

# SAPC VNF Lifecycle Manager Workflow Instruction for OpenStack

Ericsson Service-Aware Policy Controller

Installation Instructions

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# 1 SAPC VNF Lifecycle Manager Workflow Instruction for OpenStack Introduction

The purpose of this document is to describe the VNF Lifecycle Manager (VNF-LCM) use cases (Workflows) for the SAPC in OpenStack based NFVIs.



## 2 SAPC VNF Lifecycle Manager Workflow Instruction for OpenStack Overview

The VNF-LCM is an Ericsson implementation of the ETSI defined S-VNFM. For more information on VNF-LCM, see *VNF-LCM CEE Upgrade Instructions*, *VNF-LCM Openstack Upgrade Instructions*, *VNF Lifecycle Management, System Administration Guide*, and *VNF Lifecycle Manager User Guide*.

The workflows provide means to orchestrate simple or complex sequences of actions, which automate the VNF-LCM operations for the VNFs.

All vEPC VNF-LCM workflow packages require the use of external storage that is configured on the Virtual Network Function Lifecycle Automation Framework Services (VNFLAF-Services) Virtual Machine (VM). The workflows can manage SAPC with Heat in generic OpenStack environments, such as RedHat OpenStack, or Ericsson CEE OpenStack environment. The SAPC VNF-LCM workflows are applicable for the deployment with the HOT package.

The SAPC VNF-LCM workflows can be executed through any of the following modes. All these modes support multiple VIMs, and multiple tenant infrastructures:

- LCM executed interactively on VNF-LCM GUI

The mode is enabled to view and execute an ordered sequence of actions that are called **workflows**.

- VNF-LCM exposed NBI

This is a non-interactive alternative for executing LCM operations if the purpose is to centralize LCM operations of several S-VNFM, or enable script-based orchestration of VNFs, for example in Lab deployments.

**Note:** To execute SAPC on OpenStack, use the VNF-LCM media 18.04 or later releases.

The VNF-LCM can work either in LCM operations driven by VNF-LCM GUI or NBI. It is not possible to execute LCM operations from VNF-LCM GUI or NBI simultaneously.



## 3 SAPC VNF Lifecycle Manager Workflow Instruction for OpenStack Installation

To execute VNF-LCM operations, the workflows for the operations must be installed on a VNF-LCM Service VM.

Installation procedure requires access to a SAPC Virtual Deployment Package (VDP) and a workflow installation RPM package, both delivered for each VNF in the Ericsson Software Gateway.

### 3.1 VNF-LCM Preparation for Workflow Installation

Perform the following steps to install the RPM package:

#### Steps

1. Log in to the VNF-LCM service Virtual Machine (VM) with the cloud user credentials using this command:

```
ssh cloud-user@<vnflcm service IP>
```

#### Example

```
$ ssh cloud-user@10.93.200.81
Last login: Fri Jun 8 05:32:59 2018 from 10.64.189.246
[cloud-user@vnflaf-services ~]$
```

2. Copy the VNF VDP package to the VNF-LCM Service VM, and save it in the directory /vnflcm-ext/ericsson/ERICsapc\_lcm\_wf\_heatworkflows/work/vdp/ using the command:

```
cp
ERICsapc_lcm_wf_heat_CXP9034557_<productNumber>_<revision>.tar
.gz /vnflcm-ext/ericsson/ERICsapc_lcm_wf_heatworkflows/
work/vdp/
```

3. Extract the VNF VDP compressed file on the VNF-LCM Service VM using the command:

```
tar -xvf <VDP package>
```

#### Example

```
[cloud-user@vnflaf-services ~]$ tar -xvf vdp_sapc_qcow2_cxp9032849_7r4a28.tar.gz
vdp_sapc_qcow2_cxp9032849_7r4a28/
vdp_sapc_qcow2_cxp9032849_7r4a28/templates/
vdp_sapc_qcow2_cxp9032849_7r4a28/templates/adapt_cluster_template_network_separation.cfg
vdp_sapc_qcow2_cxp9032849_7r4a28/templates/adapt_cluster_template_georedActiveActive_noVr.cfg
vdp_sapc_qcow2_cxp9032849_7r4a28/templates/adapt_cluster_template.cfg
...
```



4. Grant permission to the **vdp** folder: `chmod -R 777 <VDP package>`.

Example

```
chmod -R 777 vdp_sapc_qcow2_cxp9032849_7r4a35
```

5. Copy the RPM file `ERICsapc_lcm_wf_heat_<productNumber>_<revision>.rpm` to the home directory of the cloud-user in the VNF-LCM Service VM using the command:

```
scp ERICsapc_lcm_wf_heat_<productNumber>_<revision>.rpm cloud-user@<vnflcm service IP>:/home/cloud-user
```

Example

```
$ scp ERICsapc_lcm_wf_heat_CXP9034557_1r5a01-1.4.0.rpm cloud-user@10.93.200.81:/home/cloud-user
ERICsapc_lcm_wf_heat_CXP9034557_1r5a01-1.4.0.rpm
100% 25 MB 24.6 MB/s 00:00
```

6. Perform the steps of the workflow installation as described in [Workflow Installation on VNF-LCM](#) on page 4.

For the workflow package installation guidelines, see *ENM System Administration Guide*.

## 3.2 Workflow Installation on VNF-LCM

Perform the following actions and commands to list, uninstall, and install the workflow. Installation and uninstallation of the SAPC workflows require the user to have root access.

The following actions are executed by the root user:

### Steps

1. Switch from cloud-user to root user on the VNF-LCM Service VM using the command:

```
sudo su -
```

2. List the installed workflows using the command:

```
wfmgr bundle list
```

3. Optional step: uninstall the previous workflow version using the command:

```
wfmgr bundle uninstall --name=<name> --version=<version>
```

Example

```
wfmgr bundle uninstall --name=sapc_lcm_wf_heat --version=1.3.0
```





4. Install the SAPC workflow using the command:

```
wfmgr bundle install --package=<path>
```

#### Example

```
wfmgr bundle install --package=/home/cloud-user/ERICsapc_lcm_wf_heat_ CXP9034557_1r5a01-1.4.0.rpm
```



## 4 HEAT Workflows

The following workflows operate using the cloud orchestrator *Heat*.

### 4.1 Onboarding

The Onboard SAPC on OpenStack workflow extracts the HOT package for the instantiation, uploads software images to OpenStack, and stores the yaml templates on the VNF-LCM environment.

It performs:

- Authentication on OpenStack
- Selection of VDP
- Selection of HOT package

#### 4.1.1 Preconditions

The following preconditions are required to meet in case of onboarding SAPC by VNF-LCM GUI and NBI:

- Extract the VNF VDP to `/vnflcm-ext/ericsson/ERICsapc_lcm_wf_heatworkflows/work/vdp`
- Generate HOT package following the instructions included in *SAPC VNF Descriptor Generator Tool* and store it in the SAPC vdp folder.
- User credentials used by the workflow has the proper rights and privileges to upload images, create flavors, and create availability zones in OpenStack. User credentials are pre-configured on the VNF-LCM environment
- The flavors, availability zones, and networks or subnetworks that are defined in the HOT package are created in the OpenStack environment manually

#### 4.1.2 Post-conditions

After the workflow is completed successfully, the following outcome is expected:

- Images in the VDP are uploaded to OpenStack if they have not been uploaded before
- HOT package is stored in a local database `/vnflcm_ext/current/vnf_package_repo`



### 4.1.3 Workflow Execution

Perform the steps to start an Onboard SAPC session on OpenStack workflow:

#### Steps

1. Select the Onboard SAPC option on OpenStack workflow from the list of workflows.
2. Click **Start a New Instance**.
3. Click **Submit** to continue.

#### 4.1.3.1 VIM and Tenant Selection

After clicking the Submit button from the start form, select VIM and Tenant for the workflow.

A VIM must be selected from the drop-down list.

The screenshot displays the 'Workflow Instance' page for 'Onboard SAPC on OpenStack SMALL STACK\_1529397236'. The 'Workflow Definition' section shows the name and version (1.5.0). The 'Workflow Progress' section indicates the workflow is 'In Progress' with a 5% completion bar and a start time of 2018-06-19 10:34:21. The 'Task' section on the right features a 'Select VIM' dropdown menu with a red asterisk, and 'Submit' and 'Reset' buttons. The 'Workflow Diagram' section at the bottom shows a sequence of steps: 'Onboard started', 'Start log', 'Precheck Parameters', 'Read Workflow Specific Parameters', 'Assign Stack to OpenStack' (highlighted in yellow), 'Initiate', 'Configure', 'Create Resource', and 'Store template'. A 'Log error message' button is also present at the end of the diagram.

Figure 1 Selection of VIM

A Tenant must be selected from the drop-down list.

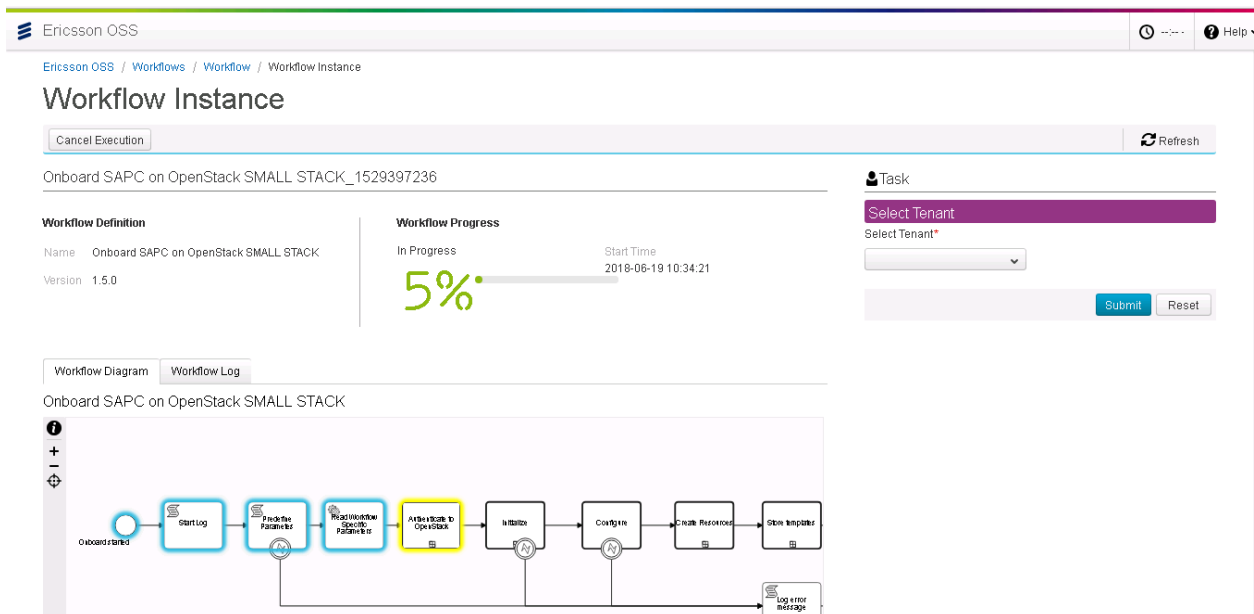


Figure 2 Selection of Tenant

#### 4.1.3.2 VDP Selection

Select a VDP for the workflow to continue.

#### Virtual Deployment Package

One VIM Package must be selected from the drop-down list.

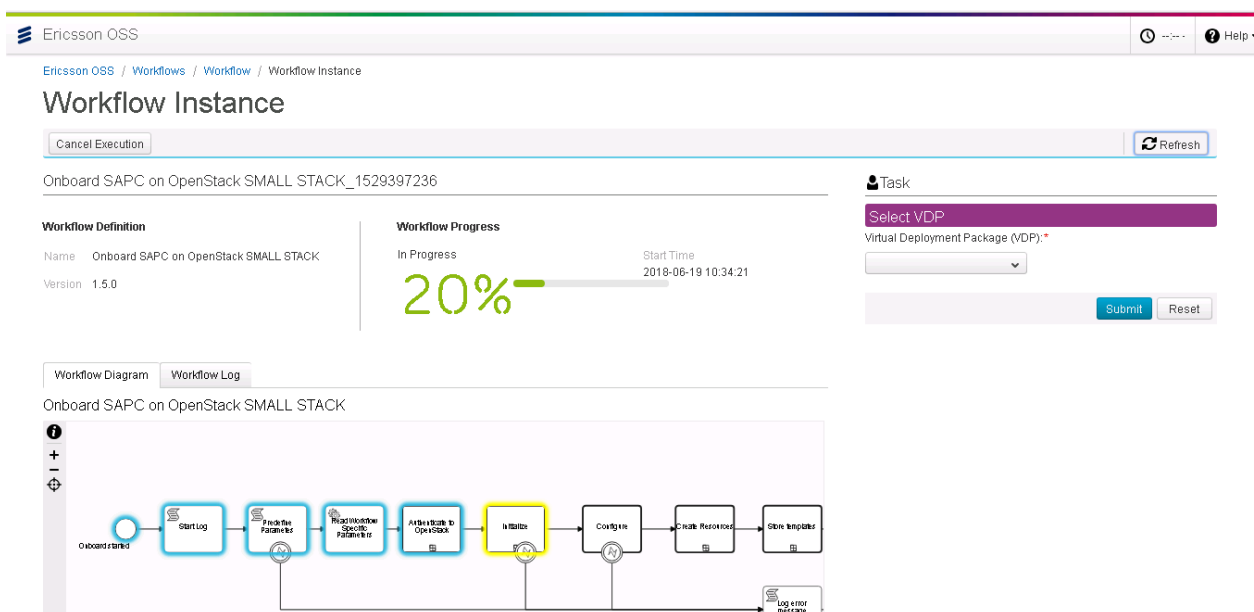


Figure 3 Selection of VDP Form



### 4.1.3.3 VNF Descriptor Selection

Select the VNF Descriptor file `SAPC_cxp9032849_<revision>.zip` from the drop-down list to continue.

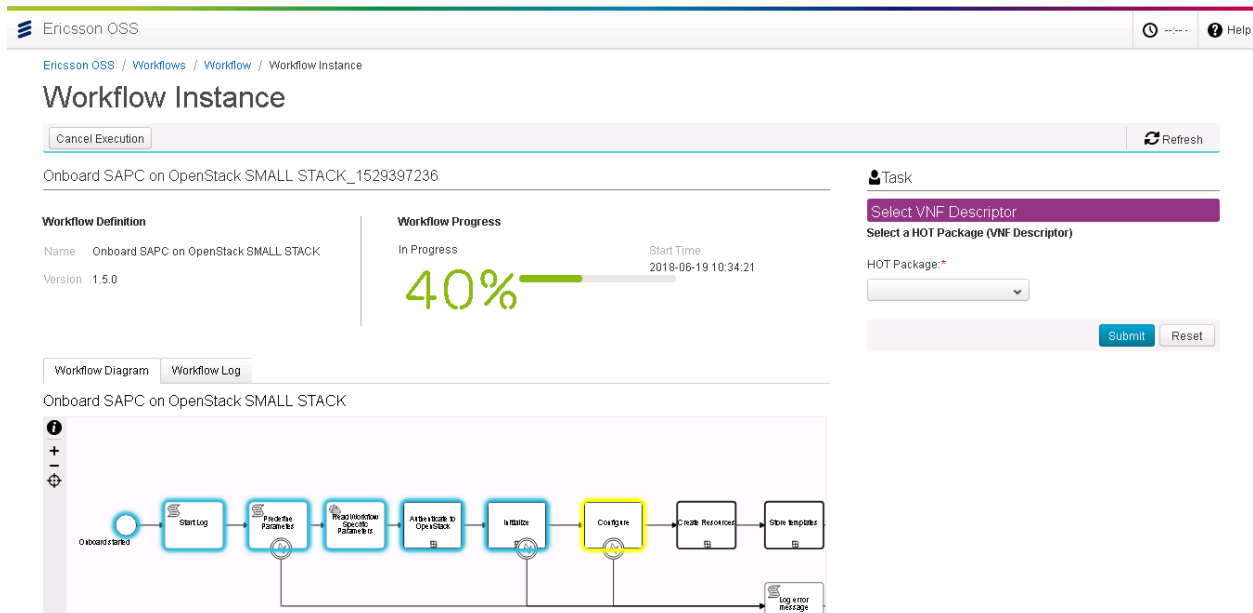


Figure 4 Selection of VNF Descriptor

### 4.1.4 Non-Interactive REST API Workflow Execution for Onboarding Process

The format of the NBI REST Call command is `curl -X POST http://IP:8080/wfs/rest/instances -d @NBI_DIR/NBI_parameter_file -H "Content-Type: application/json"`

The NBI\_DIR/NBI\_parameter\_file is on the server which runs the curl command.

The NBI parameter templates are stored in `/vnflcm_ext/ericsson/ERICsapc_lcm_wf_heatworkflows/work/nbi_templates` on the VNF-LCM.

Table 1 Non-Interactive REST API Workflow VNF Descriptor

Parameter Name	Type	Presence	Description
vimConnectionInfo	String	Optional	If the value is not defined, the default vim is used. Transfer the parameter original format to the following format: <pre>[{"vimId": "vim-name",   "vimType": "vimType",   "interfaceInfo": {     "identityEndPoint": "identity-endPoint-url",     "accessInfo": {       "projectId": "projectId",       "projectName": "projectName",       "domainName": "domainName"     }   } }]</pre>



Parameter Name	Type	Presence	Description
			<code>\\"domainName", \\"credentials\": {\\"username\":" userName \\",\\"password\":"\\"YWRtaW4= \\"},\\"extra\":"{\\"\\"}}}</code>
interactive	Boolean	Mandatory	Set to <i>false</i> in order to use REST API.
vnfVdp	String	Mandatory	Virtual Deployment Package name under the path: ext/ericsson/ ERICsapc_lcm_wf_vcdworkflows/work/vdp
vnfDescriptorDescription	String	Optional	Description of the VNF Descriptor.
vnfdId	String	Mandatory	Name of the descriptor file to create. It must be different from the existing ones.
vnfdFileName	String	Mandatory	Name of the HOT package to be used.

## 4.2 Instantiation

The SAPC Instantiation on OpenStack workflow creates a SAPC VNF. It performs the following steps:

- Authentication on OpenStack
- Template file selection
- Injection file selection upon request of the template
- Instantiation of SAPC
- Update of the VNF in ENM/OSS-RC topology
- Enable SSH on SAPC

### 4.2.1 Preconditions

The following pre-conditions are needed:

- An Onboard SAPC on OpenStack workflow must be executed previously to have the environment ready with the HOT templates created
- The parameters `ossUserName`, `ossPassword`, and `ossHostName` must be preconfigured in the VNF-LCM Services VM

### 4.2.2 Post-conditions

After the workflow finished successfully, a SAPC application is created in the OpenStack per the definitions in the HOT file.



The information of the SAPC is updated in ENM/OSS-RC topology.

The VNF-LCM can connect directly by SSH with the SAPC.

#### 4.2.3 Post-configuration

After Workflow completion, follow the steps to configure the SAPC included in VNF Deployment Instruction for OpenStack.

#### 4.2.4 Workflow execution

Perform the following steps to start SAPC Instantiation on OpenStack workflow:

##### Steps

1. Click the SAPC Instantiation on OpenStack workflow from the list in the workflows.
2. Click the Start a New Instance button.

Some parameters are requested to be filled in on the start form. No more user interaction is requested during the workflow execution.



[Ericsson OSS](#) / [Workflows](#) / [Workflow](#) / Start A Workflow

## Start A Workflow

### Instantiate SAPC on OpenStack

**Instance Name\***

**VNF Instance Name:\***

☒ Rollback on Heat create failure?

☒ Add Network Element in ENM/OSS-RC?

☒ Enable SSH Key Pair

Figure 5 Start Form of SAPC Instantiation on OpenStack

#### 4.2.4.1 VIM and Tenant Selection

##### VNF Instance Name

After clicking the Submit button from the start form, select the VIM and Tenant for the workflow.

A VIM must be selected from the drop-down list.



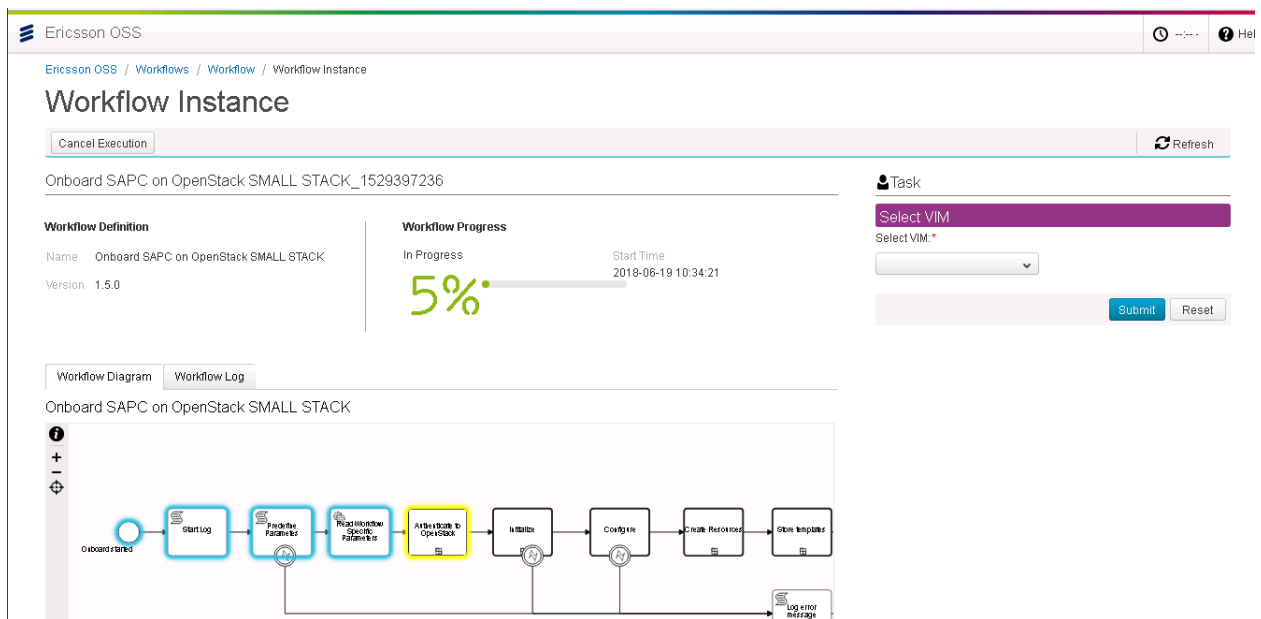


Figure 6 Selection of VIM

A Tenant must be selected from the drop-down list.

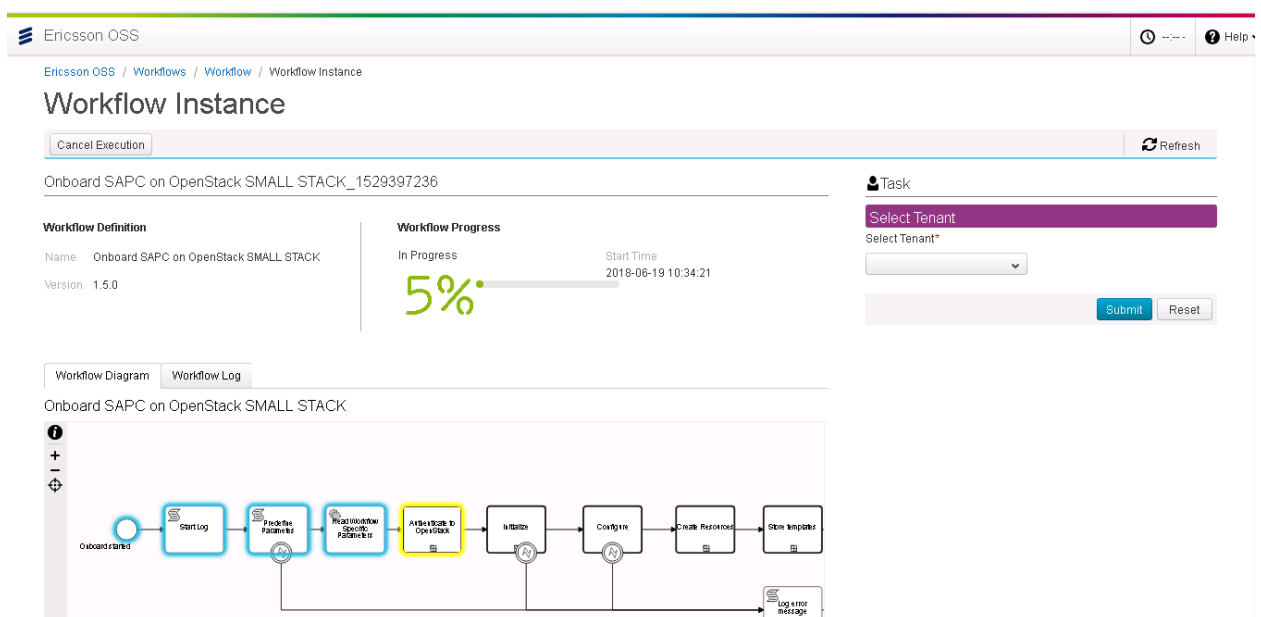


Figure 7 Selection of Tenant

### Rollback on Heat create failure?

If checked: If the Instantiate SAPC workflow fails during the stack creation, the Heat orchestration triggers rollback and delete all resources created in the instantiation process. If the Instantiate SAPC workflow fails after the stack created, the resources created in the instantiation workflow, and the failure logs are kept until the user deletes them manually. The failure reasons are recorded in

**Workflow Log.** If unchecked: If the Instantiate SAPC workflow fails, no rollback is performed. The resources created in the instantiation, and the failure logs are kept until the user deletes them manually.

## Add Network Element in ENM/OSS-RC

If checked: Workflow requests related parameter as shown in chapter 4.2.3.4 and add new VNFs to ENM or OSS-RC network resource model; If unchecked, workflow ends, means finished successfully.

## Enable SSH

If checked: After SAPC instantiation, the workflow will request the selection of a VDP. This allows the VNF-LCM to find the script that connects the SAPC with the VNF-LCM automatically. If Add Network Element has not checked, this step asks for the VNF credentials.

#### 4.2.4.2 Template File Selection

When the Template File Name is invalid, the workflow requests selection for template file, as show in below figure. The template file defines the SAPC application. The template file should be uploaded to the VNFLAF-Services VM directory (automatically done by Onboarding workflow). Select the files from drop-down list, then click the Submit button to continue the workflow.

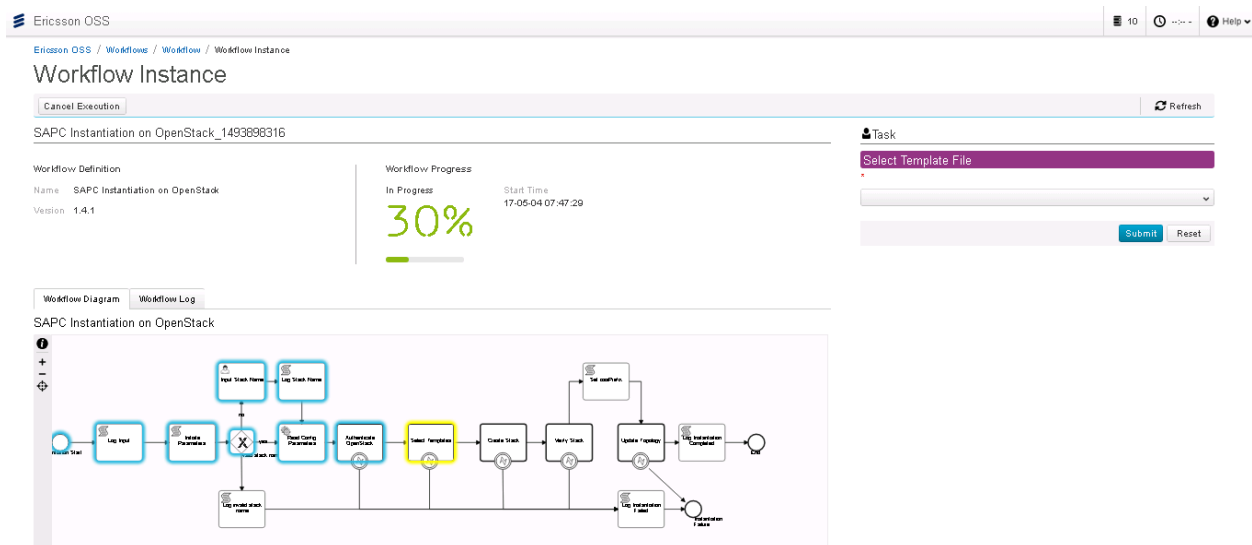


Figure 8 Selection of Template Form

Table 2 Template File Parameters

Parameter Name	Type	Presence	Description
interactive	Boolean	Mandatory	Set to false to use REST API.
vnfInstanceName	String	Mandatory	Name of the workflow instance.



Parameter Name	Type	Presence	Description
addVNFToOSS	Boolean	Mandatory	Update topology in OSS/ENM.
enableSSH	Boolean	Mandatory	Set to true to insert an sshKey in the SAPC. The key is under the VDP path.
enableRollback	Boolean	Mandatory	Use this parameter to rollback the creation of the SAPC in case of failure.
configFile	String	Optional	Name of the adapt cluster configuration file used.

If the Enable SSH is set to `true`, these parameters are required for the execution:

Table 3 Parameters of Enabled SSH

vnfIpAddress	String	Mandatory	The OAM service IP address of the instantiated SAPC.
vnfUsername	String	Mandatory	The username for the SAPC login.
vnfPassword	String	Mandatory	The password for the SAPC login.

#### 4.2.4.3 Injection File Selection

When the template requires an injection file, the workflow requests the selection for injection file. This injection file is at /vnflcm-ext/ericsson/ERICsapc\_lcm\_wf\_heatworkflows/work/vnf-configurations.

Select a file from the drop-down list, then click the Submit button to continue the workflow.

**SAPC Instantiation on OpenStack**

## Workflow Instance

Cancel Execution Refresh

SAPC Instantiation on OpenStack\_1493898316

---

Workflow Definition

Name SAPC Instantiation on OpenStack

Version 1.4.1

Workflow Progress

In Progress

Start Time  
17-05-04 07:47:29

30%

Task

Select Injection File

Submit Reset

---

Workflow Diagram Workflow Log

SAPC Instantiation on OpenStack

```

graph LR
    Start((Start)) --> LogInput[Log Input]
    LogInput --> MergeParam[Merge Parameters]
    MergeParam --> LogStackName[Log Stack Name]
    LogStackName --> SelectTemplate[Select Template]
    SelectTemplate --> CreateStack[Create Stack]
    CreateStack --> VerifyStack[Verify Stack]
    VerifyStack --> UpdateTemplate[Update Template]
    UpdateTemplate --> LogInjectionFile[Log Injection File]
    LogInjectionFile --> End((End))
  
```

Figure 9 Selection of Injection File Form



#### 4.2.4.4 Add Network Topology in ENM/OSS-RC

After stack has been created on HEAT, and the tick box *Add Network Element in ENM/OSS-RC* has been checked, the workflow requests related parameters as shown below and add new VNFs to ENM or OSS-RC network resource model.

##### Task

### Add Network Element in ENM/OSS-RC

#### VNF connection parameters

Management IP address:

\*

Username: \*

Password: \*

#### ENM/OSS-RC Network Element parameters

Associated Site  
(mandatory for OSS-RC):

Subnetworks:

Network Element Version  
(ossModelIdentity): \*

SNMP Community:

Figure 10 Form to Add Network Element



### VNF connection parameters

Management IP address: OAM service IP address of the newly instantiated SAPC.

Username: Username for login to the newly instantiated SAPC.

Password: Password for login to the newly instantiated SAPC.

### ENM/OSS-RC Network Element parameters

Associated Site: The site under which the VNF is to be added in OSS-RC network resource model. If no current site is used, fill in the string new. In ENM, this parameter is not used.

Subnetworks: Subnetwork is used for logical grouping of nodes within ENM and OSS-RC. In ENM deployment Subnetworks are optional and it can contain one or more child Subnetworks. Subnetwork has to be separated by ';', such like 'SubNetwork=SubnetworkName1, SubNetwork=SubnetworkName2', for example SubNetwork= SAPC. In OSS-RC deployment Subnetwork is mandatory, and only a single child Subnetwork is allowed. The input string of Subnetwork is without prefix SubNetwork=, like SubnetworkName, for example SAPC.

Network Element Version: The version of the Network Element. Example in OSS-RC like 16A-CP06, refer to 'supported Network Element' excel sheet in OSS-RC CPI in reference [8]. In ENM, this parameter refers to ossModelIdentity like 16A-CP02.

SNMP Community: Community string for SNMP. If not provided, default public would be taken for OSS-RC and in ENM, default enm-public would be taken.

#### 4.2.4.5

### Enable SSH

If the option has been selected. Enable SSH displays a form showing the available VDPs. After selecting one, the workflow will connect between the instantiated SAPC and the VNF-LCM storing the SSH Keys to connect automatically for further actions as Scale-In.



Ericsson OSS

Ericsson OSS / Workflows / Workflow / Workflow Instance

## Workflow Instance

Cancel Execution Refresh

Instantiate SAPC on OpenStack\_1522073502

**Workflow Definition**

Name Instantiate SAPC on OpenStack

Version 1.4.0

**Workflow Progress**

In Progress

Start Time 2018-03-26 10:12:17

70%

**Task**

Select VDP

Submit Reset

Workflow Diagram Workflow Log

Instantiate SAPC on OpenStack

Figure 11 Form to Enable SSH

#### 4.2.5 Non-Interactive REST API Workflow Execution for Instantiation Process

The format of the NBI REST Call command: `curl -X POST http://IP:8080/wfs/rest/instances -d @NBI DIR/NBI parameter file -H "Content-Type: application/json"`

The NBI DIR/NBI parameter file is on the server which runs the `curl` command.

The NBI parameter templates are stored in `/vnflcm_ext/ericsson/ERICsapc_lcm_wf_heatworkflows/work/nbi templates` on the VNF-LCM.

Table 4 Non-Interactive REST API Workflow Parameters

Parameter Name	Type	Presence	Description
vimConnectionInfo	String	Optional	If the value is not defined, the default vim is used. Transfer the parameter original format to the following format: <pre>[{"vimId": "vim-name",   "vimType": "vimType",   "interfaceInfo":     {"identityEndPoint":       {"identity-endPoint-url":         "\", \"accessInfo\":         {"projectId": "projectId",           "projectName":             "\", \"domainName":             "\", \"domainName":             "\", \"credentials":             {"username": "username",               "password": "YWRtaW4="             }, "extra": {"\"}}}</pre>



Parameter Name	Type	Presence	Description
interactive	Boolean	Mandatory	Set this parameter to false.
vnfInstanceName	String	Mandatory	The name of the stack to instantiate is OpenStack. As this is an OpenStack instance prefix too, a dash - is added at the end of the prefix. It is also the node ID of the SAPC to instantiate. The value contains alphanumeric characters only, or -, starts with alpha, and is 255 characters or less.
enableRollback	Boolean	Mandatory	This parameter indicates if the heat should perform a rollback in case the Instantiate VNF workflow fails during the stack creation.
continueUpdateTop	Boolean	Mandatory	This parameter indicates if the workflow adds the network element in ENM/OSS-RC after a successful VNF instantiation.
templateName	String	Mandatory	It is the template name in the catalog to use at VNF Instantiation.
configFile	String	Mandatory	The name of the VNF configuration file on the path <code>vnflcm-ext/ericsson/ERICsapc_lcm_wf_heatworkflows/work/vnf-configuration/</code> .
vnfHostname	String	Mandatory when <code>continueUpdateTop</code> is set to true	It is the OAM service IP address of the SAPC to instantiate.
vnfUsername	String	Mandatory when <code>continueUpdateTop</code> is set to true	It is the username for the SAPC login by ENM/OSS-RC of the SAPC to instantiate.
vnfPassword	String	Mandatory when <code>continueUpdateTop</code> is set to true	It is the password for the SAPC login by ENM/OSS-RC of the SAPC to instantiate.
subNetworks	String	Optional	It is the subnetwork used for logical grouping of the nodes within the ENM and OSS-RC. In ENM, it can contain one or more child subnetworks. Separate the subnetworks with commas and no spaces: <code>'SubNetwork=SubnetworkName1,SubNetwork=SubnetworkName2'</code> . In OSS-RC, only a single child Subnetwork is allowed. The input string of the Subnetwork is marked without the prefix <code>'Subnetwork='</code> , such as: <code>'Subnetworkname'</code> .
networkElementVersion	String	Mandatory when <code>continueUpdateTop</code> is set to true	It is the version of the network element. In OSS-RC, this parameter refers to <code>supportedNetworkElement</code> . In ENM, this parameter refers to <code>ossModelIdentity</code> . To execute the command in ENM to get the available Network Element Version is <code>cmedit describe -neType SAPC</code> .
communityString	String	Optional	It is the community string for the SNMP. Default value is public for OSS-RC, and enm-public for ENM.



## 4.3 Scale

The functionality of SAPC Scale workflow is to create or remove VMs in an existing SAPC application.

### 4.3.1 Preconditions

The following pre-conditions are needed:

- The SAPC application is launched by the Instantiation workflow
- The related flavors are not changed from SAPC Instantiation
- To Scale-In, the SAPC must be Scaled-Out before
- Only for Scale-In, the SAPC has to be instantiated with the SSH Enable option

### 4.3.2 Post-conditions

After the Scale workflow successfully finishes, a new PL is added or removed.

### 4.3.3 Workflow Execution

Start the Scale SAPC on OpenStack workflow:

#### Steps

1. Select the Scale SAPC on OpenStack workflow from the list in the workflows.
2. Select the Scale type, the options are **In** (remove a VM) or **Out** (create a VM).
3. Click the Start a New Instance button.
4. Click the Submit button.

#### 4.3.3.1 Stack Selection

Select a stack (SAPC) from the drop-down list. Continue the workflow by clicking the Submit button.





The screenshot shows the 'Workflow Instance' page for 'Scale SAPC on OpenStack\_1522073173'. The page has a top navigation bar with 'Ericsson OSS' and a 'Help' icon. Below the navigation bar, there's a breadcrumb trail: 'Ericsson OSS / Workflows / Workflow / Workflow Instance'. The main title is 'Workflow Instance'. Below the title, there's a 'Cancel Execution' button and a 'Refresh' button. The workflow name is 'Scale SAPC on OpenStack\_1522073173'. On the left, under 'Workflow Definition', the name is 'Scale SAPC on OpenStack' and the version is '1.4.0'. In the center, under 'Workflow Progress', it says 'In Progress' with a green progress bar at 15% and a start time of '2018-03-26 10:06:15'. On the right, under 'Task', there's a 'Select Stack Form' button, a dropdown menu, and 'Submit' and 'Reset' buttons. At the bottom, there are tabs for 'Workflow Diagram' and 'Workflow Log'.

Figure 12 Select Stack Form

#### 4.3.3.2 Scale Type Selection

After the Stack is selected to Scale, a new form shows a drop-down list with two options.

- **In:** Removes the latest PL scaled-out. If Scale-Out has not been executed before, the workflow fails because the SAPC has the minimum deployment. To execute Scale-In, a SAPC VDP has to be selected
- **Out:** Creates a new PL on the deployed SAPC

The screenshot shows the 'Workflow Instance' page for 'Scale SAPC on OpenStack\_1522073173'. The page has a top navigation bar with 'Ericsson OSS' and a 'Help' icon. Below the navigation bar, there's a breadcrumb trail: 'Ericsson OSS / Workflows / Workflow / Workflow Instance'. The main title is 'Workflow Instance'. Below the title, there's a 'Cancel Execution' button and a 'Refresh' button. The workflow name is 'Scale SAPC on OpenStack\_1522073173'. On the left, under 'Workflow Definition', the name is 'Scale SAPC on OpenStack' and the version is '1.4.0'. In the center, under 'Workflow Progress', it says 'In Progress' with a green progress bar at 25% and a start time of '2018-03-26 10:06:15'. On the right, under 'Task', there's a 'Select Scale Type' button, a dropdown menu with 'Out' and 'In' options, and 'Submit' and 'Reset' buttons. At the bottom, there are tabs for 'Workflow Diagram' and 'Workflow Log'.

Figure 13 Select Scale Type form



#### 4.3.3.2.1 Scale-In: VDP Selection

Scale-In requires an internal command execution. A script from the VDP performs this command execution.

The screenshot shows the 'Workflow Instance' page in the Ericsson OSS interface. The page title is 'Workflow Instance' and the breadcrumb is 'Ericsson OSS / Workflows / Workflow / Workflow Instance'. The workflow name is 'Scale SAPC on OpenStack\_1522073173'. The workflow definition shows 'Name: Scale SAPC on OpenStack' and 'Version: 1.4.0'. The workflow progress is 'In Progress' with a 'Start Time' of '2018-03-26 10:06:15' and a progress bar at '30%'. The 'Task' section shows a 'Select VDP' task with a dropdown menu and 'Submit' and 'Reset' buttons. The 'Workflow Diagram' and 'Workflow Log' tabs are visible at the bottom.

Figure 14 Select VDP Form

#### 4.3.4 Non-Interactive REST API Workflow Execution for Scaling Process

The format of the NBI REST Call command: `curl -X POST http://IP:8080/wfs/rest/instances -d @NBI DIR/NBI parameter file -H "Content-Type: application/json"`

The NBI DIR/NBI parameter file is on the server which runs the curl command.

The NBI parameter templates are stored in `/vnflcm_ext/ericsson/ERICsapc_lcm_wf_heatworkflows/work/nbi templates` on the VNF-LCM.

Table 5 Non-Interactive REST API Workflow Scaling

Parameter Name	Type	Presence	Description
interactive	Boolean	Mandatory	Set to <code>false</code> to use REST API.
vnfInstanceName	String	Mandatory	Name of the workflow instance.
scale	String	Mandatory	Type of Scale: <b>In</b> or <b>Out</b> .

#### 4.3.5 Auto-Scale Out

Scale workflow with **Out** option can be triggered automatically if the SAPC is instantiated and if the network element is added to OSS/ENM.



This workflow is triggered by the SAPC alarms `GxSessionInitsTooBusyReached` and `RxSessionInitsTooBusyReached`.

The `sapc_lcm_wf_heat-autostart-rules.xml` file is delivered in the directory `/opt/ericsson/ERICsapc_lcm_wf_heatworkflows/autostart-rules`, and the user needs to copy it to `/vnflcm-ext/current/workflows/auto-start-rules/` to activate it.

## 4.4 Termination

This Workflow deletes the SAPC from the given Stack.

### 4.4.1 Preconditions

The virtual SAPC application (a stack) is launched by the Instantiation workflow.

### 4.4.2 Post-conditions

After the workflow is finished, the SAPC application (the stack) is terminated. Corresponding information of this SAPC is deleted in VNFLAF database, and deleted from ENM/OSS-RC topology as well.

### 4.4.3 Workflow Execution

To start the Terminate SAPC on OpenStack workflow, do the following steps:

#### Steps

1. Select the Terminate SAPC on OpenStack workflow from the list in the workflows.
2. Click the Start a New Instance button.



#### 4.4.3.1 Start Form

Ericsson OSS

Ericsson OSS / Workflows / Workflow / Start A Workflow

## Start A Workflow

### Terminate SAPC on OpenStack

**Instance Name\***

Terminate SAPC on OpenStack\_1508

☒ Delete Network Element in ENM/OSS-RC

Figure 15 Start Form of SAPC Termination Workflow

#### Delete Network Element in ENM/OSS-RC

If checked, delete topology will take effect after stack deleted from OpenStack; If unchecked, workflow will finish after stack deleted from OpenStack. If *Add Network Element in ENM/OSS-RC* in instantiate SAPC on OpenStack is performed successfully, check this box, otherwise leave it empty.

#### 4.4.3.2 Stack Selection

Select a Stack (SAPC) to terminate from the drop-down list, then, click the Submit button to continue the workflow.

Ericsson OSS

Ericsson OSS / Workflows / Workflow / Workflow Instance

## Workflow Instance

Terminate SAPC on OpenStack\_1508745341

**Workflow Definition**

Name Terminate SAPC on OpenStack

Version 1.2.1

**Workflow Progress**

In Progress

10%

Start Time 17-10-23 03:54:57

**Task**

Select stack

Select vApp:

Workflow Diagram Workflow Log

Terminate SAPC on OpenStack

+

Figure 16 Select Stack Form



#### 4.4.4 Non-Interactive REST API Workflow Execution for Termination Process

The format of the NBI REST Call command: `curl -X POST http://IP:8080/wfs/rest/instances -d @NBI_DIR/NBI_parameter_file -H "Content-Type: application/json"`

The NBI\_DIR/NBI\_parameter\_file is on the server which runs the curl command.

The NBI parameter templates are stored in /vnflcm\_ext/ericsson/ERICsapc\_lcm\_wf\_heatworkflows/work/nbi templates on the VNF-LCM.

Table 6 Non-Interactive REST API Workflow Update Topology

Parameter Name	Type	Presence	Description
interactive	Boolean	Mandatory	Set to false to use REST API.
vnfInstanceName	String	Mandatory	Name of the workflow instance.
deleteTopology	Boolean	Mandatory	This parameter is used to update topology in OSS.