

# IPWorks VNF Life Cycle Management (Workflow) - Small Stack

## User Guide

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# 1 Introduction

This document describes how to manage the lifecycle of a vIPWorks that is deployed as a Virtual Network Function (VNF) by using the VNF Lifecycle Manager (LCM) application.

The VNF-LCM application is web-based application, it provides the capability to automate use cases of the lifecycle of a VNF.

VNF life cycle procedures are realized by executing ordered sequences of steps, called Workflows. Each workflow must be provided with VNF-specific input parameters during execution.

VNF life cycle procedure can be performed in two types:

- **Small stack:** VNF life cycle procedure without ECM.
- **Full stack:**
  - VNF life cycle procedure trigger from ECM.
  - VNF life cycle procedure trigger from LCM with ECM involved.

For detailed information, refer to [IPWorks VNF Life Cycle Management \(Workflow\) - Full Stack](#)

The following use cases are supported for IPWorks:

- Instantiation
- Scale-out
- Scale-in
- Termination

**Note:** Scale-out and Scale-in are **NOT** supported if IPWorks is upgraded and originally deployed by VNF-LCM.

Each VNF lifecycle use case is realized as a workflow that can be independently executed by using the VNF LCM application. A workflow is an ordered sequence of steps to realize a specific use case. A workflow instance is created when a workflow is started.





## 2 Prerequisites

This section describes the prerequisites that must be fulfilled to manage the IPWorks VNF life cycle by workflow.

### 2.1 Hardware and Software

The following hardware (virtual and physical) and software are required:

- IPworks workflow package (RPM).
- CEE as Virtual Infrastructure Managers (VIMs) is used. VIM must be configured in VNF-LCM.
- VNF-LCM (with version 18.16 IP1, media version 4.9.22 or above) is available using either Operations Support System for Radio and Core (OSS-RC) or Ericsson Network Manager (ENM).

**Note:** The VIM configuration in VNF-LCM can be checked with the command `vnflcm vim list`. For detailed information, refer to VNF-Lifecycle Manager System Administration Guide, Reference [2], in the OSS-RC documentation.







## 3 Onboarding

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

### 1. Install IPWorks workflows package.

- a. Log on to VNF-LCM services VM as cloud-user and switch to root user.

```
$ssh cloud-user@<VNF-LCM services VM>
```

```
[cloud-user@vnflaf-services ~]$ su -
```

- b. Uninstall the existing workflow. (Optional)

```
[root@vnflaf-services ~]# wfmgr bundle uninstall  
--name=<Name> --version=<Version>
```

Use command "**wfmgr bundle list**" to view the package name and version.

**Note:** Before the uninstallation, make sure the configuration files under `/vnflcm-ext/current/vnf_package_repo/` have been backed up.

- c. Install package.

```
[root@vnflaf-services ~]# wfmgr bundle install  
--package=<The path of the workflow package name>
```

- d. Verify that the installation is successful.

```
[root@vnflaf-services ~]# wfmgr bundle list
```

For example:

Name	Version	Package
vIPWorks	3.1.2	ERICvIPWorks_CXP9040851-3.1.2-1.noarch.rpm

### 2. Check SSH key pair.

- a. Check if the key pair `id_rsa` and `id_rsa.pub` exist.

```
[root@vnflaf-services ~]# ls /home/jboss_user/.ssh/
```

If it exists, skip step b.

- b. Generate SSH key pair.



```
[root@vnflaf-services ~]# su jboss_user

[jboss_user@vnflaf-services root]$ ssh-keygen -t rsa

# Generating public/private rsa key pair.
# Enter file in which to save the key (/home/jboss_user/.ssh/id_rsa)
# Enter passphrase (empty for no passphrase): [Press enter]
# Enter same passphrase again: [Press enter]
Your identification has been saved in /home/jboss_user/.ssh/id_rsa.
Your public key has been saved in /home/jboss_user/.ssh/id_rsa.pub.

[jboss_user@vnflaf-services root]$ exit
```

**Note:** Encrypted private keys are not supported, that is, keep passphrase empty.



## 4 Procedures

These sections describe how to perform LCM operations.

### Attention!

Do not execute a workflow instance on a VNF while another one is in progress, as it can cause unexpected behavior. Terminate the ongoing procedure before starting a new one.

VNF-LCM procedures utilize workflow instances. Figure 1 shows an 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 that are performed in the **Task** view.

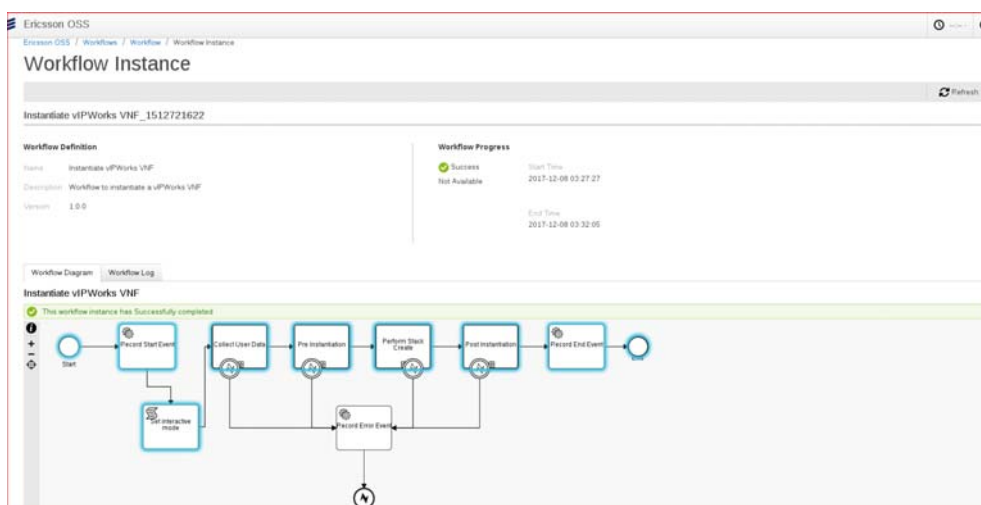


Figure 1 Workflow Instance Overview

### 4.1 Instantiate VNF

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

1. Prepare the required configuration files.

```
[root@vnflaf-services ~]# cp /home/cloud-user/main.yaml
/vnflcm-ext/current/vnf_package_repo/vIPWorks_<Version>
[root@vnflaf-services ~]# cp /home/cloud-user/ipw_scaling_group.yaml /vnflcm-ext/current
[root@vnflaf-services ~]# cp /home/cloud-user/env.yaml /vnflcm-ext/current
[root@vnflaf-services ~]# cp /home/jboss-user/.ssh/id_rsa.pub /vnflcm-ext/current
```



```
[root@vnflaf-services ~]# cp /home/jboss_user/.ssh/id_rsa.pub /vnflcm-ext/c
```

## 2. Generate the wrapper file VNFD\_Wrapper\_vIPWorks.json.

- a. Make sure config.yaml, and yaml2json.py are in the correct folders under /vnflcm-ext/current/vnf\_package\_repo/vIPWorks\_<Version>.

```
— vIPWorks_<Version>/Resources/EnvironmentFiles/config
  .yaml
```

```
— vIPWorks_<Version>/Resources/LcmScripts/yaml2json.py
```

- b. Log on to LCM, and go to /vnflcm-ext/current/vnf\_package\_repo/vIPWorks\_<Version>/Resources/LcmScripts.

- c. Run the script yaml2json.py.

```
> python yaml2json.py -o ../VnfdWrapperFiles/VNFD_Wrapper_vIPWorks.json
```

VNFD\_Wrapper\_vIPWorks.json will be generated in /vnflcm-ext/current/vnf\_package\_repo/vIPWorks\_<Version>/Resources/VnfdWrapperFiles/.

## 3. Verify the structure of the vnflcm-ext/current/vnf\_package\_repo/vIPWorks\_<Version> directory is as follow:

```
<vnfId>
├── configurations
│   ├── instance1_config
│   │   ├── env.yaml
│   │   └── id_rsa.pub
│   └── Resources
│       ├── EnvironmentFiles
│       │   └── config.yaml
│       ├── HotFiles
│       │   └── ipw_scaling_group.yaml
│       ├── LcmScripts
│       │   ├── post_instantiation.py
│       │   ├── pre_instantiation.py
│       │   ├── pre_termination.py
│       │   ├── ipwcommon.py
│       │   ├── pre_scale.py
│       │   ├── post_scale.py
│       │   └── yaml2json.py
│       ├── UserConfigurationFiles
│       │   └── id_rsa.pub
│       ├── VnfdWrapperFiles/
│       │   └── VNFD_Wrapper_vIPWorks.json
└── main.yaml
```



4. Remove nfvo configuration from LCM-VIM.

- a. Check if the nfvo configuration exists.

```
[root@vnflaf-services ~]# vnflcm nfvo list
```

- b. If nfvo exists, delete it.

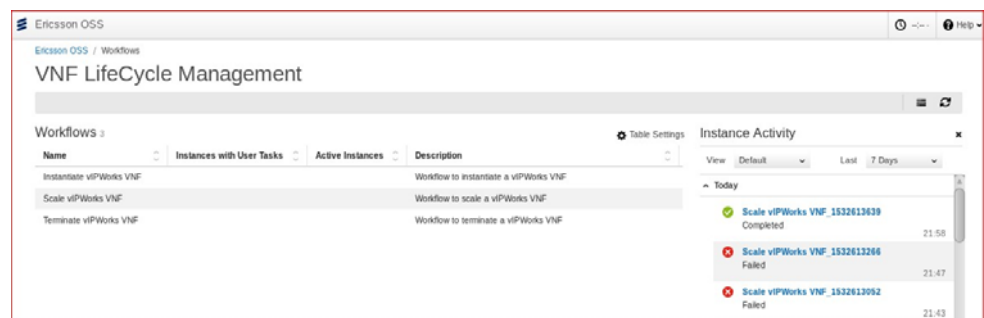
```
[root@vnflaf-services ~]# vnflcm nfvo delete --baseurl  
<baseurl>
```

**Note:** baseurl can be get from Step a.

5. To perform LCM operations, start a web browser from a host with connectivity to the VNF-LCM machine. For example:

<http://<VNF-LCM services IP>/index.html#workflows>

6. On the VNF-LCM **Workflows** page, select **Instantiate vIPWorks VNF**, and click **Start a New Instance**.



7. On the **Start a Workflow** page, fill out the **Instance Name** field, and click **Submit**.

8. Select the newly created workflow from the **Instance Activity** panel.

9. On the **Workflow Instance** page, add **VNF Instance Name** and **VNF instance description**. Choose a VNF description ID under **Select VNF descriptor ID**. Then click **Submit**.



## Task

### Get VNF name and VNFD

#### Instantiate VNF

VNF Instance Name \*

VNF instance description \*

Select VNF descriptor ID \*

☐ Add Network Element in ENM/OSS-RC

Submit

Reset

#### Note:

- The **VNF Name** is also used as the stack name.
- The **Select VNF descriptor Id** displays the available VNF configurations for instantiation in the `/vnflcm-ext/current/vnf_package_repo/` directory.

10. On the **Get Instance Configuration** page, select a VNF configuration to instantiate, and click **Submit**.



## Task

### Get Instance Configuration Data

#### Get Instance Configuration

Select Configuration for the VNF instance \*

instance1\_config

Submit

Reset


**Note:** The **Select Configuration for the VNF instance** field lists all VNF configurations available for instantiation in the /vnflcm-ext/current/vnf\_package\_repo/vIPWorks\_<Version>/configurations/ folder.

11. Add parameters in ENM, and click **Submit**. Skip this step if you did **NOT** checked **Add Network Element in ENM/ OSS-RC** when adding **VNF Instance Name**.

Followings are the mandatory parameters:

Parameter	Description
Network Element Type	VNF type. For example, "vIPWorks".
Network Element Username	VNF user name. For example, "root".
Network Element Password	VNF password. For example, "rootroot".
Node Ip Address	The value of MIP_OAM_IP. For example, "10.134.142.70".
NETCONF Port	830 is recommended.



 Task

---

**Get OSS/ENM parameters**

Get OSS/ENM Configuration

---

Network Element

---

Managed Element Types (not used in ENM)

Network Element Type<sup>\*</sup>

Network Element Version


Network Element Username<sup>\*</sup>

Network Element Password<sup>\*</sup>

Repeat Network Element Password<sup>\*</sup>

12. Click **Refresh**.

13. On the **Select VIM** page, select a Vim, and click **Submit**.

 Task

---

**Select VIM**

Select VIM: <sup>\*</sup>

14. On the **Select Tenant** page, select a tenant, and click **Submit**.





## Task

Select Tenant

Select Tenant\*

**Note:** It will take a few minutes to complete. You can click **Refresh** to check the status of the task.

15. Add subtenant if there are subtenants within the tenant. Choose the subtenant you need and click **Submit**. If no subtenant, this page will not be showed.

## Task

Add subtenant or not?

☐ Do you want to add Subtenant?

16. Add the **HostName of the server**, **UserName of the server**, **Password of the server**, and **Port no of the server**, then click **Submit**. Skip this step if you did **NOT** checked **Add Network Element in ENM/ OSS-RC** when adding **VNF Instance Name**



## Task

### SSH Credentials

HostName of the server

UserName of the server\*

Password of the server

ssh key of the server

Port no of the server\*

17. Change the password for the <EMERGENCY\_USER> user.

```
$ssh <EMERGENCY_USER>@<SC-1_IP_Address>
```

This <EMERGENCY\_USER> user is used for graceful termination and scale operations. The default value of <EMERGENCY\_USER> is **emergency**. The default password is **emergency**.

After logging on the system for the first time, there is a prompt to have the user change the password.

For more information about the parameter <EMERGENCY\_USER>, refer to the table "IPWorks VNF Deployment Parameter for HEAT Stack" in IPWorks Deployment Guide, Reference [3].

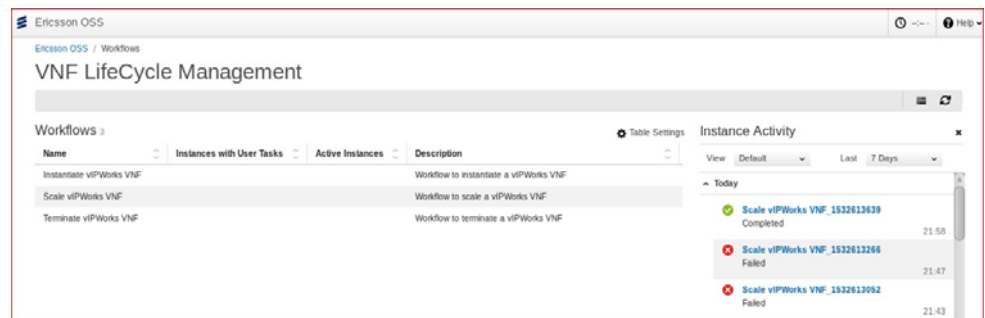


## 4.2 Scale VNF

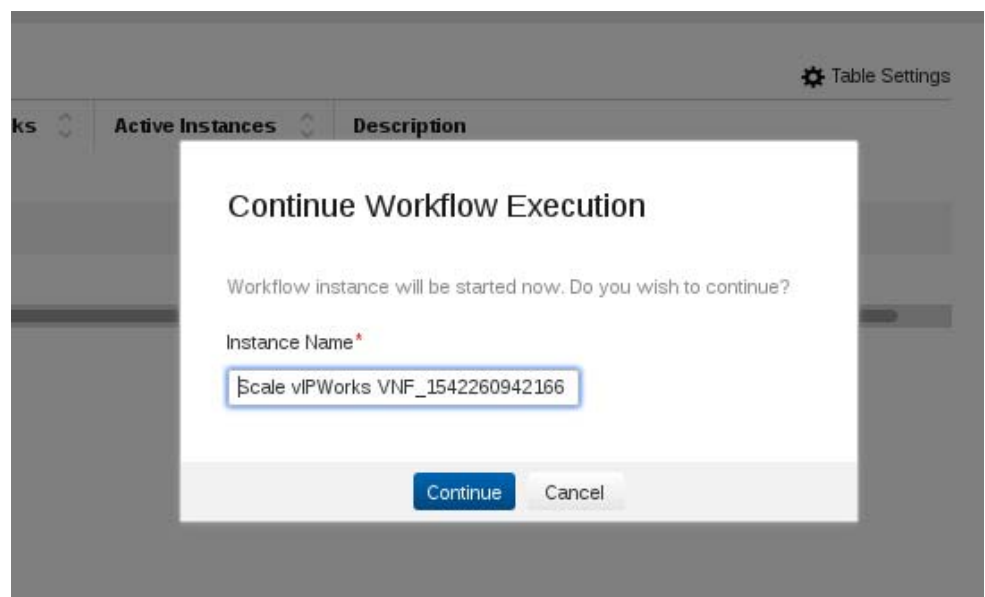
This section describes how to scale-out/in a VNF using VNF-LCM.

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

1. On the VNF-LCM **Workflows** page, select **Scale vIPWorks VNF**, and click **Start a New Instance**.



2. In the prompt window, fill out the **Instance Name** field, and click **Continue**.



3. Select the newly created workflow from the **Instance Activity** panel.



4. Select one scaling method from **Task** panel, and click **Submit**.

#### Workflow Instance

5. If Scale-Out is chosen, fill out the user data in **Task** panel, and click **Submit**.

**Note:**

- The **Availability zones for scaling separated by commas** field is a list of zones which is corresponded to all the scaled VMs. For example, the first element in the list is for <VNFFNAME>\_Scale\_0, the second is for <VNFFNAME>\_Scale\_1, and so on. For how to find the available zone for VMs, refer to the nova command `nova availability-zone-list` and `nova host-describe` to check.
- If the total number of scaled-out VMs is more than the number of availability zone(s), the rest of VMs will be assigned to any zone(s) automatically.

Take an example to clarify how to scale out the VM for multiple times:

In the following example, the VMs are scaled out for 2 times, 2 VMs are scaled out for each time, then the added 4 VMs are assigned to 4 zones in sequence.

a. First scale-out:

Number of additional VMs: 2

Availability zones: nova:compute-0-2.domain.tld,nova:compute-0-3.domain.tld

b. Second scale-out:

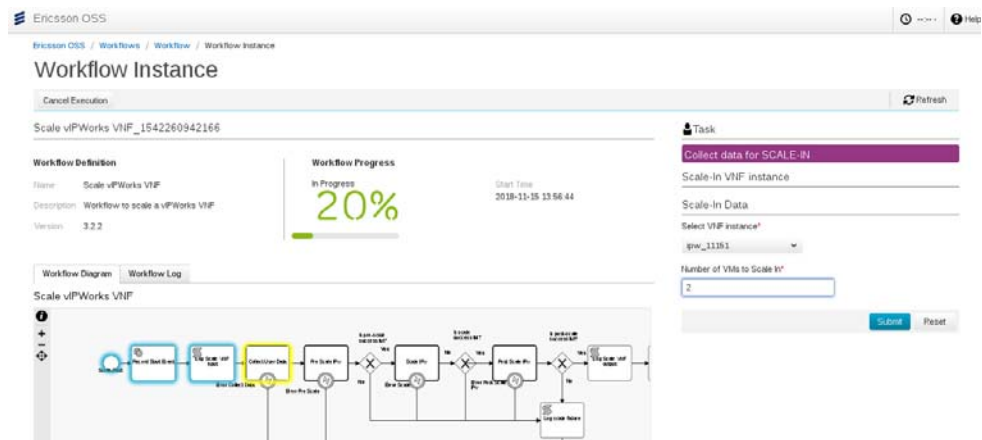
Number of additional VMs: 2

Availability zones: nova:compute-0-2.domain.tld,nova:compute-0-3.domain.tld,nova:compute-0-4.domain.tld,nova:compute-0-5.domain.tld

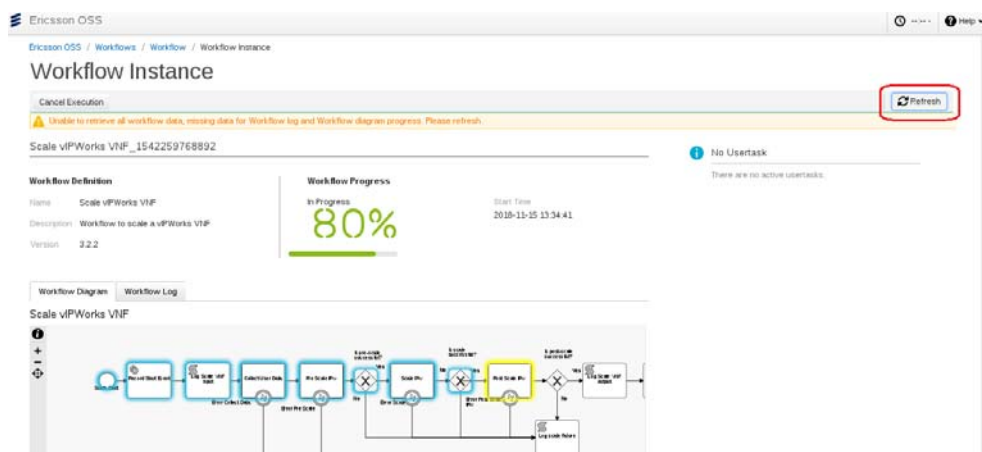
If the zones provided are not enough, the rest of VMs are assigned automatically.

**Note:** It will take a few minutes to complete. You can click **Refresh** to check the status of the task.

6. If Scale-In is chosen, fill out the user data in **Task** panel, and click **Submit**.



- It will take a few minutes to complete. Click **Refresh** to check the status of the task.

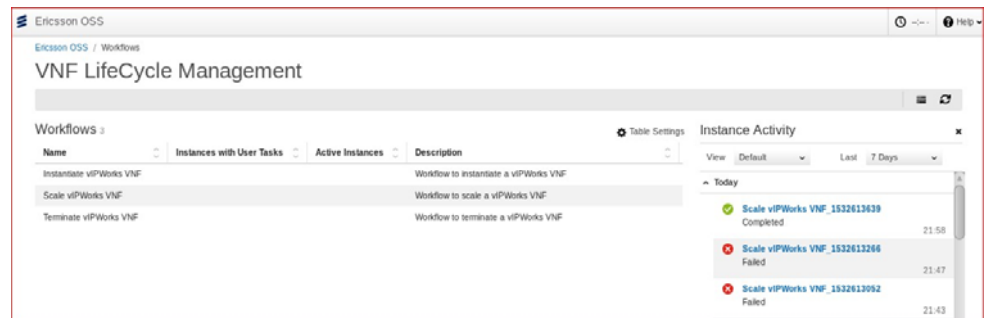


### 4.3 Terminate VNF

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

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

1. On the VNF-LCM **Workflows** page, select **Terminate VNF**, and click **Start a New Instance**.



2. On the **Start a Workflow** page, 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** page, select the VNF that is to be terminated, select **termination type**, and click **Submit**.



Collect user data for Terminate

Terminate VNF instance

Termination data

Select VNF instance \*

ipw47 (a2df5f2b-af78-40... ▼)

Termination type:

Graceful

Graceful termination timeout (sec)

-1

Submit

Reset

**Note:** It will take a few minutes to complete. You can click **Refresh** to check the status of the task.

The following options are available as termination types:



<b>Graceful</b>	The VMs in the cluster are gracefully locked: the VNF instance gradually stops processing traffic, but there still might be a minor traffic loss. The VNF is terminated after the expiration of the graceful termination period.
<b>Forceful</b>	The VNF is terminated immediately, all ongoing traffic is lost. This option must be confirmed on the next screen, as it stops all traffic.
<b>Graceful termination timeout (sec)</b>	The graceful termination timeout value defines the time length from applying graceful termination to the termination of the VNF. Ongoing traffic still happens during this period. The default value is -1, which means the VNF is terminated only after all VMs stopped processing traffic.

#### 5. Terminate external network stack.

The external network stack was generated in deployment. For detailed information about external network stack, refer to [IPWorks Deployment Guide](#).

##### a. Log on to Atlas and list all stacks.

```
atlasadm@atlas:~ # openstack stack list
```

```
+-----+-----+-----+
| ID                                | Stack Name      | Stack St
+-----+-----+-----+
| 171dd7ab-d29b-4df0-b29b-4e5f9b264fc4 | ipw_41          | UPDATE_C
| 53031877-1a83-41ce-b7e3-a58a7320019f | ipw_41-net      | CREATE_C
+-----+-----+-----+
```

##### b. Delete network stack.

```
atlasadm@atlas:~ # openstack stack delete <stack ID>
```

For example:

```
atlasadm@atlas:~ # openstack stack delete 53031877-1a83-41ce-b7e3-a58a7320019f
```





## 5 Troubleshooting

If the workflow execution is unsuccessful, refer to the section [IPWorks Workflows Problems in IPWorks Troubleshooting Guideline](#) to investigate and resolve the possible issues.

The log from VNF-LCM is located in VNF-LCM: `/ericsson/3pp/jboss/standalone/log/server.log`.





## Reference List

### Documents

- [1] VNF-LCM CEE/Openstack Installation Instructions, 1/153 72-APR 901 0578
- [2] VNF-Lifecycle Manager System Administration Guide, 1543-APR 901 0578 Uen
- [3] IPWorks Deployment Guide, 21/1553-AVA 901 33/3 Uen
- [4] IPWorks Upgrade Instruction, 1/153 72-AVA 901 33/3 Uen
- [5] IPWorks Troubleshooting Guideline