OAM Border Gateway Routers (Extreme x670)	35
6.2.2	Configuration Example of Traffic Border Gateway Routers (Extreme x670)	36



6.3	Set the SAPC Licenses Configuration	37
6.4	Final Backup	38



# 1 Overview

Basic knowledge of **OpenStack, Linux, and networking** is mandatory for any user who wants to follow this document.

Read before **SAPC VNF Network Configuration Guide**.

## 1.1 General

The purpose of this document is to describe how to deploy and set up the SAPC in OpenStack, either with Ericsson Cloud Manager (ECM) on top of OpenStack or with OpenStack CLI. The following procedures are covered:

- Deploying the SAPC virtual Application (vAPP) based on a generated OVA file
- Deploying the SAPC vAPP based on a generated HOT template (named stack in this case)
- Post deployment activities after the SAPC deployment
- Health check of the SAPC
- Configuration of the SAPC

## 1.2 ECM-OpenStack/OpenStack CLI

OpenStack is installed and configured in all physical hosts in which the SAPC vAPP is deployed and properly connected to ECM/OpenStack CLI. The installation of OpenStack, ECM, and OpenStack CLI products are out of scope of this document, refer to their corresponding CPI documents.

**Note:** All the ECM screen captures included in the document belong to ECM 17 Q3.

## 1.3 Accesses

The following information is required to deploy the SAPC on ECM-OpenStack:

- Access to the Virtual Delivery Package through the SAPC software gateway.
- Access to ECM: a tenant must be available in ECM. Also, a Virtual Data Center connected to the target Virtual Infrastructure Manager (VIM) in this tenant where the SAPC is deployed must be available. Credentials to log in to ECM must be provided.
- Access to the OpenStack CLI server: credentials to login to the server with OpenStack CLI must be provided, for instance, credentials for Atlas server in



case of Ericsson Cloud Execution Environment (CEE) or Director server in case of Red Hat OpenStack Platform (RHOSP).

- Administration user identities and default passwords for the SAPC can be found in [SAPC Users and Passwords](#).



## 2 SAPC VNF Descriptor Generation

### 2.1 Download the SAPC Virtual Delivery Package

The required software is listed in Table 1 and can be downloaded from Ericsson Software Gateway under a unique ticket number. Refer to Release Notes for specific version information and ticket number. Make sure that the Software Package file for the SAPC is available on a preparation server where you access the ECM WEB GUI or OpenStack CLI server.

Table 1 Software Package

Software Package	Filename
SAPC Virtual Delivery Package	vdp_sapc_qcow2_cxp9032849_<revision>.tar.gz

### 2.2 Generate the SAPC VNF Descriptor

The SAPC OVF package file for ECM deployments, or the HOT template files for OpenStack CLI deployments are generated on the preparation server according to the instruction stated in *SAPC VNF Descriptor Generator Tool*.







## 3 Deploy the SAPC for Standalone

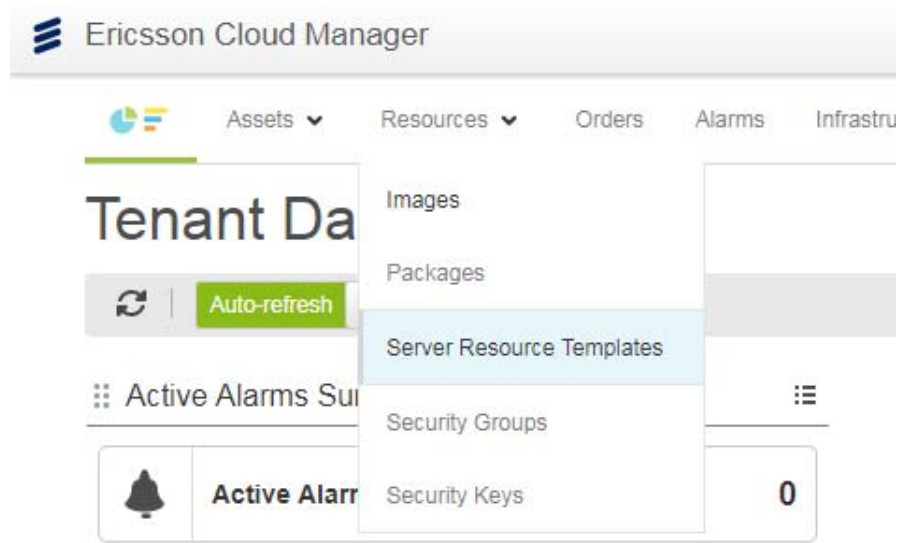
### 3.1 Deployment with ECM

#### 3.1.1 Flavors Addition

In **OpenStack**, a flavor defines the compute, memory, and storage capacity of a virtual server that users can launch. A flavor is referred as Server Resource Template (SRT) in ECM.

Log in to ECM.

Select the **Server Resource Templates** option in the **Resources** menu.



Select **Create** and when **Create Server Resource Template** pops up, fill the boxes with proper information for the System Controller's flavor.



Create Server Resource Template

Basic Information

Name\*

2vcpu\_6144MBmem\_40GBdisk

Type

Number of Virtual CPUs\*

2

Virtual Memory (MB)\*

6144

Disk Size (GB)\*

40

Swap Disk Size (MB)

Ephemeral Disk Size (GB)

Receive/Transmit Factor

Description

SAPC SC flavor

Extra Specifications

Key

\*

Value

\*

×

+

hw:cpu\_policy

dedicated

🗑️✎

hw:mem\_page\_size

1048576

🗑️✎

hw:watchdog\_action

reset

🗑️✎

Create

Cancel

Repeat for SRTs required by the Processor Load (PL) and Virtual Router (VR) (optional) as shown below.



## Create Server Resource Template ✕

### Basic Information

Name\*

Type

Number of Virtual CPUs\*

Virtual Memory (MB)\*

Disk Size (GB)\*

Swap Disk Size (MB)

Ephemeral Disk Size (GB)

Receive/Transmit Factor

Description

### Extra Specifications

Key	*	Value	*	✕	+
hw:cpu_policy		dedicated		🗑️	✎
hw:mem_page_size		1048576		🗑️	✎
hw:watchdog_action		reset		🗑️	✎



Create Server Resource Template



Basic Information

Name\*

2vcpu\_1024MBmem\_4GBdisk

Type

Number of Virtual CPUs\*

2

Virtual Memory (MB)\*

1024

Disk Size (GB)\*

4

Swap Disk Size (MB)

Ephemeral Disk Size (GB)

Receive/Transmit Factor

Description

SAPC VR flavor

Extra Specifications

Key	Value		
hw:cpu_policy	dedicated		
hw:mem_page_size	1048576		
hw:watchdog_action	reset		

Create

Cancel

Once SRTs are created, transfer all SRTs to the VIM in which the SAPC will be deployed at a later stage. Therefore, after selecting the SRT, press the **Transfer to VIM** icon.



Name	Provisioning Status	Virtual CPUs	Virtual Memory (MB)	Disk Size (GB)	Ephemeral Disk Size (GB)	Swap Disk Size (MB)	Recal Factor	Accessibility
18_2vcpu_1024MBmem_0GBdisk	Active	2	10,240	0		0		All Tenants
18_2vcpu_1024MBmem_4GBdisk	Active	2	1,024	4		0		All Tenants
18_2vcpu_6144MBmem_40GBdisk	Active	2	6,144	40		0		All Tenants
2vcpu_10240MBmem_0GBdisk	Active	2	10,240	0		0		All Tenants
2vcpu_10240MBmem_4GBdisk	Active	2	1,024	4		0		All Tenants
2vcpu_6144MBmem_40GBdisk	Active	2	6,144	40		0		All Tenants
7_2vcpu_10240MBmem_0GBdisk	Active	2	10,240	0		0		All Tenants
7_2vcpu_1024MBmem_4GBdisk	Active	2	1,024	4		0		All Tenants
7_2vcpu_6144MBmem_40GBdisk	Active	2	6,144	40		0		All Tenants
test2	Active	6	2,048	20		0		All Tenants

In the **Transfer Template** pop up window, select the VIM zone to which the SRT must be transferred to and press the **Transfer** button.

Transfer Template: 2vcpu\_1024MBmem\_4GBdisk

Transfer Server Resource Template to the selected VIM Zones

Candidate VIM Zones (0)

Refine Results

☐ VIM Zone

Selected VIM Zones (1)

Refine Results

☐ VIM Zone

☒ SAPC04 CEE

**Transfer** **Cancel**

**Do!**

Transfer all the previously created SRTs to the VIM by repeating the previous steps.



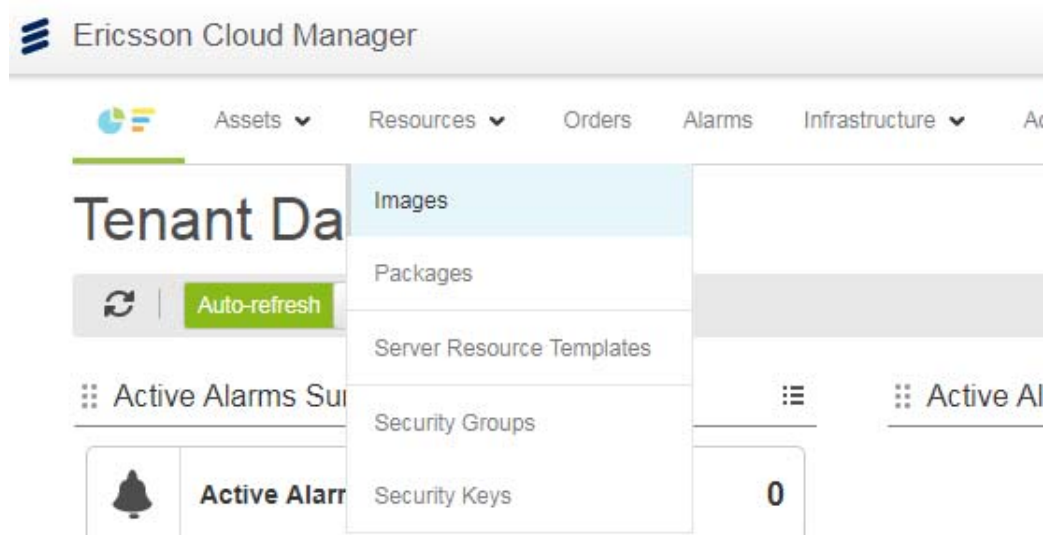
### 3.1.2 Upload the SAPC Images

Log in to ECM.

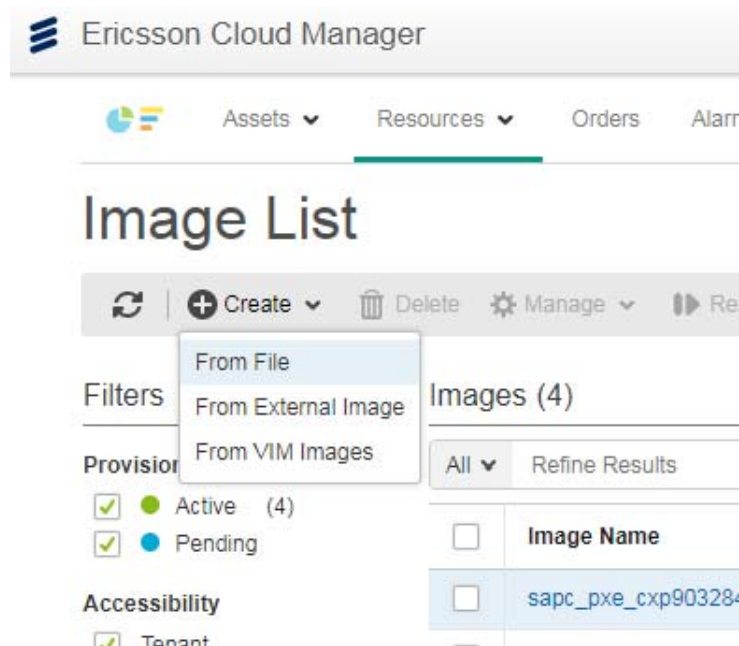


The login page for Ericsson Cloud Manager. It features the Ericsson logo at the top left. Below it, the text "ERICSSON CLOUD MANAGER" is displayed in green. There are two input fields: "tenant\_id" and "user\_id". Below the "user\_id" field is a password field represented by dots. A "Login" button is located below the password field. A disclaimer states: "These computer resources are for authorized users. For legal, security and cost resources, usage is monitored and recorded in a log file." At the bottom, there is a copyright notice: "Copyright © Ericsson Enterprise AB, 2017. All rights reserved."

Select the **Images** option in the **Resources** menu.





Select the **Create > From File** icon.



Select the **Select File** icon.

Select a **qcow2** image file and click the **Open** button. This is an example.

Name	Size	Modified ▾
 sapc_pxe_cxp9032849_<revision>.qcow2	786.4 kB	15:23
 sapc_vr_cxp9032849_<revision>.qcow2	1.2 GB	15:26
 sapc_sc_cxp9032849_<revision>.qcow2	2.0 GB	15:28

Fill required information in the next window.





## Create Image

Select a file or drag one and drop it anywhere on this page

File Name\*

New Image Name\*

Description


**Note:** The image files can only be uploaded one by one. Make sure that all **qcow2** image files are uploaded.

After starting the upload, the ECM performs an MD5 checksum of the image inside the browser first and then starts the actual upload. This step takes long time for bigger images, depending on the capabilities of the host from where the browser is started.

Upload all the SAPC images and keep the default names to match the defined names. The VM image list looks like this:

```
sapc_sc_cxp9032849_<revision>
sapc_pxe_cxp9032849_<revision>
sapc_vr_cxp9032849_<revision> (optional)
```

After all the images are uploaded, do a final check to make sure that all the SAPC images are uploaded and that everything looks fine.

Use the  icon in the upper left part of the ECM GUI and refresh the **Images** list to check that all the images are visible and uploaded. Check that the correct virtual machine image names are chosen. Check that the **Image Format** is of type **qcow2** and **Provisioning Status** is **Active**.



## Images (4)

All

Refine Results

Hide Filters

<input type="checkbox"/>	Image Name	Image Format	Provisioning Status	Transferable
<input type="checkbox"/>	<a href="#">sapc_pxe_cxp9032849_revision</a>	qcow2	<span>●</span> Active	Yes
<input type="checkbox"/>	<a href="#">sapc_sc_cxp9032849_revision</a>	qcow2	<span>●</span> Active	Yes
<input type="checkbox"/>	<a href="#">sapc_vr_cxp9032849_revision</a>	qcow2	<span>●</span> Active	Yes

Transfer all the previously created images to the VIM by repeating the previous steps.

Ericsson Cloud Manager

Assets Resources Orders Alarms Infrastructure Administration

### Images

Create Delete Manage Resume

Filters Reset x Image

Register VIM Images into Cloud Manager  
Transfer Image to more VIM Zones

Provisioning Status: (3)  
☒ Active  
☒ Pending

Accessibility: (3)  
☒ Tenant  
☒ All Tenants

Image Name	Image Format	Provisioning Status	Transferable	Accessibility	VIM Zones
<input checked="" type="checkbox"/> sapc_pxe_cxp9032849_revision	qcow2	Active	Yes	All Tenants	0
<input type="checkbox"/> sapc_sc_cxp9032849_revision	qcow2	Active	Yes	All Tenants	0
<input type="checkbox"/> sapc_vr_cxp9032849_revision	qcow2	Active	Yes	All Tenants	0

In the **Transfer Template** pop up window, choose the VIM zone to which the image must be transferred to and press the **Transfer** button.

Transfer Image: sapc\_pxe\_cxp9032849\_revision

Transfer Image to the selected VIM Zones

Candidate VIM Zones (0)

Refine Results

☐ VIM Zone

No Candidate VIM Zones

Selected VIM Zones (1)

Refine Results

☐ VIM Zone

☒ SAPC04 CEE

Transfer Cancel



## Do!

Transfer all the previously uploaded images to the VIM by repeating the previous steps.

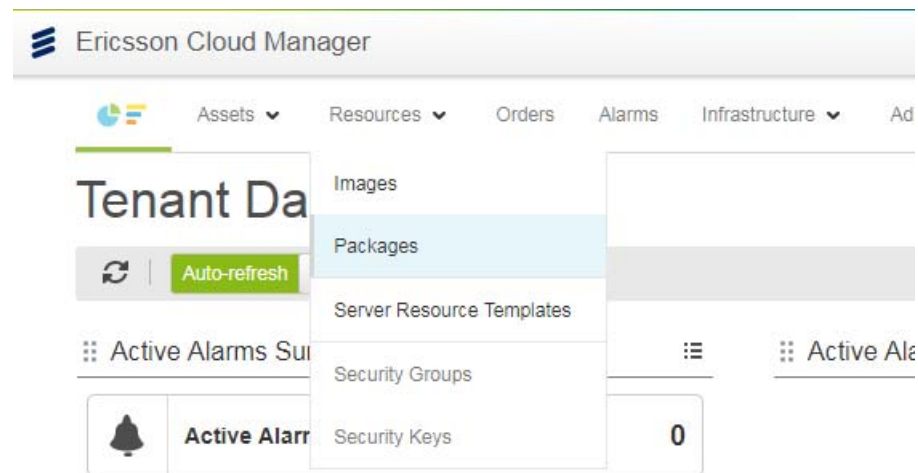
### 3.1.3 Upload the SAPC OVF/HOT Package

Upload the generated Open Virtualization Appliance (OVA) or HOT file in Section 2.2 on page 3 depending on the selected method for deploying the SAPC and keep the default names for simplicity. The **OVF** or **HOT Packages** describing the SAPC looks like this:

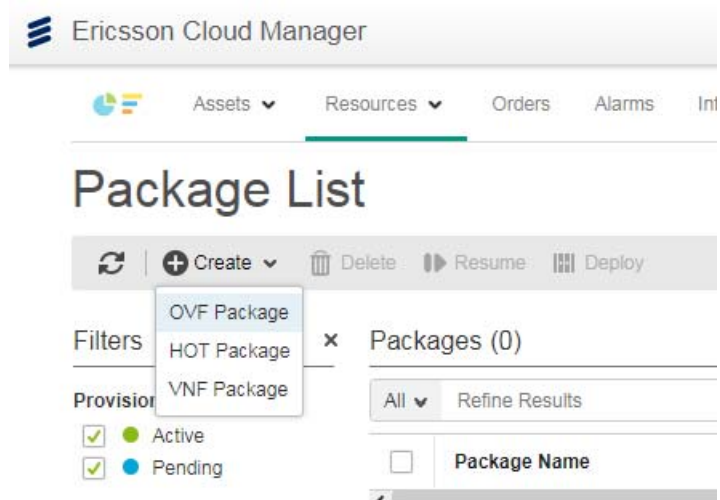
sapc\_cxp9032849\_<revision>.ova

sapc\_cxp9032849\_<revision>\_ECM.zip

Select the **Packages** icon in the **Resources** menu in the main WEB GUI of ECM.



Select the **Create > OVF Package** or **HOT Package** menu item depending on the selected case.



Press **Select File**. Select the `sapc_cxp9032849_<revision>.ova` or `sapc_cxp9032849_<revision>_ECM.zip` description file from the directory where you saved it and click the **Open** button. Then fill the boxes with the required information as in the example below and select the **Start** icon.

After the descriptor file is uploaded, do a final check to make sure that everything looks fine.

### Create OVF Package

Select File *Select a file or drag one and drop it anywhere on this page*

File Name\*  
SAPC\_cxp9032849\_<revision>.ova (30 KB)

New Package Name\*  
SAPC\_cxp9032849\_revision

Description  
SAPC ova file description

Start

Pause

Stop



## Create OVF Package

✓ Package created successfully.

File Name\*

SAPC\_cxp9032849\_<revision>.ova (30 KB)

New Package Name\*

SAPC\_cxp9032849\_revision

Description

SAPC ova file description


Time elapsed: 00:00:02      Uploaded size: 30 KB      Remaining size: 0 B

Time left: 00:00:00      Total size: 30 KB      Transfer rate: 8.00 Kbit/s

Upload Complete

100%

Close

Use the  icon and refresh the **Packages** list to check that the descriptor file is visible and uploaded. Check that the **Format** is of type **OVF** or **HOT** depending on the used package and **Provisioning Status** is **Active**.

Ericsson Cloud Manager

Assets Resources Orders Alarms Infrastructure Administration

## Package List

Refresh Create Delete Resume Deploy

Filters [Reset](#) Packages (1)

Provisioning Status

- ☒ Active (1)
- ☒ Pending

Format

- ☒ OVF (1)

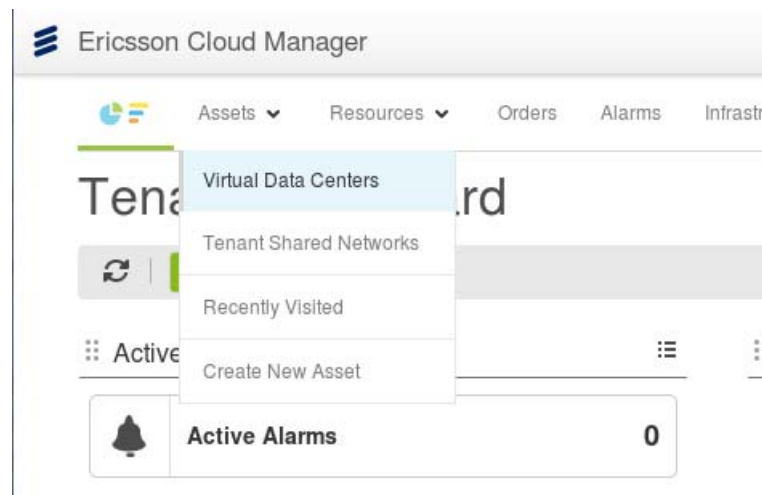
Package Name	Format	Provisioning Status	Type
SAPC_cxp9032849_revision	OVF	Active	VAPP

**Note:** The last three windows show the case when the uploaded package is an OVF package, as an example. When the uploaded package is a HOT package, the windows are similar, although the displayed format type is HOT instead of OVF that is shown in the example.

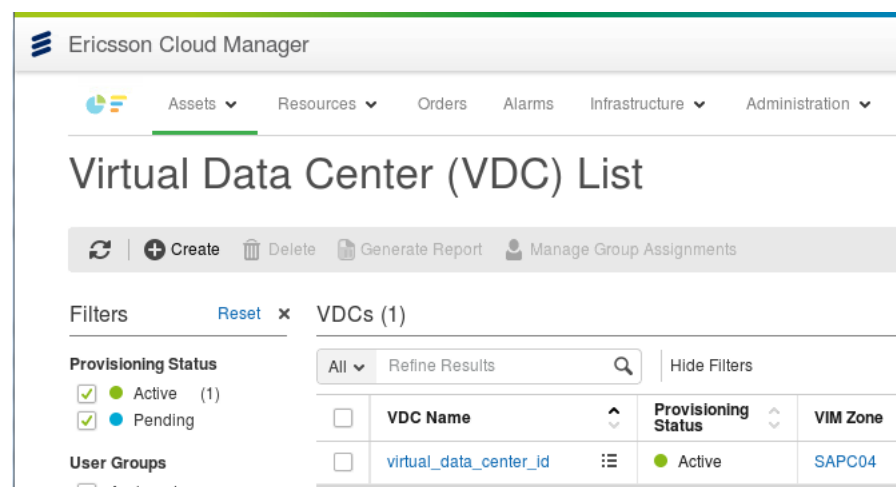
### 3.1.4 Deploy the SAPC vAPP

The **vAPP** is an ECM concept that is used to logically group several virtual machines together in a logical entity. When creating a **vAPP**, the ECM instructs OpenStack to create all the virtual machines and other related objects in a specific order, as specified in the **vAPP** definition. In the case of the SAPC, the **SC-1** is created first, and then the rest of the virtual machines. The **vAPP** provisioning status changes to **Active** when all virtual machines are started.

Select the **Assets > Virtual Data Centers** icon.



Select the desired **VDC** from the list.



Choose the **Virtual Applications** tab. Then press the **Create** button.



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## Virtual Data Center (VDC) Detail: virtual\_data\_center\_id

[View all Virtual Data Centers](#)

General Attributes Services Virtual Applications VMs Virtual Networks VRFs Block Storage

Refresh Create Delete Start Stop Pause Suspend Resume Other Actions

Filters **Reset** x VAPPs (0)

Provisioning Status

- ☒ Active
- ☒ Pending

All Refine Results Hide Filters

<input type="checkbox"/>	VAPP Name	Provisioning Status	VAPP Type	# VMs
VAPPs (0)				

In the **Search for Offers** tab, select **Package Offer** as **Offer Source** and click **Next**.

Ericsson Cloud Manager

Quota Alarms (0) Help tenant\_id / use

Assets Resources Orders Alarms Infrastructure Administration

## Create Virtual Application (VAPP)

Search for Offers Choose Offer Enter Attributes

### Search for Offers

Tenant

tenant\_id

Asset Type\*

Virtual Application

Offer Source\*

Package Offer

VDC Name\*

virtual\_data\_center\_id (CEE)

Cancel Next →



Ericsson Cloud Manager

Quota Alarms (0) Help tenant\_id / use

Assets Resources Orders Alarms Infrastructure Administration tenant\_id

## Create Virtual Application (VAPP)

Search for Offers Choose Offer Set VIM Criteria Choose VIM Zone

### Choose Offer

VAPP Offers in VDC virtual\_data\_center\_id (1)

Refine Results

Offer Name	Offer Source	Description
SAPC_cxp9032849_revision	OVF Package	SAPC ova file description

SAPC\_cxp9032849\_revision

- Virtual Application: SAPC
  - Virtual Machine: SC-1
    - VM VNIC: Network\_Adapter\_1
      - Virtual Network: Internal0
    - VM VNIC: Network\_Adapter\_2
      - Virtual Network: Internal1
    - VM VNIC: Network\_Adapter\_3
      - Virtual Network: ExtOAM0
  - Virtual Machine: SC-2

Cancel Previous Next

In the **Choose Offer** tab, select the OVF or HOT package with the SAPC desired and click **Next**.

In the **Set VIM Criteria** tab, add VIM characteristics if any or leave it empty. Press **Submit Order** and click **Next**.





Ericsson Cloud Manager

Quota Alarms (0) Help tenant\_id / use

Assets Resources Orders Alarms Infrastructure Administration tenant\_id

## Create Virtual Application (VAPP)

Choose Offer Set VIM Criteria Choose VIM Zone

### Set VIM Criteria

Optionally Select additional VIM Characteristics. Users can view but NOT assign additional characteristics at the Resource Groups level.

Characteristics Level

VIM Level

Resource Groups

Group1

Available (0)

Refine Results

Characteristics

Required (0)

Refine Results

Characteristics

No available characteristics

No required characteristics

Cancel Previous Next

Ericsson Cloud Manager

Quota Alarms (0) Help tenant\_id / use

Assets Resources Orders Alarms Infrastructure Administration tenant\_id

## Create Virtual Application (VAPP)

Choose Offer Set VIM Criteria Choose VIM Zone Enter Attributes

### Choose VIM Zone

New asset will be created in this VIM Zone \*

CEE VIM Zones (1)

Name	Site	Used Virtual CPU	Used Vir
SAPC04	GIC ROS Data Center	42 / Unspecified	82 / Unspecified

Cancel Previous Next

In the **Choose VIM Zone** tab, VIM is preselected, so click **Next**.

In the **Enter Attributes** tab, review the correct values for the virtual application. Press **Submit Order**.



Ericsson Cloud Manager

Quota Alarms (0) Help tenant\_id / use

Assets Resources Orders Alarms Infrastructure Administration tenant\_id

## Create Virtual Application (VAPP)

Set Offer Set VIM Criteria Choose VIM Zone Enter Attributes

### Enter Attributes

SAPC\_cxp9032849\_revision in VDC ...

```
<?xml version="1.0" encoding="UTF-8"?>
<Envelope xmlns="http://schemas.dmtf.org/cim/2.0.0">
  <!--
  OVF descriptor for the following SAPC deployment
  -->
  <pre>
deployment_type = custom
target_cloud_system = ecm_cee
version = R6
create_ova_file = true
sc_count = 2
sc_vcpus = 2
sc_mem = 6144
  </pre>
  </Envelope>
```

Attributes

Objects Configuration Images

Assign Prefix to Object Names\*

None

Objects (17)

Object Type	Parent Object	Name
-------------	---------------	------

Cancel Previous Submit Order

**Order Submitted**

Order [2043020](#) has been submitted successfully.

Create More Assets View Asset List

An order is created. Click the blue number link in the **Order Submitted** pop-up window. Check the **Order Details** window until the order is **Completed**, as in the example below.



Order Details

Completed

1876214

Submitted By

tenant403

Submitted Date

03/12/2018 16:57:20

Order Message

None

Detail Status

Completed

Completion Date

03/12/2018 16:59:47

Order Items

Order Parameters

Create Virtual Machine

SC-1

VDC: tenant403 / VAPP: SAPC

System ID: 6f68b8a0-a498-495f-95a7-8cd0c247c626

Boot Source

Image Name: sapc\_sc-1\_cxp9032849\_7r3a12

Server Resource Templ...: 2vcpu\_6144MBmem\_40GBdisk

Metadata

ha-policy: managed-on-host

Dereference

Close

Check if the vApp has **Provisioning Status Active**.

VAPPs (1)

All ▾	Refine Results	🔍	Hide Filters			
<input type="checkbox"/>	VAPP Name ▴ ▾	Provisioning Status ▴ ▾	VAPP Type ▴ ▾	# VMs ▴ ▾	# Connection Points ▴ ▾	# Service Associations ▴ ▾
<input type="checkbox"/>	SAPC ⋮	● Active		8	0	0

Check in tab **VMs** that all **vAPP** virtual machines have the **Provisioning Status** and **Operational Status** columns set to **Active** status.



<div> <span>Delete</span> <span>Start</span> <span>Stop</span> <span>Pause</span> <span>Suspend</span> <span>Resume</span> <span>Other Actions</span> </div>					
VMs (8)					
<div> <span>All</span> <span>Refine Results</span> <span>Hide Filters</span> </div>					
<input type="checkbox"/>	VM Name		Provisioning Status	Operational Status	VAPP Name
<input type="checkbox"/>	PL-3		● Active	● Active	SAPC
<input type="checkbox"/>	PL-4		● Active	● Active	SAPC
<input type="checkbox"/>	SC-1		● Active	● Active	SAPC
<input type="checkbox"/>	SC-2		● Active	● Active	SAPC
<input type="checkbox"/>	VR-1		● Active	● Active	SAPC
<input type="checkbox"/>	VR-2		● Active	● Active	SAPC
<input type="checkbox"/>	VR-3		● Active	● Active	SAPC
<input type="checkbox"/>	VR-4		● Active	● Active	SAPC

## 3.2 Deployment with OpenStack CLI

Follow this procedure to deploy the SAPC in OpenStack using the OpenStack CLI.

**Note:** To execute the "openstack" command properly, set up the following environment variables:

- **OS\_AUTH\_URL** points to Keystone service
- **OS\_CACERT** for the verification of the server certificate
- **OS\_TENANT\_NAME** contains the name of the tenant where the stack is to be created
- **OS\_USERNAME**: user with appropriate rights
- **OS\_PASSWORD**: password for OS\_USERNAME

### 3.2.1 Upload the SAPC HOT Package

The generated **yaml** files in Section 2.2 on page 3 must be uploaded to a machine where the OpenStack CLI is available (OpenStack\_cli\_server). The HOT package is named SAPC\_cxp9032849\_<revision>.zip.

Once the HOT package is transferred to the OpenStack\_cli\_server, it has to be extracted:

```
<OpenStack_cli_server># mkdir ~/<my_deploy_dir>
```

```
<PreparationServer># sftp <User@OpenStack_cli_server>
```



Transfer `SAPC_cxp9032849_<revision>.zip` to `~/<my_deploy_dir>`.

```
<OpenStack_cli_server># cd ~/<my_deploy_dir>
```

```
<OpenStack_cli_server># unzip SAPC_cxp9032849_<revision>.zip
```

### 3.2.2 Upload the SAPC Images CLI

Connect to the `OpenStack_cli_server` by ssh using the provided credentials, and change to the directory where the SAPC HOT template files are extracted.

Run the `openstack image create` command to upload the required images under `~/<my_deploy_dir>/Resources/Images` to OpenStack:

```
sapc_sc_cxp9032849_<revision>
sapc_pxe_cxp9032849_<revision>
sapc_vr_cxp9032849_<revision> (optional)
```

The example below shows how to upload the SC image:

```
<OpenStack_cli_server># openstack image create --container-format
bare --disk-format qcow2 --file Resources/Images/sapc_sc_cxp903284
9_<revision>.qcow2 sapc_sc_cxp9032849_<revision>
```

---



---

### Do!

Repeat the `openstack image create` command for each required image file.

---



---

**Note:** After the images of the virtual machines are uploaded to OpenStack, it is recommended to remove the **qcow2** images from the `~/<my_deploy_dir>/Resources/Images` directory, to save time and disk space during the deployment phase.

### 3.2.3 Create Flavors

In **OpenStack**, a flavor defines the compute, memory, and storage capacity of a virtual server that the users can launch.

#### 3.2.3.1 Create Flavors for OpenStack

During the VNF descriptor generation described in [SAPC VNF Descriptor Generator Tool](#), a script to create flavors is automatically generated: `openstack_flavors_sapc_cxp9032849_<revision>.sh`.

These flavors are valid for deployments on OpenStack configured for CPU Pinning and Non-Uniform Memory Access (NUMA) Awareness, for example CEE.



1. Transfer `openstack_flavors_sapc_cxp9032849_<revision>.sh` to `OpenStack_cli_server`.
2. Log on to the `OpenStack_cli_server`.
3. Enter the following command to execute the script and create the needed flavors:

```
OpenStack_cli_server:# ./openstack_flavors_sapc_cxp9032849_<revision>.sh
```

**Note:** The output of the script describes the result of the creation, so no manual check is needed.

### 3.2.3.2 Create Flavors for OpenStack Not Configured for CPU Pinning and NUMA Awareness

1. Log on to the `OpenStack_cli_server`.
2. Enter the following commands to create the needed flavors:

```
OpenStack_cli_server:# openstack flavor create --ram 6144  
--vcpus 2 --disk 40 2vcpu_6144MBmem_40GBdisk
```

```
OpenStack_cli_server:# openstack flavor create --ram 10240  
--vcpus 2 --disk 0 2vcpu_10240MBmem_0GBdisk
```

```
OpenStack_cli_server:# openstack flavor create --ram 1024  
--vcpus 2 --disk 4 2vcpu_1024MBmem_4GBdisk
```

**Note:** The last command is valid only for deployments with VRs.

**Note:** The output of each script describes the result of the creation, so no manual check is needed.

### 3.2.4 Deploy the SAPC Stack

The **stack** is a concept that is used to logically group several virtual machines and other resources together in a logical entity. When creating a **stack**, OpenStack is instructed to create all the virtual machines and other related objects in a specific order, as specified in the **stack** definition file. In the case of the SAPC, the **SC-1** is created first, and then the rest of the virtual machines. The **stack** provisioning status changes to **Create Complete** when all virtual machines are started.

Execute the following steps:

1. Connect to the machine running OpenStack CLI by SSH using the provided credentials, and change to the directory where the SAPC HOT template files are extracted.

```
<OpenStack_cli_server># cd ~/<my_deploy_dir>
```

2. Execute the following command:



```
<OpenStack_cli_server># openstack stack create -t  
SAPC_cxp9032849<revision>.yaml -e Resources/EnvironmentFiles/SAPC_cxp9032849<revision>params.yaml <stack_name>
```

3. Run the `openstack stack list` command. The status for the stack changes to `CREATE_IN_PROGRESS` until the operation is finished and the status changes to `CREATE_COMPLETE`.

### 3.3 Verify the SAPC Deployment

Even though the SAPC comes up properly after deployment with no manual interaction, a command is provided to perform a check of the SAPC health.

Log on with the **root** user to the **SC-1** virtual machine, through the virtual console, either from within the ECM WEB GUI or from OpenStack available dashboard (for example Horizon or Atlas).

Once the virtual console has started, the login prompt is displayed. If the console remains black, then hit any key on the keyboard.

Log on as the root user to the **SC-1** virtual machine and execute the **sapcHealthCheck** command as is explained in the [SAPC Advanced Troubleshooting Guideline](#) document for getting the node state.







## 4 Install Additional SAPC Instances

### 4.1 Install Additional SAPC Instances from ECM

Additional SAPC instances can be deployed in the same VDC. The OVF or HOT package uploaded and used to deploy the first SAPC instance can also be used for the additional instance if the dimensioning (VM size and number of VMs) remains the same (details explained in this chapter). If not, a different OVF or HOT package must be generated following the previous chapters.

**Note:** To permit the deployment of additional instances, the objects for each instance **must be unique**.

#### 4.1.1 Customize the Additional SAPC Instance

Before the deployment of the additional instance, the configuration file for the SAPC customization (`adapt_cluster.cfg`) must be modified with the proper configuration, related to external VIPs for traffic and OAM, Diameter configuration, and so on, according to the [SAPC VNF Descriptor Generator Tool](#) document.

#### 4.1.2 Deploy Additional SAPC Instances

Repeat the steps explained in Section 3.1.4 on page 18 up to the point in which the **Enter Attributes** tab in the **Create Virtual Application (vAPP)** window is displayed.

To assign individual names to all objects within the OVF package for the additional instance, select the **Manual Prefix** option in the **Enter Attributes** tab. That option is in the **Assign Prefix to Object Names** dropdown menu and introduces a prefix for the vAPP.



## Create Virtual Application (VAPP)

Search for Offers Choose Offer Set VIM Criteria Choose VIM Zone Enter Attributes

Enter Attributes

SAPC\_cxp9032849\_revision in VDC virtual\_data\_c...

```
<?xml version="1.0" encoding="UTF-8"?>
<Envelope xmlns="http://schemas.dmtf.org/ovf/envelope/2" xmlns:ovf="http://schemas.dmtf.org/ovf/envelope/2" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://schemas.dmtf.org/ovf/envelope/2 http://schemas.dmtf.org/ovf/envelope/2/ovf-environmental.xsd">
  <!--
  OVF descriptor for the following SAPC deployment:
  deployment_type = custom
  target_cloud_system = ecm_cee
  version = R6
  create_ova_file = true
  sc_count = 2
  sc_vcpus = 2
  sc_mem = 6144
  sc_disk = 40
  pl_count = 2
  pl_vcpus = 2
  pl_mem = 10240
  pl_disk = 0
  HW flavor      vCPUs      Memory [MB]  Disk [GB]
  #1             2           6144         40
  -->
  </Envelope>
```

Attributes

Objects Configuration Images

Assign Prefix to Object Names\* Prefix Text\*

Manual Prefix prefix\_id

Objects (17)

Object Type	Parent Object	Name in Package
Virtual Application name		SAPC
Virtual Machine name	VAPP: SAPC	SC-1

Cancel Previous Submit Order

Select the **Configuration** tab for the SC-1 and VR-1, VR-2, VR-3, and VR-4 (if applicable) virtual machines and choose the modified `adapt_cluster.cfg` file created in the previous section.

## Create Virtual Application (VAPP)

Search for Offers Choose Offer Set VIM Criteria Choose VIM Zone Enter Attributes

Enter Attributes

SAPC\_cxp9032849\_revision in VDC virtual\_data\_c...

```
<?xml version="1.0" encoding="UTF-8"?>
<Envelope xmlns="http://schemas.dmtf.org/ovf/envelope/2" xmlns:ovf="http://schemas.dmtf.org/ovf/envelope/2" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://schemas.dmtf.org/ovf/envelope/2 http://schemas.dmtf.org/ovf/envelope/2/ovf-environmental.xsd">
  <!--
  OVF descriptor for the following SAPC deployment:
  deployment_type = custom
  target_cloud_system = ecm_cee
  version = R6
  create_ova_file = true
  sc_count = 2
  sc_vcpus = 2
  sc_mem = 6144
  sc_disk = 40
  pl_count = 2
  pl_vcpus = 2
  pl_mem = 10240
  pl_disk = 0
  HW flavor      vCPUs      Memory [MB]  Disk [GB]
  #1             2           6144         40
  -->
  </Envelope>
```

VAPP: SAPC

VM: SC-1

VM: SC-2

VM: PL-3

VM: PL-4

Configuration Parameters (1)

Name	Classifier	Data Type	C
configDrive		boolean	

Configuration Files (1)

Package File Contents	New File Contents*
adapt_cluster.cfg	adapt_cluster_modified.cfg

Select File

Cancel Previous Submit Order

Click the **Submit Order** button. Repeat steps in Section 3.3 on page 27 to validate the deployment of the additional instance.

If a HOT package is used for the additional instance, select the **Enter Attributes** tab, and introduce a **Virtual Application Name** that is different from the one that was used previously.



## Create Virtual Application (VAPP)

Search for Offers Choose Offer Set VIM Criteria Choose VIM Zone Enter Attributes

Enter Attributes

SAPC\_cxp9032849\_revision\_ECM in VDC tenant401

```
heat_template_version: '2015-04-30'
description: >
  HOT template for Ericsson SAPC.
  VDP version: SAPC_cxp9032849_7r4a32
  Generated 2018-06-28 Time: 21:58:43 CEST by bin/SAPC_descriptor_generat
Copyright (c) Ericsson AB.
All rights reserved.
#=====
parameter_groups:
#=====
- label: Flavor
  parameters:
    - scs_flavor
    - pls_flavor
    - vrs_flavor
- label: Image
  parameters:
    - sc_image
    - pl_image
    - vr_image
- label: Availability Zone
  parameters:
    - nova
```

Attributes

Basic Information Configuration Files

Virtual Application Name\*

SAPC\_cxp9032849\_revision\_ECM\_2

VAPP Version VAPP Vendor

VAPP Type Flavor

Type value or select...

Description

Select the **Files** tab and introduce a new `adapt_cluster.cfg` file for this specific instance by pressing the **Replace File** button.

## Create Virtual Application (VAPP)

Search for Offers Choose Offer Set VIM Criteria Choose VIM Zone Enter Attributes

Enter Attributes

SAPC\_cxp9032849\_revision\_ECM in VDC tenant401

```
heat_template_version: '2015-04-30'
description: >
  HOT template for Ericsson SAPC.
  VDP version: SAPC_cxp9032849_7r4a32
  Generated 2018-06-28 Time: 21:58:43 CEST by bin/SAPC_descriptor_generat
Copyright (c) Ericsson AB.
All rights reserved.
#=====
parameter_groups:
#=====
- label: Flavor
  parameters:
    - scs_flavor
    - pls_flavor
    - vrs_flavor
- label: Image
  parameters:
    - sc_image
    - pl_image
    - vr_image
- label: Availability Zone
  parameters:
    - nova
```

Attributes

Basic Information Configuration Files

Configuration Files (2) Add More Files Reset To Default

File Type	File ID*	
HOT Reference	Resources/HotFiles/SAPC_cxp9032849_7r4a32	
User Configuration	Resources/UserConfigurationFiles/adapt_cluster	Replace File

Environment Files (1) Add More Files Reset To Default

File Name	
Resources/EnvironmentFiles/SAPC_cxp9032849_7r4a32_params.yaml	Replace File

Click the **Submit Order** button. Repeat steps in Section 3.3 on page 27 to validate the deployment of the additional instance.

## 4.2 Install Additional Instances with OpenStack CLI

Similarly to Section 4.1 on page 29, additional SAPC instances can be deployed with OpenStack CLI, although in this particular case to deploy a new SAPC instance it is much simpler than in the ECM case. To deploy a new SAPC instance, just proceed with the provided steps in Section 3.2.4 on page 26 using a different `stack_name`, since OpenStack Heat does not allow stack name duplicity.



**Note:** The HOT Environment file needs to be adapted accordingly to describe new VIPs to be applied for the new SAPC instance before the stack command is executed.

Follow steps in Section 3.3 on page 27 to validate the deployment of the additional instance.



## 5 Deploy the SAPC for Geographical Redundancy

To perform the SAPC installation in the Geographical Redundancy scenario, deploy each of the SAPC nodes as stated in Section 3 on page 5.

It is important to remark that the **PREFERRED** parameter is set to a different value on each node to be deployed. For more details, see [Adapt Cluster Tool](#).





## 6 Configure the SAPC

### 6.1 SAPC Hardening after Deployment

For detailed information, refer to [Security Hardening Guide](#).

### 6.2 Connectivity to External Networks

The SAPC application uses a predefined set of subnetworks that were set up during the installation process when the SAPC vAPP was created. This is just an example considering the basic configuration without traffic separation. In other configurations, additional external networks may exist, although the principle shown in this section would be the same including the additional external networks.

The External OAM and External Traffic networks are the ones used to connect the vApp to the external world while the remaining networks are mainly for the SAPC virtual machine inter-operability.

To ensure the SAPC accessibility from outside the cloud and from other nodes, such as EPG and MME, specific routes must be defined in Border Gateway Routers to guarantee access to the vApp VIPs (OAM and Traffic).

The following sections describe an example (four Border Gateway Routers) and just taking an Extreme Switch x460/x670 as a reference, the following routing must be set up.

#### 6.2.1 Configuration Example of OAM Border Gateway Routers (Extreme x670)

Log in to the Border Gateway Routers:

```
PreparationServer:# ssh admin@<Extreme Switch>
```

Check if External-OAM VLAN exists and contains the suggested IP address (10.41.30.225 for External-OAM) and the required configuration.

```
BorderGatewayRouter:# show vlan
```

```
SAPC_Cloud_2004 2004 10.41.30.225 /29 -f-----
ANY 4 /4 VR-Cloud
```

If the VLAN does not exist, create it:

```
BorderGatewayRouter:# create vlan <Vlan Name 1>, SAPC_Cloud_<tag 1>>
```

```
BorderGatewayRouter:# configure vlan <Vlan Name 1> tag <Tag 1>
```



```
BorderGatewayRouter:# configure vlan <Vlan Name 1> add ports
<Switch Ports> tagged
```

Ensure the SAPC accessibility from outside the cloud and from other nodes, such as EPG and MME:

Configure IP addresses for the External VLANs and IP routing:

```
BorderGatewayRouter:# configure vlan <Vlan Name 1> ipaddress
10.41.30.225 255.255.255.248
```

```
BorderGatewayRouter:# enable ipforwarding vlan <Vlan Name 1>
```

```
BorderGatewayRouter:# configure iproute add <VIP_OAM>
255.255.255.255 10.41.30.226
```

Save the configuration changes done in the Border Gateway Router switch:

```
BorderGatewayRouter:# save configuration
```

The configuration file primary.cfg already exists.

Do you want to save configuration to primary.cfg and overwrite it? (y/N) Yes

Saving configuration on master ..... done!

Configuration saved to primary.cfg successfully.

```
# save configuration secondary
```

The configuration file secondary.cfg already exists.

Do you want to save configuration to secondary.cfg and overwrite it? (y/N) Yes

Saving configuration on master ..... done! Configuration saved to secondary.cfg

The current selected default configuration database to boot up the system (primary/secondary) is primary.

Default configuration database selection cancelled.

## 6.2.2 Configuration Example of Traffic Border Gateway Routers (Extreme x670)

Log in to the Border Gateway Routers:

```
PreparationServer:# ssh admin@<Extreme Switch>
```

Check if External-Traffic VLAN exists and contains the suggested IP address (10.41.70.225 for External-Traffic) and the required configuration.

```
BorderGatewayRouter:# show vlan
```

```
SAPC_Cloud_2005 2005 10.41.70.225 /29 -f-----
ANY 4 /4 VR-Cloud
```

If the VLAN does not exist, create it:

```
BorderGatewayRouter:# create vlan <Vlan Name 2, SAPC_Cloud_<tag
2>>
```





```
BorderGatewayRouter:# configure vlan <Vlan Name 2> tag <Tag 2>
```

```
BorderGatewayRouter:# configure vlan <Vlan Name 2> add ports
<Switch Ports> tagged
```

Ensure the SAPC accessibility from outside the cloud and from other nodes, such as EPG and MME:

Configure IP addresses for the External VLANs and IP routing:

```
BorderGatewayRouter:# configure vlan <Vlan Name 1> ipaddress
10.41.70.225 255.255.255.248
```

```
BorderGatewayRouter:# enable ipforwarding vlan <Vlan Name 1>
```

```
BorderGatewayRouter:# configure iproute add <VIP_TRAFFIC>
255.255.255.255 10.41.70.226
```

Save the configuration changes done in the Border Gateway Router switch:

```
BorderGatewayRouter:# save configuration
```

```
The configuration file primary.cfg already exists.
```

```
Do you want to save configuration to primary.cfg and overwrite it? (y/N) Yes
```

```
Saving configuration on master ..... done!
```

```
Configuration saved to primary.cfg successfully.
```

```
# save configuration secondary
```

```
The configuration file secondary.cfg already exists.
```

```
Do you want to save configuration to secondary.cfg and overwrite it? (y/N) Y
```

```
Saving configuration on master ..... done! Configuration saved to secondar
```

```
The current selected default configuration database to boot up the system (p
```

```
Default configuration database selection cancelled.
```

## 6.3 Set the SAPC Licenses Configuration

The configuration of the application is done logging into the SAPC through the OAM VIP. This can be done either directly from the OAM Border Gateway Router, or from outside the cloud (for example, Jumpstart Server) if proper routing was in place: `ssh vr "VR-Default" root@<VIP_OAM>`.

In case of problems logging into the SAPC VM through the VIP-OAM, connect through a virtual console reachable from ECM or the OpenStack dashboard, as it was specified in former sections.

Configure the licenses following these steps.

1. Set the fingerprint with the value given during the license ordering. For more information, see [LM User Guide for ELIM](#).
2. Install the license key file following [Install License Key File](#).



3. Check the license information following [View License Information](#).

## 6.4 Final Backup

Once the SAPC configuration is done, generate a system backup. Follow the instructions specified in [Create Backup](#).