

# MTAS VNF Life Cycle Management Guide

MTAS

USER GUIDE

**Copyright**

© Ericsson AB 2017, 2018. All rights reserved. No part of this document may be reproduced in any form without the written permission of the copyright owner.

**Disclaimer**

The contents of this document are subject to revision without notice due to continued progress in methodology, design and manufacturing. Ericsson shall have no liability for any error or damage of any kind resulting from the use of this document.

**Trademark List**

All trademarks mentioned herein are the property of their respective owners. These are shown in the document Trademark Information.



# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Prerequisites</b>	<b>5</b>
2.1	Hardware and Software	5
<b>3</b>	<b>Onboarding</b>	<b>7</b>
3.1	Onboard VNF Package on VNF-LCM	7
3.2	Onboard VNF Package on EO	12
<b>4</b>	<b>Procedures</b>	<b>15</b>
4.1	Instantiate a VNF Using VNF-LCM	15
4.2	Instantiate a VNF Using EO	19
4.3	Scale-out a VNF	20
4.4	Scale-In a VNF	21
4.5	Heal a VNF	23
4.6	Terminate a VNF Using VNF-LCM	25
4.7	Terminate a VNF Using EO	26
4.8	Upgrade a VNF	27
<b>5</b>	<b>Logging</b>	<b>29</b>





# 1 Introduction

This document describes system administration tasks performed in the VNF Life Cycle Manager (VNF-LCM).

The VNF-LCM provides a workflow execution environment and a web-based application for managing VNF life cycle procedures. The workflows can be executed through the Or-Vnfm interface, which is a REST API provided by VNF-LCM. The procedures are realized by executing ordered sequences of steps, called workflows, installed in the VNF-LCM. Each workflow must be provided with VNF-specific input parameters during execution.

The workflow manages virtual resources for the VNF by communicating with the Virtual Infrastructure Manager (VIM) and with the NVFO (Network Functions Virtualization Orchestrator) in case of full stack.. For example, if Ericsson CEE is used, the HOT API is used at the Vi-Vnfm reference point.

The workflow calls LCM scripts to interact with the VNF for VNF-specific operations, such as configuration importing. The LCM scripts access the VNF using the SSH or the NETCONF Northbound Interface (NBI).

Figure 1 shows an overview of a full Ericsson Stack and also the difference to a small stack.

The workflows can be executed through the following:

- Ericsson Orchestrator (EO)

For a Full Ericsson Stack, EO can be used to trigger workflows on VNF-LCM through the Or-Vnfm interface.

- VNF-LCM

For a Small Ericsson Stack, VNF-LCM is the only option.

## Full Stack and Small Stack

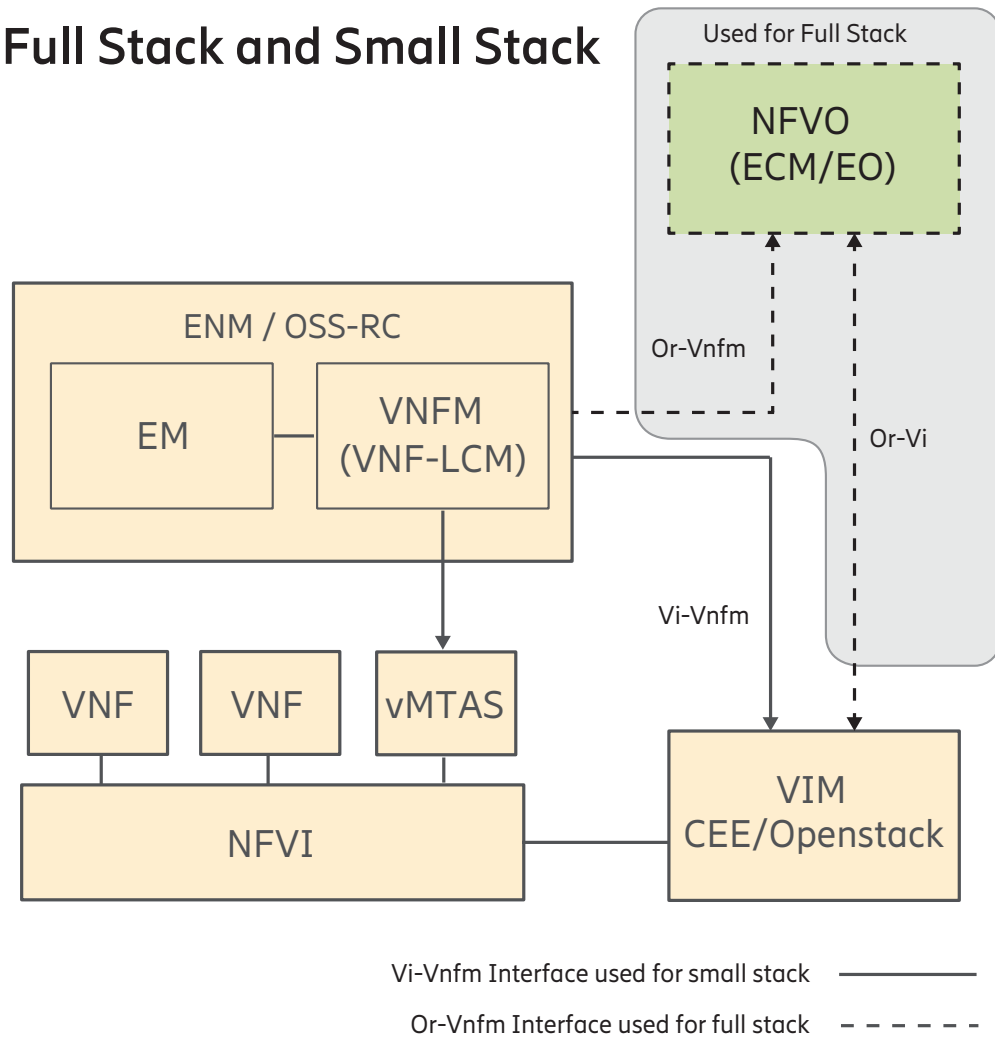


Figure 1 VNF-LCM Overview

The following workflow-based life cycle management procedures can be performed:

- Instantiate VNF
- Scale-out VNF
- Scale-in VNF
- Heal VNF
- Terminate VNF
- Upgrade VNF



**Note:** The Upgrade VNF Work Flow (WF) is not available in the current release.

The use of WFs in a VMware environment is not commercially supported in the current release.

The following limitations apply for workflows execution through the Or-Vnfm interface:

- EO is the only supported NFVO.
- The only supported workflows are instantiation and termination.
- For triggering workflows, the only supported cloud environment is OpenStack.







## 2 Prerequisites

This section describes the prerequisites which must be fulfilled before the MTAS can be installed.

### 2.1 Hardware and Software

The following hardware (virtual and physical), and software is required:

- The software delivery package (so called MTAS Workflow pack) including vIMS workflow bundle, and the vMTAS VNF package is available.
- VNF-LCM is available using either Operations Support System for Radio and Core (OSS-RC) or Ericsson Network Manager (ENM).
- In Openstack based cloud environment: Openstack Mitaka (or newer) release-based cloud environment is used. For example: Ericsson Cloud Execution Environment (CEE) R6 or newer.
- In VMware based cloud environment: vCenter Server 6.0 or 6.5.
- The Tenant(s) in which the VNF instance(s) resides and the connected VIMs are configured in VNF-LCM.

The VIM configuration in VNF-LCM can be checked with the `vnflcm vim list` command.

For more information on VIM/Tenant configuration, refer to ENM/OSS-RC documentation.

- OSS-RC/ENM related parameters are configured properly on VNF-LCM.

For more information, refer to ENM/OSS-RC documentation.

- The minimum VNF-LCM and EO (full stack deployment only) version required can be found in the release specific PRI document
  - Log on to the IMS PLM homepage.
  - In Table of Contents, follow the link to the wanted MTAS version.
  - Click Deliveries and choose the MTAS software package and revision.
  - Open the PRI document
- In case of Full Stack
  - In EO, the VIM zone, VDC, and SRT are configured, the external VNFM is registered. For more information on configuring EO, refer to System Administration Guide 1543-CN 160 9180.



- NVFO is configured on VNF-LCM, refer to ENM/OSS-RC documentation.



## 3 Onboarding

### 3.1 Onboard VNF Package on VNF-LCM

This section describes how to prepare for workflow-based VNF operations using VNF-LCM. Performing this procedure is a prerequisite for life cycle operations.

**Note:** For Openstack the onboarding process has changed to VNF package upload and unpack. For VMware it's still the old legacy way!

1. Decompress the vMTAS workflow pack CXP9034815\_1-<R-state>.tar.gz where <R-state> defines the revision state of the package.

```
cd /home/cloud-user
```

```
tar -zxvf CXP9034815_1-<R-state>.tar.gz
```

2. Install the vIMS workflow bundle:

- a. Log on to vnflaf-services VM as cloud-user and switch to root user.
- b. Verify that the bundle is not already installed by running the List command.

```
wfmgr bundle list
```

If the version of vIMSWorkflows is older than the version included in the vMTAS Workflow Pack CXP9034815\_1-<R-state>.tar.gz, install the newer version.

- c. Install the workflow bundle package by running the install command.

```
wfmgr bundle install --package=\
<workflow_bundle_rpm_file _path>
```

For more information on workflow bundle installation in VNF-LCM, refer to ENM/OSS-RC documentation.

3. OpenStack only onboarding steps:

- a. Decompress vMTAS VNF package <VNF package>.zip (which was created in MTAS SW Installation and uploaded to VFN-LCM):

```
unzip /home/cloud-user/<VNF package>.zip -d
/vnflcm-ext/backups/workflows/vnfd/
```

- b. Copy the VNF configuration files which are previously created. See (link to MTAS Installation):

```
cd /vnflcm-ext/backups/workflows/vnfd/\
```



```
<VNF package>/configurations/<VNF_1 configuration>
```

```
cp -r /home/cloud-user/<VNF_1 configuration> .
```

**Note:** Each directory in configurations contains a VNF instance-specific environment file (`env.yaml`), configuration files `evip_cli.txt` for eVIP, `ss7.conf` for SS7, and `pdb_bundle.zip` for application configuration. Each directory also contains `id_rsa.pub` public key of the VNF-LCM's `jboss_user`. The files `evip_cli.txt`, `ss7.conf`, and `pdb_bundle.zip` are optional.

To use the same VNF package for instantiate another VNF (VNF2) the following steps are needed:

- Create the VNF2 specific configuration files as It is described in MTAS Installation (section 3.3.1.6).

- Create the configuration directory for VNF2:

```
mkdir /vnflcm-ext/backups/workflows/vnfd/\
<VNF package>/configurations/<VNF_2 configuration>
```

- Copy the VNF2 specific configuration files to the configuration directory:

```
cd /vnflcm-ext/backups/workflows/vnfd/\
<VNF package>/configurations/<VNF_2 configuration>

cp -r /home/cloud-user/<VNF_2 configuration> .
```

#### 4. VMware only onboarding steps:

- Decompress vMTAS LCM scripts `CXP9034788_1-<R-state>.tar.gz` where `<R-state>` defines the revision state of the package:

```
mkdir /vnflcm-ext/backups/workflows/vnfd/\
<VNFTType__VNFVersion>
```

```
cd /vnflcm-ext/backups/workflows/vnfd/\
<VNFTType__VNFVersion>
```

```
tar -zxvf /home/cloud-user/CXP9034788_1-<R-state>.tar.gz
```

**Note:** Follow the naming convention: VNF type and VNF version separated by `__`. (Where `“__”` is a double underscore.)

- In `/vnflcm-ext/backups/workflows/vnfd/<VNFTType__VNFVersion>`, create a configurations subdirectory with read permission for the `jboss_user` and a child directory for each VNF configuration (that is, VNF instance), and copy the VNF configuration to the child directory:

```
mkdir /vnflcm-ext/backups/workflows/vnfd/\
<VNFTType__VNFVersion>/configurations
```



```
mkdir /vnflcm-ext/backups/workflows/vnfd/\
<VNFTYPE__VNFFVersion>/configurations/<VNF_1
configuration>
```

```
cd /vnflcm-ext/backups/workflows/vnfd/\
<VNFTYPE__VNFFVersion>/configurations/<VNF_1
configuration>
```

```
cp -r /home/cloud-user/<VNF_1 configuration> .
```

**Note:** Each directory in configurations contains a VNF instance-specific environment file (env-vcd.yaml ), configuration files evip\_cli.txt for eVIP, ss7.conf for SS7, and pdb\_bundle.zip for application configuration. Each directory also contains id\_rsa.pub public key of the VNF-LCM's jboss\_user. The files evip\_cli.txt, ss7.conf, and pdb\_bundle.zip are optional.

5. If the SSH key is not available yet for jboss, create it using the following commands:

```
su jboss_user
```

```
ssh-keygen -t rsa
```

```
exit
```

**Note:** The use of encrypted private keys is not supported in the current release (that is, do not use passphrase).

6. Copy the public SSH key into the configuration directory of VNF instance:

```
cp /home/jboss_user/.ssh/id_rsa.pub /vnflcm-ext/backups/workflows/vnfd/<VNF package>\
/configurations/<VNF_1 configuration>/
```

**Note:** The public key must be added in the configuration directory for each instance.

7. Verify the structure of the /vnflcm-ext/backups/workflows/vnfd/<VNF package> directory:

In OpenStack based cloud environment:



```
-- vMTAS-<version>-falvorId
|
|-- configurations
|   |
|   |-- <VNF_1 configuration>
|   |   |
|   |   |-- env.yaml
|   |   |-- evip_cli.txt*
|   |   |-- ss7.conf*
|   |   |-- instance1_pdb_bundle.zip*
|   |   |-- id_rsa.pub
|   |   |-- <VNF_2 configuration>
|   |   |   |
|   |   |   |-- env.yaml
|   |   |   |-- evip_cli.txt*
|   |   |   |-- ss7.conf*
|   |   |   |-- instance1_pdb_bundle.zip*
|   |   |   |-- id_rsa.pub
|   |
|   |-- mtas_hot.yaml
|
|-- Resources
|   |
|   |-- HotFiles
|   |   |-- mtas_hot_scaling.yaml
|   |
|   |-- LcmScripts
|   |   |-- common.py
|   |   |-- parsers.py
|   |   |-- post_instantiation.py
|   |   |-- post_scale_in.py
|   |   |-- post_scale_out.py
|   |   |-- pre_heal.py
|   |   |-- pre_instantiation.py
|   |   |-- pre_scale_in.py
|   |   |-- pre_scale_out.py
|   |   |-- pre_termination.py
|   |   |-- pre_upgrade.py
|   |   |-- VERSION
|   |
|   |-- VnfdWrapperFiles
|   |   |-- VNFD_Wrapper.json
|   |   |-- vnflcmOperationsConfiguration.json
```

In VMware based cloud environment:



```

`-- vMTAS__<x.y>
    |-- vnflcmOperationsConfiguration.json
    |-- configurations
    |   |-- <VNF_1 configuration>
    |   |   |-- env-vcd.yaml
    |   |   |-- id_rsa.pub
    |   |   |-- evip_cli.txt*
    |   |   |-- ss7.conf*
    |   |   `-- instance1_pdb_bundle.zip*
    |   `-- <VNF_2 configuration>
    |       |-- env-vcd.yaml
    |       |-- id_rsa.pub
    |       |-- evip_cli.txt*
    |       |-- ss7.conf*
    |       `-- instance1_pdb_bundle.zip*
    `-- lcmScripts

```

The files marked with \* are optional.

8. Only for Openstack based cloud environment: If automatic invocation of Heal VNF WF (so called auto-heal WF) is to be enabled:

**Note:** For CEE deployments, this step is not necessarily needed since CEE's CM-HA feature can be primary used to Heal a VNF.

- a. Verify the presence of file `vIMS-autostart-rules.xml` in services VM of VNF-LCM:

```
11 /vnflcm-ext/current/workflows/auto-start-rules/vIMS
-autostart-rules.xml
```

- b. If the file is not present, copy the template `autostart-rule` file to the above mentioned directory and remove all existing template `workflowTriggerRule`:

```
sed '24,45d' /opt/ericsson/ERICvIMSWorkflowsworkflows/au
tostart-rules/vIMS-autostart-rules.xml \
```

```
> /vnflcm-ext/current/workflows/auto-start-rules/vIMS
-autostart-rules.xml
```

**Note:** It can be needed to verify that the first template `workflowTriggerRule` starts in line 24 and the last `workflowTriggerRule` ends in line 45.

- c. The file `/vnflcm-ext/current/workflows/auto-start-rules/vIMS-autostart-rules.xml` must contain the following `workflowTriggerRule`:



```
<wft:workflowTriggerRule name="vMTAS-AutoHealing" id="vMTAS-AutoHealing" type="FM_ALARM">
  <wft:triggerCondition>
    <wft:attributeName>specificProblem</wft:attributeName>
    <wft:triggerConditionOperator>EQUALS</wft:triggerConditionOperator>
    <wft:attributeValue>COM SA, CLM Cluster Node Unavailable</wft:attributeValue>
  </wft:triggerCondition>
  <wft:triggerAction WorkflowDefinitionName="Heal VNF"
    WorkflowBundleName="vIMSWorkflows">
    <wft:param />
  </wft:triggerAction>
</wft:workflowTriggerRule>
```

- d. Verify that the content of `/vnflcm-ext/current/workflows/auto-start-rules/vIMS-autostart-rules.xml` is similar to the following example: (it can contain additional `workflowTriggerRule`):

```
<?xml version="1.0" encoding="UTF-8"?>
<!--
*****
Brief description for the elements of the sample rule shown below:
*****
<wft:workflowTriggerRule> : This is the rule element, which can have multiple triggerConditions and a triggerAction.
                          : And its mandatory attributes are id, name, type.
<wft:triggerCondition> : Defines the condition, based on which the action will be performed. Each triggerCondition
                        : has the attributeName, triggerConditionOperator, attributeValue as child elements.
<wft:attributeName> : This element is mapped with the Alarms/Event attributes.
<wft:triggerConditionOperator>: Describes the condition matching operation on the attribute values specified. Valid values
                        : for the element are EQUALS, NOTEQUALS and CONTAINS.
<wft:attributeValue> : The exact values to be evaluated.
<wft:triggerAction> : Defines the action to be taken when the condition is matched. Its mandatory attributes are
                    : WorkflowDefinitionName, and WorkflowBundleName.
*****
For more details, follow the below link :
https://arml01-eiffel004.lmera.ericsson.se:8443/nexus/content/sites/tor/vnflaf-sdk/latest/workflow-log-feature.html
-->
-->
<wft:workflowTriggerRules name="vIMS-AutoTrigger-rules" type=""
  version="" xmlns:wft="urn:com:ericsson:schema:xml:oss:wft" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="urn:com:ericsson:schema:xml:oss:wft auto-start-wf-rules.xsd">
  <wft:workflowTriggerRule name="vMTAS-AutoHealing" id="vMTAS-AutoHealing" type="FM_ALARM">
    <wft:triggerCondition>
      <wft:attributeName>specificProblem</wft:attributeName>
      <wft:triggerConditionOperator>EQUALS</wft:triggerConditionOperator>
      <wft:attributeValue>COM SA, CLM Cluster Node Unavailable</wft:attributeValue>
    </wft:triggerCondition>
    <wft:triggerAction WorkflowDefinitionName="Heal VNF"
      WorkflowBundleName="vIMSWorkflows">
      <wft:param />
    </wft:triggerAction>
  </wft:workflowTriggerRule>
</wft:workflowTriggerRules>
```

**Note:** If it is needed to enable auto-healing only for a particular VNF instance, the `workflowTriggerRule` can be refined by adding additional `triggerCondition(s)` to it.

## 3.2 Onboard VNF Package on EO

**Note:** This section is only applicable for full Ericsson stack deployments

This section describes how to prepare for workflow-based VNF operations using EO.

Performing this procedure is a prerequisite for life cycle operations.

### Prerequisites

— The user is logged on to EO.

### Steps





1. In EO, click **Resources > Packages**.
2. On the opening **Upload VNF Package** view, in **New Package File**, add the <VNF Package>.zip file which is created in MTAS Installation (link!).
3. In the **New Configuration File** new, upload the Resources/VnfdWrapperFiles/VNFD\_Wrapper.json file.

The content of the VNFD\_Wrapper.json file is now displayed in the **New Configuration File Content** field.

4. Copy the value of parameter vnfdId from the configuration file to the **New Package Name** field.
5. Fill in the following mandatory fields:
  - **Package Version**
  - **Package Vendor**
  - **Software Version**
  - **Package Category**
  - **Description**
6. In the **Managers** field, select the used VNF-LCM and click **Start**.

**Result:**

The onboarded package is now visible in the EO under **Resources > Packages**.





## 4 Procedures

The following sections describe how to perform LCM operations.

VNF-LCM procedures use workflow instances. Figure 2 shows the example of a workflow instance, where workflow progress can be tracked in the **Workflow Diagram** view. The **Workflow Diagram** only represents stages of the various procedures, operations are performed in the **Task** view.

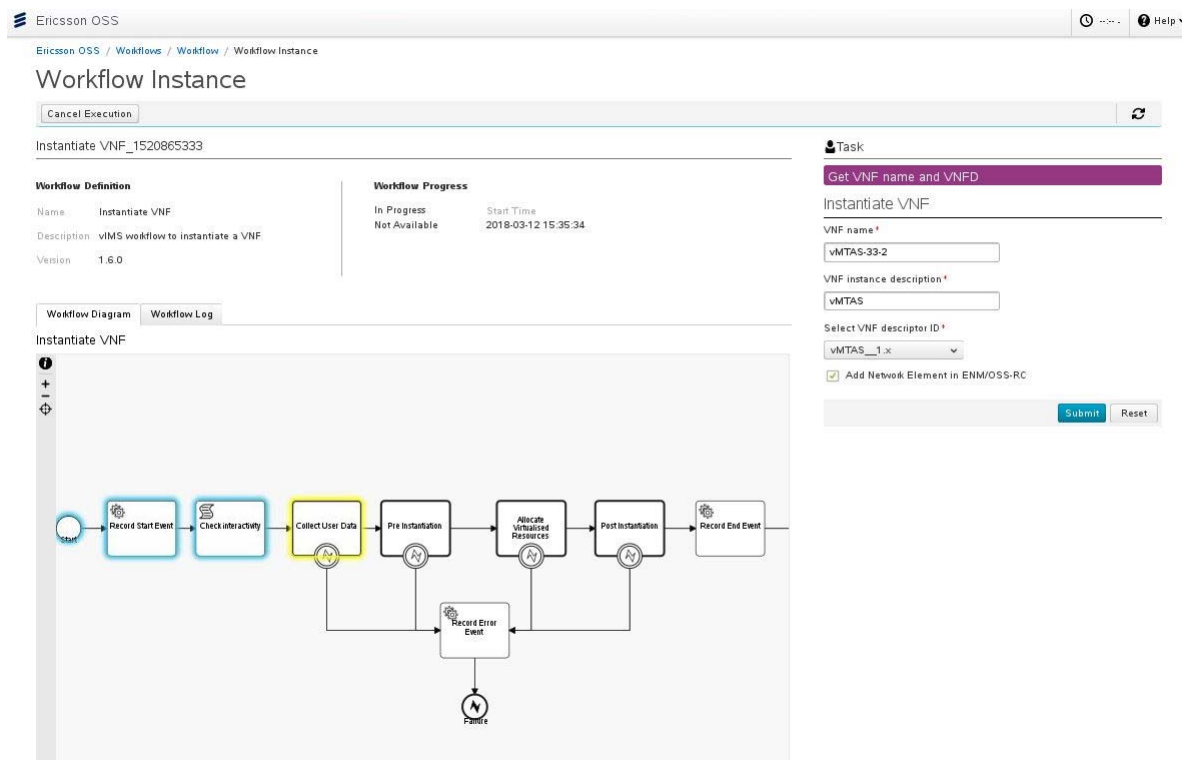


Figure 2 Workflow Instance Overview

### 4.1 Instantiate a VNF Using VNF-LCM

This section describes how to instantiate a VNF using VNF-LCM.

To instantiate a VNF:

1. Navigate to the VNF-LCM **Workflows > Instantiate VNF > Start a New Instance**. See Figure 3.



Ericsson OSS / Workflows

## VNF LifeCycle Management

Workflows 5

Name	Instances with User Tasks	Active Instances	De
Heal VNF			VIM
Instantiate VNF			VIM
NR-Upgrade VNF			VIM
Scale VNF			VIM
Terminate VNF			VIM

Figure 3 Workflows

2. In **Start a Workflow**, fill out the **Instance Name**, and click **Submit**.
3. Select the newly created workflow from the **Instance Activity** panel.
4. On the **Workflow Instance** screen, add **VNF Name**, **VNF Instance Description**, and **Select VNF descriptor id**, and click **Submit**. See example in Figure 4.

Select the **Add Network Element in ENM/OSS-RC** check box to add the new VNF in the network management application.

**Note:** The **Select VNF descriptor id\*** displays VNF releases available for instantiation in the `/vnflcm-ext/backups/workflows/vnfd/` directory.



Task

Get VNF name and VNFD

### Instantiate VNF

VNF name\*

VNF instance description\*

Select VNF descriptor ID\*

☒ Add Network Element in ENM/OSS-RC

Figure 4 Instantiate VNF

5. In **Select VIM**, choose **Select VIM** to be used, and click **Submit**. See example in Figure 5.

Task

Select VIM

Select VIM:

Figure 5 Select VIM

6. In **Select Tenant**, choose **Select Tenant** to be used, and click **Submit**. See example in Figure 6.

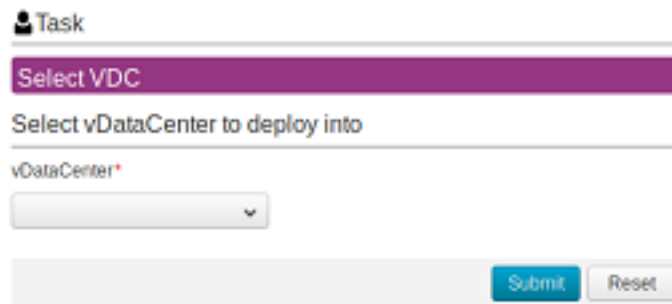
Task

Select Tenant

Select Tenant

Figure 6 Select Tenant

7. On the **Select VDC screen**, select the virtual Data Center (vDC) in which the new VNF is instantiated, and click **Submit**. See example in Page 18.



Task

Select VDC

Select vDataCenter to deploy into


vDataCenter\*

Submit Reset

Figure 7

- On the **Get Instance Configuration** screen, choose **Select Configuration for the VNF instance\***, and click **Submit**. See example in Figure 8.

**Note:** The **Select Configuration for the VNF instance\*** displays VNF configurations available for instantiation in the `/vnflcmext/backup s/workflows/vnfd/<VNF package>/configurations` directory.



Task

Get Instance Configuration Data

Get Instance Configuration

Select Configuration for the VNF instance\*

mtas-33-2

Submit Reset

Figure 8 Get Instance Configuration

- If the ENM/OSS-RC network management application is used, provide VNF instance-specific parameters for ENM/OSS-RC topology update, and click **Submit**. See example in Figure 9.

**Note:** To fill out the **Network element version supported by OSS-RC/ENM\***, check the supported VNF version on OSS-RC/ENM. For example: on ENM, the supported VNF version can be checked with the following command: `cmedit describe --netype <VNF_type>`



Task

**Get OSS/ ENM parameters**

Enter the parameters required by OSS/ENM

VNF username \*

VNF password \*

Network element type in OSS/ENM \*

Network element version supported by OSS/ENM \*

Node IP address \*

SNMP port used \*

Netconf port used \*

The Src type of network element \*

The associated site. \*

Figure 9 Enter the Parameters Required by OSS/ENM

**Note:** If the installation fails, remove the VNF instance using the Terminate VNF WF (FORCEFUL), see Section 4.6 Terminate a VNF Using VNF-LCM on page 25. If the user cannot select the VNF instance in Step 4 of the Terminate VNF workflow, then the VNF instance must be deleted manually from the cloud environment.

## 4.2 Instantiate a VNF Using EO

**Note:** It is not recommended to perform any life cycle operation using VNF-LCM on a VNF that was instantiated using EO.

### Steps



1. In EO, start a new VAPP, click **Resources > Packages**. Select the package to deploy, and click **Deploy**.
2. On the **Search for Offers** view, select values for the mandatory fields, and click **Next**.
3. On the **Choose Offer** view, select the VNF package to be used for instantiation, and click **Next**.
4. On the **Set VIM Criteria** view, click **Next**.
5. On the **Choose VIM Zone** view, select the desired VIM zone, and click **Next**.
6. On the **Enter Attributes** view, provide values for the fields of the **VAPP Attributes** tab:
  - **Virtual Application Name**, which is also the name of the Heat stack
  - **VNF Manager** - The VNF Manager chosen during onboarding is pre-selected.
  - **Flavor** - The virtual hardware configuration of the VNF, for example: number of vCPU and amount of memory.
- Note:** The value provided for Flavor is not used at this point, but as it is a mandatory field, a dummy value must be provided.
7. On the **Enter Attributes** view, provide the `VNFD_Wrapper.json` file on the **Configuration** tab. It is possible to overwrite the `VNFD_Wrapper.json` file provided during onboarding either by uploading an updated file or by modifying the attribute values on the **Configuration** tab.
8. Click **Submit Order** to finalize instantiation.

**Result:**

On the opening window, click **View Asset List** to check the status of the instantiation order. EO triggers an instantiation workflow in VNF-LCM, and the VNF becomes visible in the used VNFM.

## 4.3 Scale-out a VNF

This section describes how to scale-out a VNF using VNF-LCM.

Continue with this procedure only if the VNF to be scaled-out is instantiated using the VNF-LCM.

To scale-out a VNF:

1. In the VNF-LCM, click **Start a Workflow > Scale VNF > Start a New Instance**. See Figure 3.
2. In **Start a Workflow**, fill out **Instance Name**, and click **Submit**.





3. Select the newly created workflow from the **Instance Activity**.
4. In **Workflow Instance**, select the VNF instance to be scaled out, select scaling type (Scale Out), specify the number of VMs to be added to the VNF, and click **Submit**. See example in Figure 10.

Task

---

Collect user data for Scale

---

Scale VNF instance

---

Scale Data

---

Select VNF instance \*

vMTAS (f1149faa-809c-... ▼)

Select scaling type \*

Scale Out ▼

Number of VMs to scale \*

1

Submit Reset

Figure 10 Collect User Data for Scale-Out

The VNF instance is scaled-out, new VMs are added to the cluster.

## 4.4 Scale-In a VNF

This section describes how to scale-in a VNF using VNF-LCM.

Continue with this procedure only if the VNF to be scaled-in was instantiated using the VNF-LCM.

### Prerequisites

To gracefully scale-in a node, the system status must meet the following conditions:

- The system has sufficient memory. If the system has insufficient memory, the DBS, Memory Limit Reached alarm appears.
- One of the following CM parameters is in TRUE state:

```
ManagedElement=1,MtasFunction=MtasFunction,MtasSupportFunctions=0,
CarSelApplication=CarrierSelect,CarSelDialedStringAnalysisTable=0,
carSelDialedStringAnalysisTableSynchronization
ManagedElement=1,MtasFunction=MtasFunction,MtasSupportFunctions=0,
CarSelApplication=CarrierSelect,CarSelCarrierTable=0,
carSelCarrierTableSynchronization
ManagedElement=1,MtasFunction=MtasFunction,MtasSupportFunctions=0,
NumAnaApplication=NumberAnalysis,NumAnaLocalCallTable=0,
numAnaLocalCallTableSynchronization
ManagedElement=1,MtasFunction=MtasFunction,MtasSupportFunctions=0,
NumberNormalisation=NumberNormalisation,
numberNormalisationTableSync
```

For more information, refer to MTAS Troubleshooting Guideline.

To scale-in VNF:

1. In the VNF-LCM, click **Start a Workflow > Scale VNF > Start a New Instance**. See Figure 3.
2. In **Start a Workflow**, fill out **Instance Name**, and click **Submit**.
3. Select the newly created workflow from the **Instance Activity** panel.
4. In **Workflow Instance**, select the VNF instance to be scaled in, select scaling type (Scale In), specify **Number of VMs to Scale-In\***, and click **Submit**. See example in Figure 11.

### Task

Collect user data for Scale

Scale VNF instance

Scale Data

Select VNF instance\*

vMTAS (f1149faa-809c-... ▼

Select scaling type\*

Scale In ▼

Number of VMs to scale\*

1|

Submit

Reset

Figure 11 Collect User Data for Scale-In

The VNF instance is scaled-in, the specified number of VMs is removed from the cluster.



5. On the Collect extra parameters screen, select **Scale-in type** and optionally specify the list of VM UUIDs to be Scale-in with, and click **Submit**. See example in Figure 12.

**Note:** FORCEFUL Scale-in is a disruptive action therefore it is only to be used for Scale-in unavailable/failed PL(s). (The virtual resources reserved for the PL(s) are freed up first and then the MTAS cluster is “cleaned”.)

Figure 12 Collect Extra Parameters

The VNF instance is scaled-in, the specified number of PLs is removed from the cluster.

**Note:** If any UUID was specified in Step 5, the VMs with the specified UUIDs are removed, otherwise VMs with the highest index in their name in OpenStack are removed.

## 4.5 Heal a VNF

This section describes how to heal a VNF from compute resource or network resource (for instance Neutron port) failure using VNF-LCM.

Heal VNF WF can be started two ways:

- Manually from VNF-LCM User Interface (UI)
- Automatically, triggered on the reception of the CLM Cluster Node Unavailable alarm from the VNF instance

To enable the use of auto-heal VNF WF, set up an autostart-rule as it is specified in Step 9 of Onboarding.

The progress of auto-heal VNF WF can be tracked on the **Instance Activity** panel of VNF-LCM. The Heal VNF WF consists a FORCEFUL Scale-in and a Scale-out operation so that three WF instances are visible for the auto-heal VNF WF (Heal

VNF, Scale-in (Heal VNF) and Scale-out (Heal VNF)) on the **Instance Activity** panel.

**Note:**

- It is recommended to lower the node (VM) alarm timeout on the VNF instance from 15 minutes to 5 minutes in order to trigger the CLM Cluster Node Unavailable alarm, if a VM has lost contact with the remaining cluster members for more than 5 minutes. To lower the value of the node (VM) alarm timeout, use command:  
`cmw-node-alarm-timeout 300`
- The Heal VNF WF can only heal the VNF if sufficient compute resource is available for OpenStack's Nova scheduler.
- Healing of non-scalable VMs (SC-1, SC-2, PL-3, PL-4) is not possible.

Continue with this procedure only if the VNF to be healed was instantiated using the VNF-LCM and the Heal VNF WF shall be started manually.

To heal the VNF manually:

1. In the VNF-LCM **Workflows**, select **Heal VNF**, and click **Start a New Instance**. See Figure 3.
2. In **Start a Workflow**, fill out **Instance Name**, and click **Submit**.
3. Select the newly created workflow from the **Instance Activity** panel.
4. In **Workflow Instance**, choose **Select VNF instance\***, and click **Submit**. See example in Figure 13.

The screenshot shows a web form titled 'Task'. The first section is 'Collect user data for Healing' with a purple header. Below it is the text 'Heal VNF instance'. The next section is 'Healing Data' with a label 'Select VNF instance \*' and a dropdown menu showing 'vMTAS-33-2'. At the bottom right are 'Submit' and 'Reset' buttons.

Figure 13 Collect User Data for Healing

5. In **Input additional parameters for workflow**, specify UUID of VM to be removed from the cluster, and click **Submit**. See example in Figure 14.



Task

Collect extra parameters

Input additional parameters for workflow

UUID of VM to be healed

Submit Reset

Figure 14 Collect Extra Parameters

6. Get UUID of unavailable/failed PL(VM) from ECLI using command:  
`show -r ManagedElement=1,Equipment=1`

The VNF instance is scaled-in, the specified VM is forcefully removed from the cluster. After this, the VNF instance is scaled-out, and a PL is added to the cluster.

## 4.6 Terminate a VNF Using VNF-LCM

This section describes how to terminate a VNF using VNF-LCM.

Continue with this procedure only if the VNF to be terminated is instantiated using the VNF-LCM.

### Steps

1. In the VNF-LCM **Workflows**, select **Terminate VNF**, and click **Start a New Instance**. See Figure 3.
2. In **Start a Workflow**, fill out the **Instance Name** field, and click **Submit**.
3. Select the newly created workflow from the **Instance Activity** panel.
4. On the **Workflow Instance** screen, choose **Select VNF instance** and click **Submit**. See example in Figure 15.

Figure 15 Collect User Data for Terminate

#### Graceful

The VNF instance is gracefully locked (by setting `mtasFunctionAdministrativeState` to `SHUTTING DOWN(2)`), it gradually stops processing traffic. The VNF is terminated after the expiration of the graceful termination period or even earlier when all ongoing sessions have stopped on the node.

#### Forceful

The VNF is terminated immediately, all ongoing traffic is lost. This option must be confirmed on the next screen, as it stops all traffic.

#### Graceful termination timeout (sec)

The graceful termination timeout value defines after how many seconds the VNF is terminated when graceful termination has been applied but there is still ongoing traffic. Default value: -1, meaning that there is no graceful termination period, that is, the VNF is terminated only after the VNF stopped processing traffic.

The VNF instance is terminated. In case of Graceful termination, the VNF instance stops processing traffic gracefully and then is terminated.

## 4.7 Terminate a VNF Using EO

### Steps

1. In EO, select the VAPP to terminate and click **Delete**.
2. On the **Terminate VAPP** form, provide termination options, and click **Terminate**.



The following termination options are available:

— **Graceful**

The VMs in the cluster are gracefully locked, the VNF instance gradually stops processing traffic. The VNF is terminated after the expiration of the graceful termination period.

— **Forceful**

The VNF is terminated immediately, all ongoing traffic is lost. This option must be confirmed on the next view, as it stops all traffic.

— **Graceful termination timeout (sec)**

The graceful termination time-out value defines after how many seconds the VNF is terminated when graceful termination has been applied but there is still ongoing traffic. Default value: -1, meaning that there is no graceful termination period, that is, the VNF is terminated only after all VMs stopped processing traffic.

**Note:** Do not modify configuration data in the Configuration Parameters field.

3. Click **Terminate**.

**Result:**

The VMs in the cluster are terminated with the method selected in Step 2, the VNF instance stops processing traffic, and is terminated.

## 4.8 Upgrade a VNF

The Upgrade VNF WF is not supported by the current release.







## 5 Logging

In case of an unsuccessful workflow execution, find more information on the cause of the failure:

- In the **Workflow Log** view.
- In the Jboss Server log:

```
/ericsson/3pp/jboss/standalone/log/server.log
```

If needed, increase the log level from INFO to DEBUG during troubleshooting of the unsuccessful Workflow execution. More information on the procedure can be found in VNF-LCM documentation.

- In syslog:

```
/var/log/messages
```