

SAPC VNF Lifecycle Manager Workflow Instruction for CEE

Ericsson Service-Aware Policy Controller

INSTALLATION INSTRUCTION

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1 Introduction

The purpose of this document is to describe the VNF LifeCycle Manager (VNF-LCM) use cases (Workflows) for the SAPC in the Cloud Execution Environment (CEE).



2 Overview

Connection between a cloud orchestrator and the VNF-LCM is mandatory for any user who wants to follow this document.

2.1 VNF-LCM

The VNF-LCM feature in ENM and OSS-RC fulfills Specific VNF LifeCycle Manager (S-VNFM) functionality of ETSI NFV MANO architecture, supporting lifecycle management operations for Ericsson VNFs. The framework interfaces with different NFV deployment architectures.

2.2 Prerequisites

Before starting this procedure, ensure that the following conditions are met:

- HEAT and OSS/ENM logon data and tenant are introduced in VNF-LCM before running it.
- To perform internal SAPC operations, external connectivity is configured.



3 Starting a Workflow

The VNF-LCM GUI shows the different Workflows installed.

The screenshot shows the VNF-LCM GUI interface. At the top, there is a header bar with the Ericsson OSS logo and the text 'Ericsson OSS'. Below this, a breadcrumb trail reads 'Ericsson OSS / Workflows'. The main content area is titled 'Workflows 7'. It contains a table with two columns: 'Name' and 'Active User'. The table lists seven workflows, all of which are currently inactive (indicated by a grey background for the 'Active User' column).

Name	Active User
SAPC - Config Extreme Switch	
SAPC - Decommissioning	
SAPC - Health Check	
SAPC - Instantiation	
SAPC - Onboarding	
SAPC - Scale In	
SAPC - Scale Out	

Figure 1 VNF-LCM GUI



To start a Workflow, click one and a new menu appears above them. Click **Start Instance** to go to the start form of the selected Workflow. To start the execution of the Workflow, click **Submit**.

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[Start a New Instance](#) | [View Details](#)

Workflows 7

Name
SAPC - Config Extreme Switch
SAPC - Decommissioning
SAPC - Health Check
SAPC - Instantiation
SAPC - Onboarding
SAPC - Scale In
SAPC - Scale Out

Figure 2 VNF-LCM GUI after selecting a Workflow



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Start A Workflow

SAPC - Instantiation

Instance Name: *

Interactive / Non-interactive

Interactive workflow? *

If non-interactive, the following fields have to be filled:

Figure 3 Start form of a Workflow



4 HEAT Workflows

The following Workflows work using the cloud orchestrator Heat.

4.1 Onboarding

The Onboard SAPC on OpenStack workflow is to generate HOT file for instantiation, upload SW images to OpenStack, and for Compact Deployment, create Flavors and Availability Zones in OpenStack. It performs the following steps:

1. Authenticate on OpenStack
2. Select VDP
3. Select deployment type

For Standalone Deployment:

4. Select HOT
5. Upload images
6. Store in VNF-LCM

For Compact Deployment

4. Select Compact Deployment configuration
5. Enter VNS specific data
6. Generate HOT template
7. Upload images
8. Create flavors and availability zones
9. Store in VNF-LCM

4.1.1 Preconditions

The following pre-conditions are needed:

- Upload an unpacked VNF Virtual Deployment Package (VDP) including images to /vnflcm-ext/ericsson/ERICsapc_lcm_wf_heatworkflows/work/vdp, For example: /vnflcm ext/ericsson/ERICsapc_lcm_wf_heatworkflows/work/vdp /vdp_sapc_qcow2_cxp9032849_7r1b43/sapc_sc-1_cxp9032849_7r1b43.qcow2.



- Generate HOT file with SAPC hot_gen tool and store it on the SAPC vdp folder (Only for Stand-alone deployment).
- User credentials used by the workflow has the right privileges to upload images, create flavors and create availability zones in OpenStack. User credentials are pre-configured on the VNF-LCM environment.

4.1.2 Post-conditions

After the workflow finished successfully, following outcome is expected:

- Images in the VDP is uploaded to OpenStack if they have not been uploaded before.
- HOT file generated, and stored in a local database /vnflcm ext/ericsson/ERICsapc_lcm_wf_heatworkflows/work/catalog/templates/.
- For Compact Deployment, flavors and availability zones are created in OpenStack.

4.1.3 Workflow Execution

To start Onboard SAPC on OpenStack workflow, do the following:

1. Click the Onboard SAPC on OpenStack workflow from the list in the workflows.
2. Click the Start a New Instance button.
3. Click Submit button to continue

4.1.3.1 Select VDP and Deployment Type

After pressing Submit button from start form, the workflow requests selection of VDP and Deployment Type.

Virtual Deployment Package

One VDP Package must be chosen from the drop-down list.

Deployment Type

Either VNF Standalone Deployment or VNS Compact Deployment should be selected.



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Workflow Instance

Cancel Execution

Onboard SAPC on OpenStack_1507649390

Workflow Definition

Name Onboard SAPC on OpenStack

Version 1.2.1

Workflow Progress

In Progress

20%

Workflow Diagram

Workflow Log

Onboard SAPC on OpenStack

+−

→→→→

Figure 4 Select template name and description



4.1.3.2 Input Template Information

To identify the template in catalog database, a template name and template description is required to enter.



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Workflow Instance

Cancel Execution

Onboard SAPC on OpenStack_1507649390

Workflow Definition

Name Onboard SAPC on OpenStack

Version 1.2.1

Workflow Progress

In Progress

20%

Workflow Diagram

Workflow Log

Onboard SAPC on OpenStack

+−🔍

→→→→

Figure 5 Select VDP and deployment type form



4.1.3.3 Select Compact Deployment configuration file

When deployment type is selected as “VNS Compact Deployment”, workflow will request a configuration file to generate the HOT file. These configuration files are located under /vnflcm-ext/ericsson/ERICsapc_lcm_wf_heatworkflows/work/catalog/configurations/.

4.1.3.4 Configure Template

When deployment type is selected as “VNS Compact Deployment”, workflow will request some configuration parameters to generate the HOT file.

Task

Configure Template

VNS Parameters

Availability zones will be created or updated for below entered compute hosts and any existing configuration will be overwritten.

VNS instance name:*

vepct

Node management compute hosts:*

compute-0-4.domain.tld, compute-0-5

Control plane compute hosts:*

compute-0-6.domain.tld, compute-0-7

User plane compute hosts:*

compute-0-10.domain.tld, compute-0-

VNF Parameters

Management VLAN ID:*

null

Assign network VLAN IDs

☒ VLAN Trunking traffic separation

☐ GRE, BGP or MPLS traffic separation

☐ No, assigned by OpenStack (Scale and VLAN trunking not supported if selected)

Create BCW ports?

☒ Yes (CEE required)

☐ No

Disable port security?

☒ Yes

☐ No

Submit Reset

Figure 6 Configure deployment form

VNS Parameters

VNS instance name

This is the prefix of availability zone name

Node management compute hosts



The node management compute hosts are used to launch vRP. A comma-separated list of compute host names should be given, and each computer host is used to launch one vRP VM. Only two hosts should be filled out here. They are respectively corresponding to availability zone name.

Control plane compute hosts

The control plane computer hosts are used to launch vSRVC which serve for control plane of SAPC, and each computer host is used to launch one vSRVC VM. At least 3 hosts should be filled out here. The format should be "host1, host2, host3..." i.e. host has to be separated by ",". They are respectively corresponding to availability zone name: vns_name_cp1, vns_name_cp2, vns_name_cp3...

User plane compute hosts

At least two compute hosts should be filled in here. They are respectively corresponding to availability zone name: VNS instance name_up1, VNS instance name_up2... .

VNF Parameters

Create BGW ports: If choose yes, it means that the external network will have connectivity outside the CEE POD.

Disable port security: If choose yes, it means that allowed_address_pair info will be added to each neutron port. This parameter should be set to 'No' when CEE 16A is used and 'yes' when CEE R6 or newer is used.

OAM VLAN ID: The VLAN number for OAM.

Traffic VLAN IDs: The VLAN number for Traffic.

4.1.4

Non-Interactive REST API Workflow Execution

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" should be in the server which run the curl command.

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



Parameter name	Type	Presence	Description
interactive	Boolean	Mandatory	Please set this parameter as false
vnfVdp	String	Mandatory	Virtual Deployment Package name and path /vnflcm-ext/ericsson/ERICsapc_1/workflows/work/vdp/.
deploymentType	String	Mandatory	Valid values are "standalone" or "compact".
templateName	String	Mandatory	The template name to identify the template in the catalog.
templateDescription	String	Optional	The template description to be used in the catalog.
templateFileName	String	Mandatory when onboard using hot package	The HOT package file name under the path /vnflcm-ext/ericsson/ERICsapc_1/workflows/work/vdp/<vnfVdp>
vepcConfigurationFile	String	Optional. Will be used when deployment_type is "compact".	The available files are: vepc_compact_iot_12c_vsfo.cfg vepc_compact_iot_18c_vsfo.cfg vepc_compact_mbb_12c_vsfo.cfg vepc_compact_mbb_18c_vsfo.cfg If this parameter is not provided, the default value should be "vepc_compact_mbb_12c_vsfo.cfg".
vnsName	String	Mandatory when deployment_type is "compact".	This is the prefix of availability zone name. For example, if enter "vepc1" here, then the availability zone will be an availability zone named "vn1" after onboard workflow.
vnsComputeHostsNM	String	Mandatory when deployment_type is "compact".	Only two hosts should be filled out. The format should be "<host1>, <host2>". host has to be separated by ",". They are respectively corresponding to availability zone name: <vns_name>_nm1 and <vns_name>_nm2.
vnsComputeHostsCP	String	Mandatory when deployment_type is "compact".	More than 3 hosts should be filled out. The format should be "<host1>, <host2>, <host3>..." i.e. host has to be separated by ",". They are respectively corresponding to availability zone name: <vns_name>_cp1, <vns_name>_cp2, <vns_name>_cp3.
vnsComputeHostsUP	String	Mandatory when deployment_type is "compact".	It is mandatory to be filled for compact deployment. At least two compute hosts should be filled here. They are respectively corresponding to availability zone name: <vns_name>_up1, <vns_name>_up2.
vnsCreateBgwPorts	Boolean	Mandatory when deployment_type is "compact".	The value should be "true" or "false". If it is "true", it means that the external network should have connectivity outside the CE.
vnfAdminVlan	String	Mandatory when deployment_type is "compact".	The VLAN ID for the OAM Admin interface.
vnfTrafficVlans	String	Mandatory when deployment_type is "compact".	A comma-separated list of VLAN IDs for the traffic interfaces.



4.2 Instantiation

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

1. Authenticate on OpenStack
2. Select template file
3. If template requires injection file, select injection file
4. Instantiate a SAPC
5. Update VNF in ENM/OSS-RC topology

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 machine.

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.

4.2.3 Workflow execution

To start SAPC Instantiation on OpenStack workflow, do the following:

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

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

4.2.3.1 Input Stack Name

VNF Instance Name



Fill in the VNF name of the SAPC. SAPC Node Name must contain only alphanumeric or '_' characters, start with alpha, and be 255 characters or less.



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Workflow Instance

Cancel Execution

SAPC Instantiation on OpenStack_1493898316

Workflow Definition

Name SAPC Instantiation on OpenStack

Version 1.4.1

Workflow

In Progress

100%

Workflow Diagram

Workflow Log

SAPC Instantiation on OpenStack

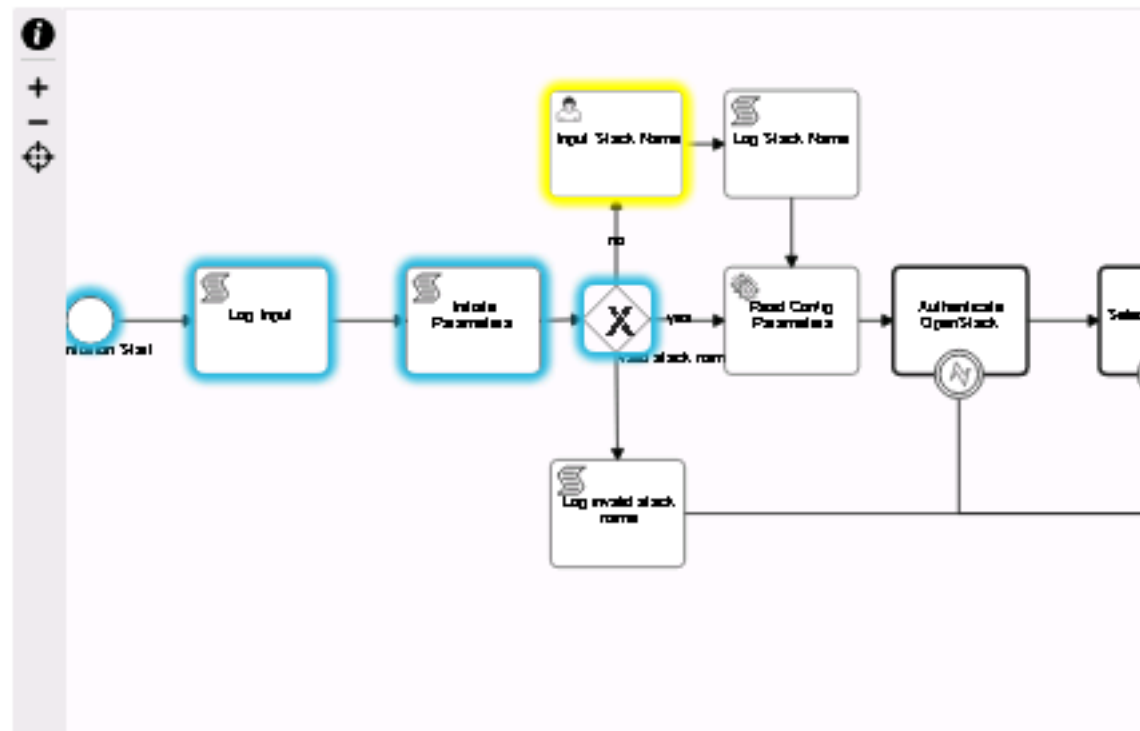


Figure 7 Input stack form



Rollback on Heat create failure?

If checked: If the Instantiate SAPC workflow fails during the stack creation, the Heat orchestration will trigger 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 will request related parameter as shown in chapter 5.2.3.4 and add new VNFs to ENM or OSS-RC network resource model; If unchecked, workflow will go to end, means finished successfully.

4.2.3.2

Select Template File

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.



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Workflow Instance

Cancel Execution

SAPC Instantiation on OpenStack_1493898316

Workflow Definition

Name SAPC Instantiation on OpenStack

Version 1.4.1

Workflow Progress

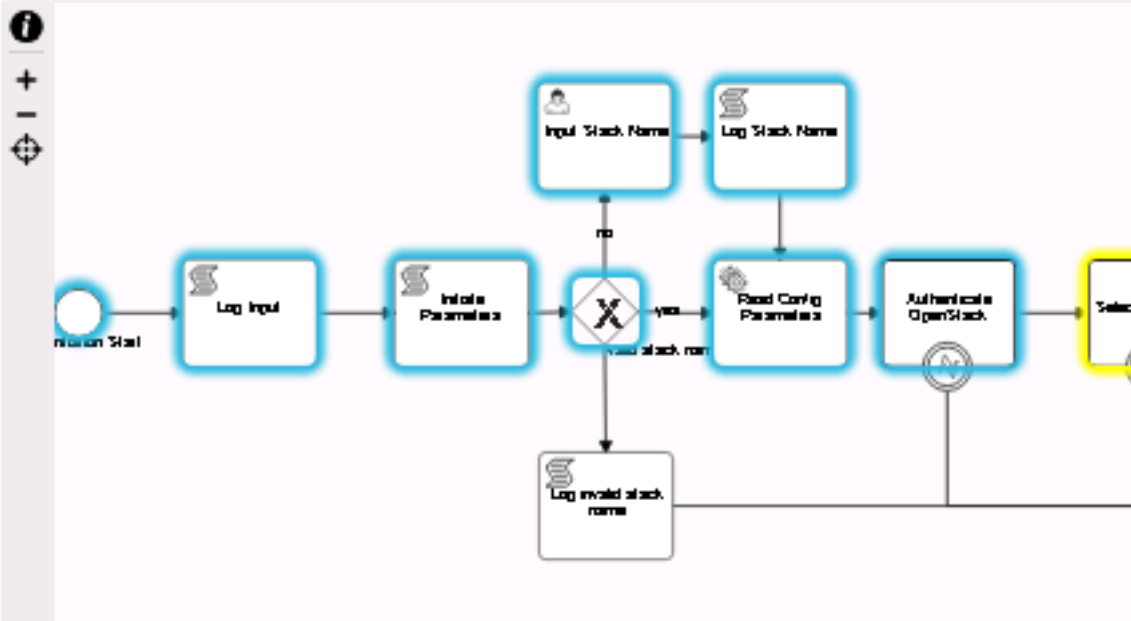
In Progress

30%

Workflow Diagram

Workflow Log

SAPC Instantiation on OpenStack



```
graph LR
    Start((Workflow Start)) --> LogInput[Log Input]
    LogInput --> InitParams[Initialize Parameters]
    InitParams --> Decision{X}
    Decision -- no --> LogInvalid[Log invalid stack name]
    Decision -- yes --> ReadConfig[Read Config Parameters]
    ReadConfig --> AuthOpenStack[Authenticate OpenStack]
    AuthOpenStack --> SelectTemplate[Select Template]
    LogInvalid --> SelectTemplate
```

The diagram illustrates the workflow for SAPC instantiation on OpenStack. It begins with a 'Workflow Start' event, followed by a 'Log Input' task, then an 'Initialize Parameters' task. A decision point (diamond with an 'X') follows. If the decision is 'no', it leads to a 'Log invalid stack name' task. If the decision is 'yes', it leads to a 'Read Config Parameters' task, which then leads to an 'Authenticate OpenStack' task. Both paths converge at a 'Select Template' task, which is highlighted in yellow.

Figure 8 Select template form




4.2.3.3 Select Injection File

When the template requires an injection file (Compact deployment), the workflow requests the selection for injection file. This injection file must be located 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.



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Workflow Instance

Cancel Execution

SAPC Instantiation on OpenStack_1493898316

Workflow Definition

Name SAPC Instantiation on OpenStack

Version 1.4.1

Workflow Status

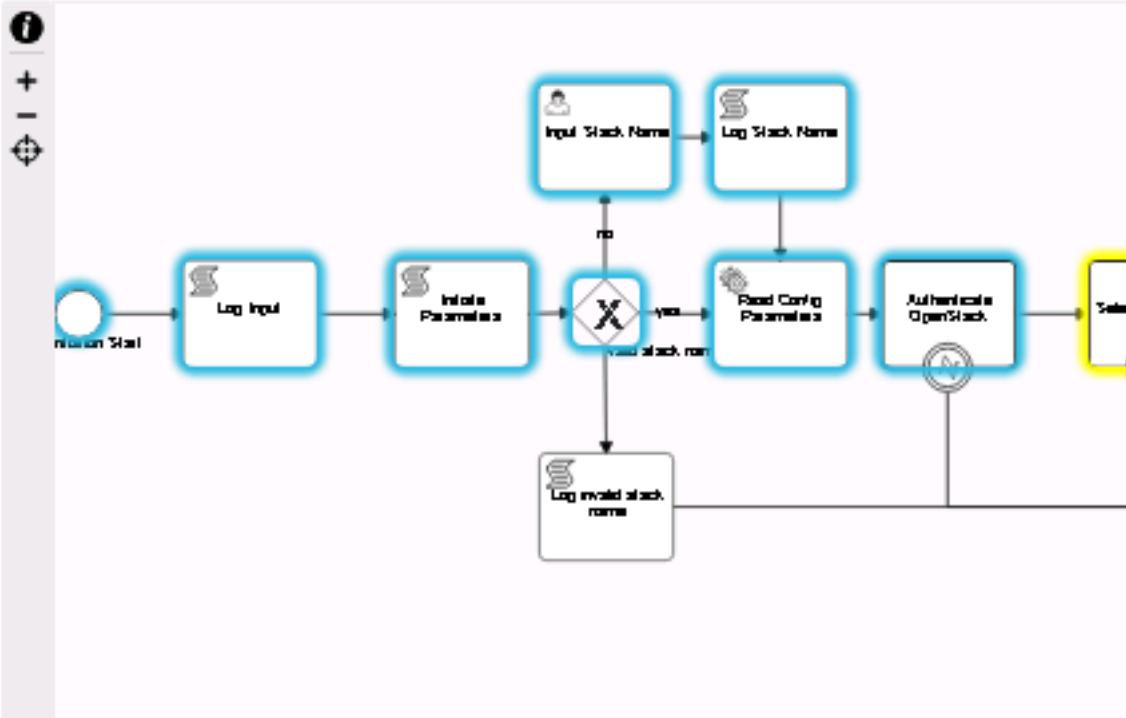
In Progress

30%

Workflow Diagram

Workflow Log

SAPC Instantiation on OpenStack



```
graph LR; Start((Workflow Start)) --> LogInput[Log Input]; LogInput --> InitParams[Initialize Parameters]; InitParams --> Decision{X}; Decision -- "no" --> InvalidStack[Log invalid stack name]; Decision -- "yes" --> ReadConfig[Read Config Parameters]; Decision -- "valid stack name" --> ReadConfig; InvalidStack --> End(( )); ReadConfig --> AuthOpenStack[Authenticate OpenStack]; AuthOpenStack --> End;
```

The diagram illustrates the workflow for SAPC instantiation on OpenStack. It begins with a 'Workflow Start' event, followed by a 'Log Input' task. The next step is 'Initialize Parameters', which leads to a decision point (diamond with an 'X'). If the decision is 'no', the flow goes to 'Log invalid stack name' and then to the end. If the decision is 'yes', the flow goes to 'Read Config Parameters'. If the decision is 'valid stack name', the flow also goes to 'Read Config Parameters'. From 'Read Config Parameters', the flow goes to 'Authenticate OpenStack' and then to the end.

Figure 9 Select inject file form



4.2.3.4 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.



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Workflow Instance

Cancel Execution

Instantiate vSGSN-MME on OpenStack_1499667842

Workflow Definition

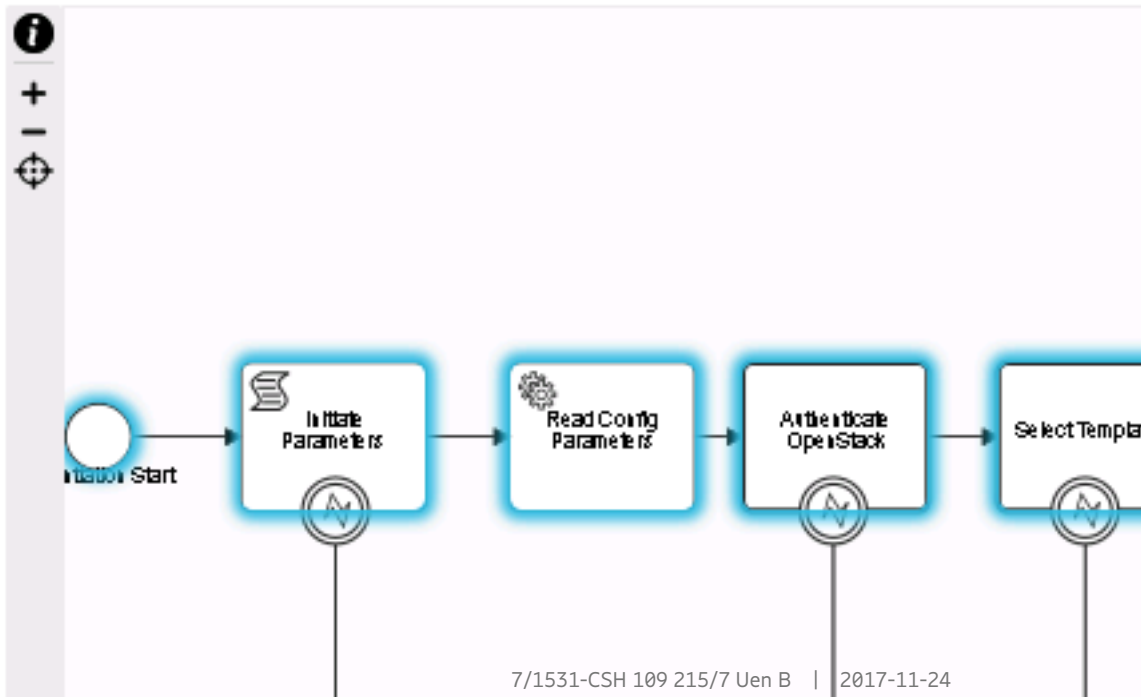
Name Instantiate vSGSN-MME on OpenStack

Version 1.4.0

Workflow Diagram

Workflow Log

Instantiate vSGSN-MME on OpenStack





VNF connection parameters

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

.Username: User name 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 will not be used.

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

4.2.3.5

Non-Interactive REST API Workflow Execution

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" should be in the server which run the curl command.

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



Parameter name	Type	Presence	Description
interactive	Boolean	Mandatory.	Please set this parameter as false.
vnfinstanceName	String	Mandatory.	The stack name to be instantiated in OpenStack instance resource prefix. It is also the name of the instance. The value must contain 1-63 characters, start with alpha, and end with alpha or numeric.
enableRollback	Boolean	Mandatory.	The value indicates whether to enable rollback when instantiate VNF workflow fails. If true, the workflow will rollback to the previous state.
continueUpdateTop	Boolean	Mandatory.	The value indicates whether to continue update top element in ENM/OSS-RC after the update fails.
templateName	String	Mandatory.	The template name in catalog to be instantiated.
configFile	String	Mandatory.	The VNF configuration file name in the format of /vnflcm-ext/ericsson/ERICsapc/vnfconfig/.
vnfHostname	String	Mandatory when "continueUpdateTop" is true.	OAM service IP address of the VNF.
vnfUsername	String	Mandatory when "continueUpdateTop" is true.	User name for login by ENM/OSS-RC.
vnfPassword	String	Mandatory when "continueUpdateTop" is true.	Password for login by ENM/OSS-RC.
subNetworks	String	Optional.	Subnetwork is used for logical grouping of VNFs in ENM and OSS-RC. In ENM, it can be used to create Subnetwork. Subnetwork has to be created before VNF. Subnetwork has to be created with "SubNetwork=SubnetworkName" or "SubNetwork=SubnetworkName" in the command. child Subnetwork is allowed. The value must be without prefix 'SubNetwork=', start with alpha, and end with alpha or numeric.
networkElementVersion	String	Mandatory when "continueUpdateTop" is true and OSS-RC is used.	The Version of the Network Element. For example, like 16A-CP06, refer to 'supportedVersions' in OSS-RC CPI in reference [9]. In ENM, this parameter refers to the version of CP02. To execute the command to create Network Element Version: 'cme create -v <version>'. The value must be without prefix 'Network Element Version:', start with alpha, and end with alpha or numeric.
communityString	String	Optional.	Community string for SNMP. Default is 'public' for OSS-RC and "enm-public" for ENM.

4.3 Scale

The functionality of SAPC Scale workflow is to create additional 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.

4.3.2 Post-conditions

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

4.3.3 Workflow Execution

Start the Scale SAPC on OpenStack workflow:

- Select the Scale SAPC on OpenStack workflow from the list in the workflows.
- Click the Start a New Instance button.
- Click submit button.

4.3.3.1 Select stack

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

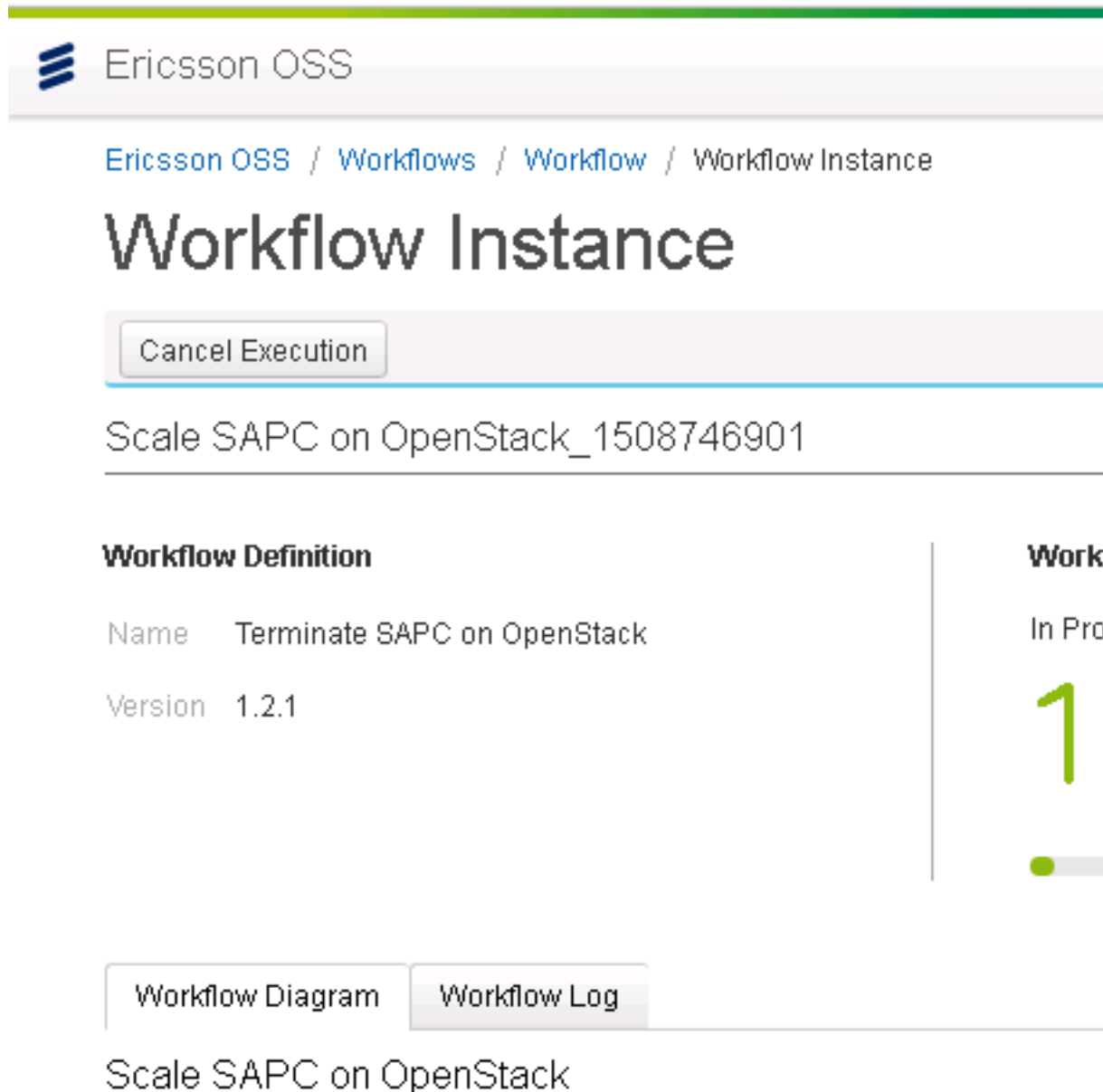


Figure 11 Select stack form

4.3.3.2

Non-Interactive REST API Workflow Execution

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" should be in the server which run the curl command.

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



Parameter name	Type	Presence	Description
interactive	Boolean	Mandatory.	Please set this parameter as fa
vnfinstanceName	String	Mandatory.	The stack name to be scaled i The value must contain only al or '_' characters, start with alp 255 characters or less.

4.4 Terminate

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:

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



4.4.3.1

Start form

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Start A Workflow

Terminate SAPC on OpenStack

Instance Name *

☒ Delete Network Element in ENM/OSS-RC

Figure 12 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, please check this checkbox, otherwise please uncheck it.

4.4.3.2

Select stack

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



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Workflow Instance

Cancel Execution

Terminate SAPC on OpenStack_1508745341

Workflow Definition

Name Terminate SAPC on OpenStack

Version 1.2.1

Workflow DiagramWorkflow Log

Terminate SAPC on OpenStack



Figure 13 Select stack form

4.4.3.3

Non-Interactive REST API Workflow Execution

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” should be in the server which run the curl command.



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

Parameter name	Type	Presence	Description
interactive	Boolean	Mandatory.	Please set this parameter as false.
vnfinstanceName	String	Mandatory.	The stack name to be terminated in OpenStack. The value must contain only alphanumeric characters, start with alpha, and be 255 characters or less.
deleteTopology	Boolean	Mandatory.	The value indicates whether workflow will remove network element in ENM/OSS before terminating VNF successfully.