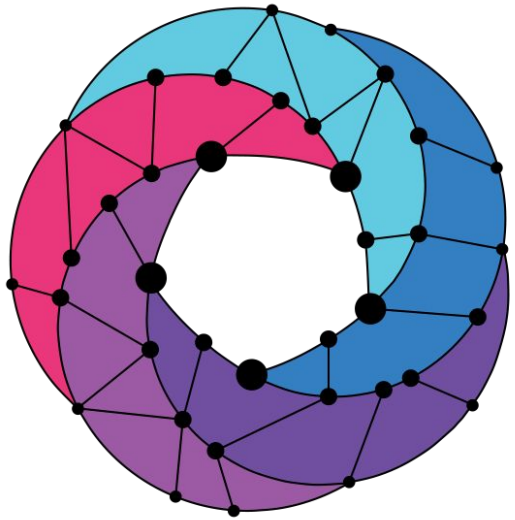

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8th OSM Hackfest – Session 2.1
Creating a basic VNF and NS

Abubakr Magzoub (Lancaster University)

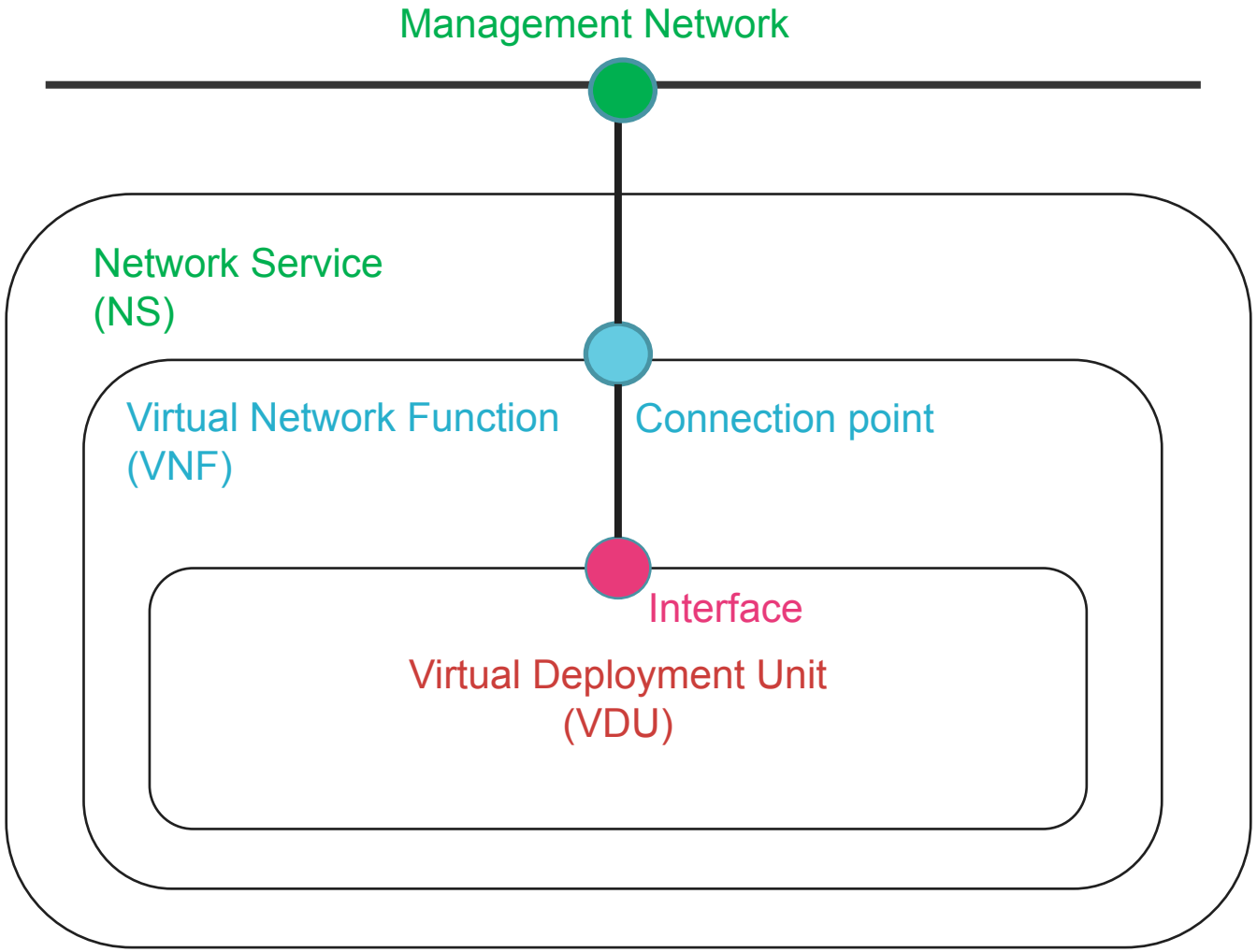
ETSI

Steps for Network Service (NS) Deployment

1. Decide what network function to deploy
2. Define the required specifications
3. Preparing Descriptor:
4. Onboard packages
5. Instantiate the NSD

1. Generate default skeletons
2. Modify default descriptors
3. Validate descriptors
4. Create package for each descriptor

Basic Virtual Network Function Diagram



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Virtual Network Function Descriptor (VNFD)

Generate VNF Descriptor

- Clone (download) the **devops** repository
  - `git clone -b v6.0 https://osm.etsi.org/gerrit/osm/devops.git`
- Generate skeleton directory for Virtual-Network-Function-Descriptor:
  - `cd /devops/descriptor-packages/tools/`
  - `Ls -l`
  - `./generate_descriptor_pkg.sh -t vnfd --image ubuntu1604 -c hackfest-basic`

Editing VNF Descriptor

- Edit the VNF-descriptor:
  - `ls /devops/descriptor-packages/tools/`
  - `Edit: hackfest-basic_vnfd/hackfest-basic_vnfd.yaml`
- Descriptor language is YAML :
  - Indentation is part of the mark-up
  - Always use the same indentation characters
    - Recommendation: 2 spaces is the preferred indentation
  - Use the Information-Model (IM) tree representation of VNFD as a reference:
    - http://osm-download.etsi.org/ftp/osm-doc/vnfd.html

```
vnfd:
-   id: hackfest-basic_vnfd
    name: hackfest-basic_vnfd
    ...
    mgmt-interface:
        cp: vnf-cp0
    vdu:
    -   id: hackfest-basic_vnfd-VM
        name: hackfest-basic_vnfd-VM
        vm-flavor:
            vcpu-count: 1
            memory-mb: 1024
            storage-gb: 10
        image: ubuntu1604
        interface:
        -   name: eth0
            virtual-interface:
                type: VIRTIO
                ...
            external-connection-point-ref: vnf-cp0
    connection-point:
    -   name: vnf-cp0
        …
```

Information-Model (IM)

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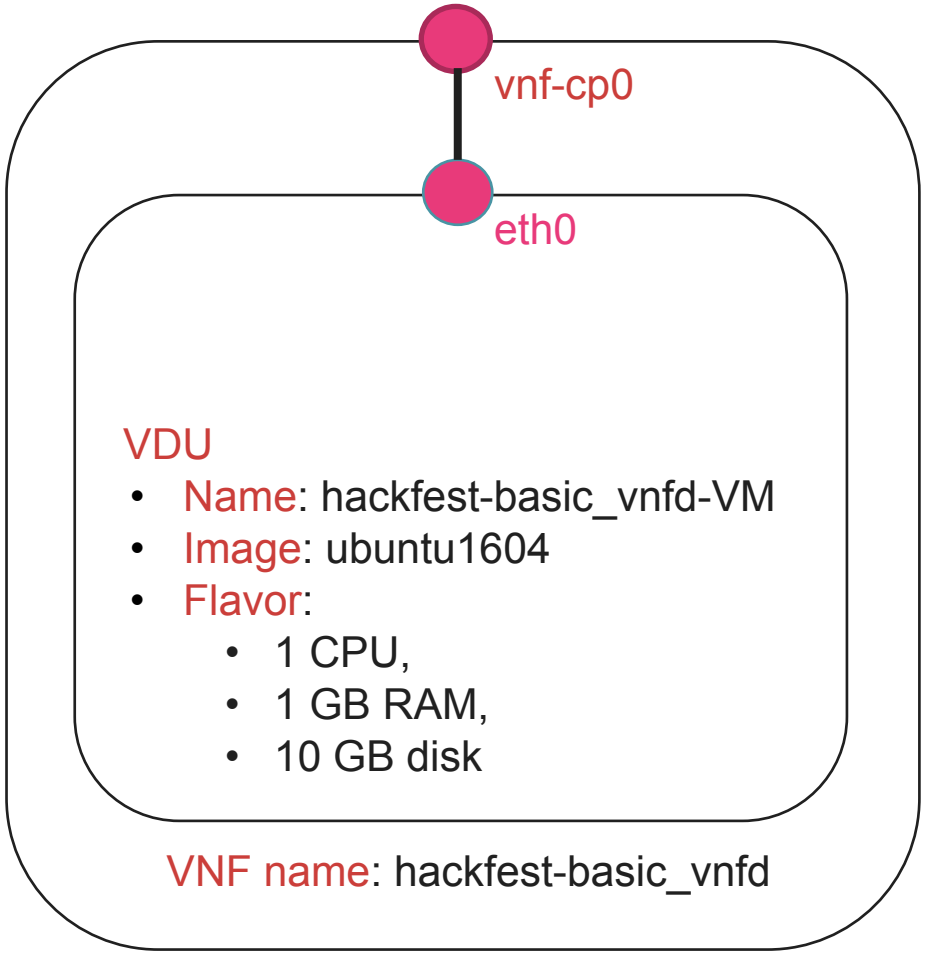
Module: vnfd, Namespace: urn:etsi:osm:yang:vnfd, Prefix: vnfd

Element [+]Expand all [-]Collapse all	Schema Type		Flags	Opts	Status	Path
vnfd	module					
vnfd-catalog	container		config		current	/vnfd:vnfd-catalog
schema-version	leaf	string	config	?	current	/vnfd:vnfd-catalog/vnfd:schema-version
vnfd[id]	list		config		current	/vnfd:vnfd-catalog/vnfd:vnfd
id	leaf	string	config		current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:id
name	leaf	string	config		current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:name
short-name	leaf	string	config	?	current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:short-name
vendor	leaf	string	config	?	current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:vendor
logo	leaf	string	config	?	current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:logo
description	leaf	string	config	?	current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:description
version	leaf	string	config	?	current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:version
vnf-configuration	container		config		current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:vnf-configuration
operational-status	leaf	vnf-operational-status	config	?	current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:operational-status
mgmt-interface	container		config		current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:mgmt-interface
internal-vld[id]	list		config		current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:internal-vld
ip-profiles[name]	list		config		current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:ip-profiles
connection-point[name]	list		config		current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:connection-point
vdu[id]	list		config		current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:vdu
vdu-dependency[vdu-source-ref]	list		config		current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:vdu-dependency
service-function-chain	leaf	enumeration	config	?	current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:service-function-chain
service-function-type	leaf	string	config	?	current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:service-function-type
http-endpoint[path]	list		config		current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:http-endpoint
scaling-group-descriptor[name]	list		config		current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:scaling-group-descriptor
monitoring-param[id]	list		config		current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:monitoring-param
placement-groups[name]	list		config		current	/vnfd:vnfd-catalog/vnfd:vnfd/vnfd:placement-groups

http://osm-download.etsi.org/ftp/osm-doc/vnfd.html

VNF Descriptor and Diagram

```
vnfd:
-   id: hackfest-basic_vnfd
    name: hackfest-basic_vnfd
    ...
    mgmt-interface:
        cp: vnf-cp0
    vdu:
    -   id: hackfest-basic_vnfd-VM
        name: hackfest-basic_vnfd-VM
        vm-flavor:
            vcpu-count: 1
            memory-mb: 1024
            storage-gb: 10
        image: ubuntu16.04
        interface:
        -   name: eth0
            virtual-interface:
                type: VIRTIO
                ...
            external-connection-point-ref: vnf-cp0
    connection-point:
    -   name: vnf-cp0
        …
```



Descriptors Validation Prerequisite :

- https://osm.etsi.org/wikipub/index.php/Creating_your_own_VNF_package#Validate_descriptors
- Install the python OSM IM package:
  - `curl "https://osm-download.etsi.org/repository/osm/debian/ReleaseSIX/OSM%20ETSI%20Release%20Key.gpg" | sudo apt-key add -`
  - `sudo apt-get update`
  - `apt-get update && add-apt-repository -y "deb [arch=amd64] https://osm-download.etsi.org/repository/osm/debian/ReleaseSIX stable IM osmclient devops"`
- update python-osm-im and its dependencies:
  - `sudo apt-get update`
  - `sudo apt-get install python-osm-im`
  - `sudo -H pip install pyangbind`

Validating and Generating VNFD Packages:

- Validate VNF Descriptor:
  - `cd /devops/descriptor-packages/tools/`
  - `./validate_descriptor.py hackfest-basic_vnfd/hackfest-basic_vnfd.yaml`
- Generate VNFD Package:
  - `cd /devops/descriptor-packages/tools/`
  - `./generate_descriptor_pkg.sh -t vnfd -N hackfest-basic_vnfd/`

Onboarding VNF Descriptor

- Onboard VNFD Package using:
  - OSM Web-interface:
    - Log-in to OSM web-interface (admin/admin)
    - Click on “VNF Package”
    - Go the directory where the VNFD is located.
    - Select, drag and drop the VNFD in the “Just drag and drop files here” box
  - OSM Client:
    - `osm vnfd-create hackfest-basic_vnfd.tar.gz`
    - `osm vnfd-list`
    - `osm vnfd-show hackfest-basic_vnfd`

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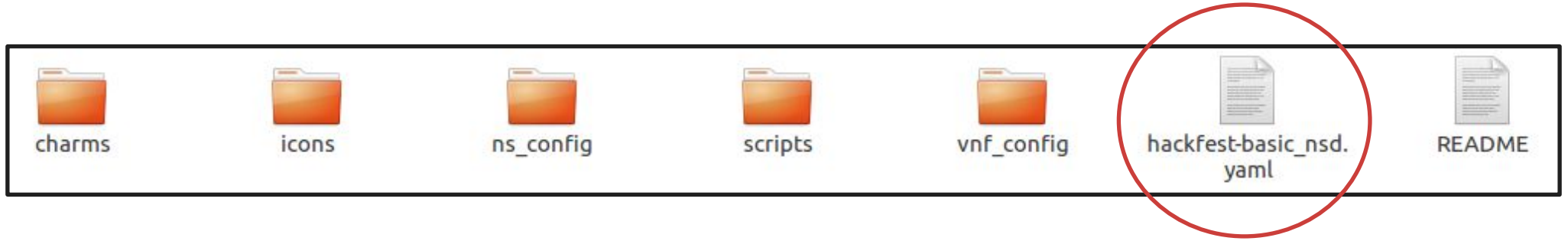
Network Service Descriptor (NSD)

Generate NS Descriptor

- Generate skeleton directory for Virtual-Network-Function-Descriptor:
  - `cd /devops/descriptor-packages/tools/`
  - `./generate_descriptor_pkg.sh -t nsd -c hackfest-basic`

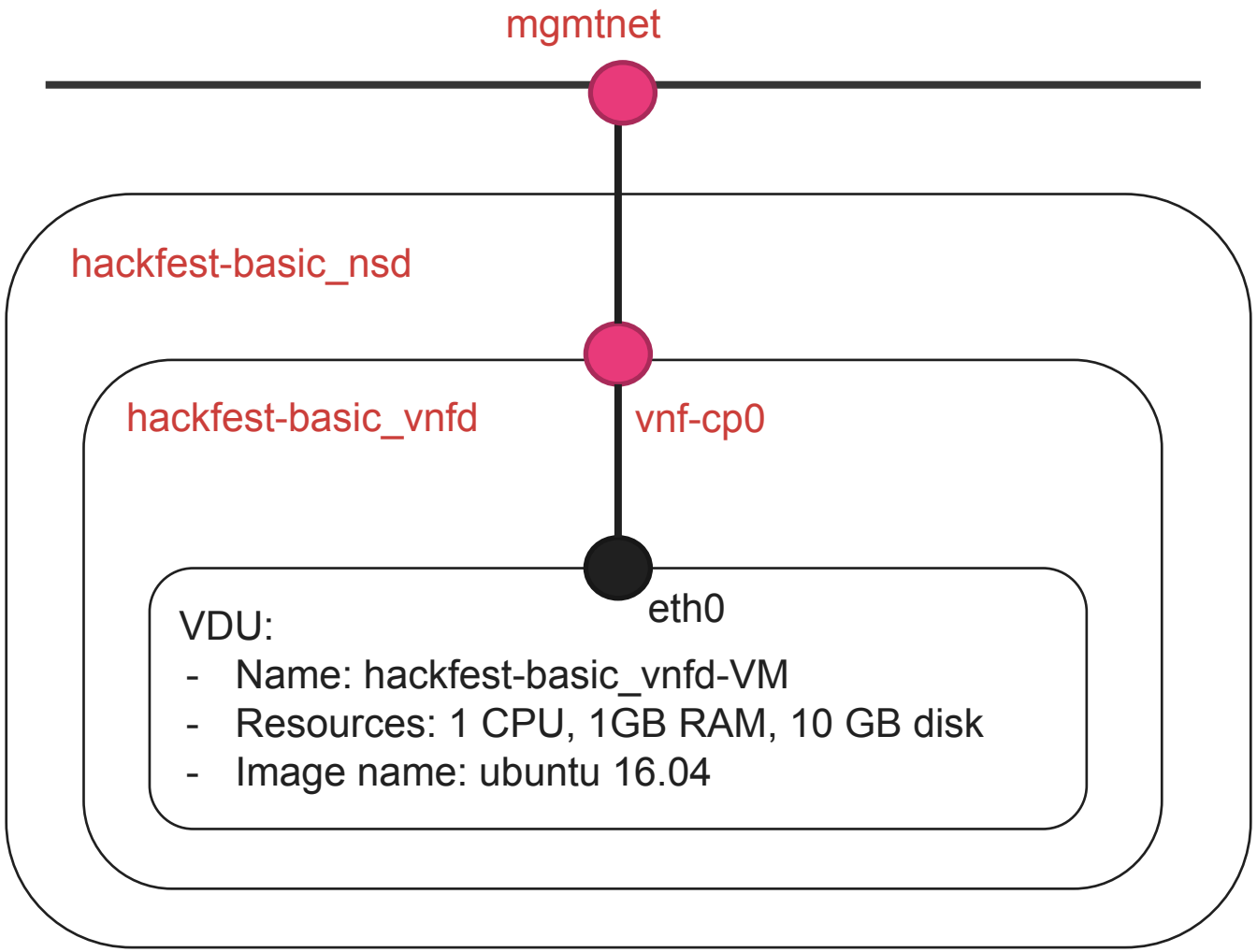


Editing NS Descriptor

- Edit the NS-descriptor:
  - `cd /devops/descriptor-packages/tools/`
  - `Edit: hackfest-basic_nsd/hackfest-basic_nsd.yaml`
- Descriptor language is YAML :
  - Indentation is part of the mark-up
  - Always use the same indentation characters
    - Recommendation: 2 spaces is the preferred indentation
  - Use the Information-Model (IM) tree representation of VNFD as a reference:
    - http://osm-download.etsi.org/ftp/osm-doc/nsd.html

```
nsd:
-   id: hackfest-basic_nsd
    name: hackfest-basic_nsd
    ...
    constituent-vnfd:
    -   member-vnf-index: 1
        vnfd-id-ref: hackfest-basic_vnfd
    vld:
    -   id: mgmtnet
        name: mgmtnet
        type: ELAN
        mgmt-network: true
        vnfd-connection-point-ref:
        -   member-vnf-index-ref: 1
            vnfd-connection-point-ref: vnf-cp0
            vnfd-id-ref: hackfest-basic_vnfd
```

NS Diagram



Validating NS Descriptor and Generating Package

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- Validate NSD Descriptor:
  - `cd /devops/descriptor-packages/tools/`
  - `./validate_descriptor.py hackfest-basic_nsd/hackfest-basic_nsd.yaml`
- Generate NSD Package:
  - `cd /devops/descriptor-packages/tools/`
  - `./generate_descriptor_pkg.sh -t nsd -N hackfest-basic_nsd/`

Onboarding NS Descriptor

- Onboard VNFD Package using:
  - OSM Web-interface:
    - Log-in to OSM web-interface (admin/admin)
    - Click on “NS Package”
    - Go the directory where the NSD is located.
    - Select, drag and drop the VNFD in the “Just drag and drop files here” box
  - OSM Client:
    - osm nsd-create hackfest-basic_nsd.tar.gz
    - osm nsd-list
    - osm nsd-show hackfest-basic_nsd

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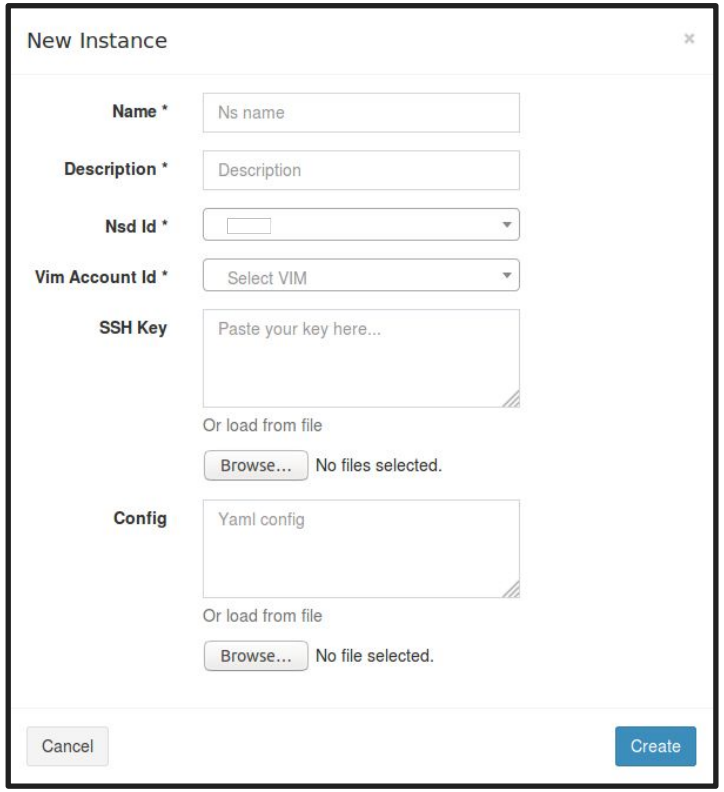
NS Instantiation

Web-interface NS instantiatation

- Log-in to OSM Web-interface (admin/admin)
- Click on “NS packages”
- Click on “Instantiate NS” icon
- Complete the form:
  - Add a name to the NS instance
  - Select the VIM where the NS will be deployed
  - In the config section, specify a default VIM network name:
    - {vld: [{name: mgmtnet, vim-network-name: osm-ext}] }
  - Paste your SSH key
- Click “Create”
- Click on “VNF Instances”
- Click on the specific VNF to see the instance IP address



Deploying NS with the client

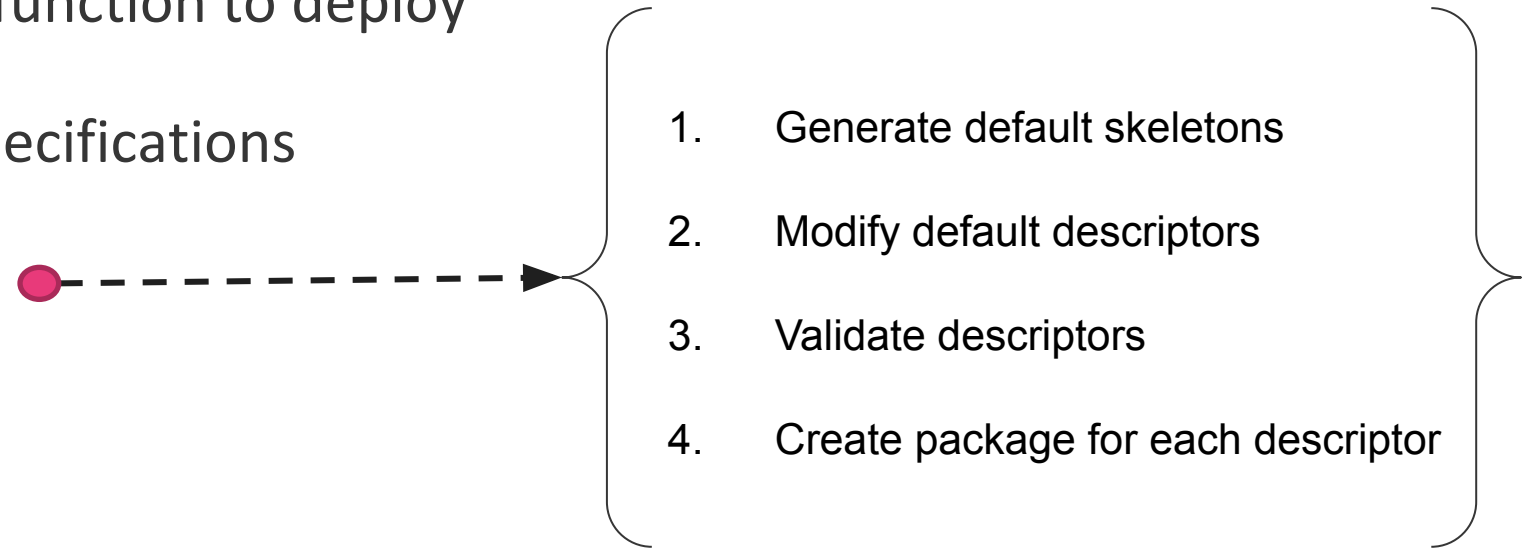
- Create an SSH key
  - `ssh-keygen`
- List NSD Packages:
  - `osm nsd-list`
- Create the NS:
  -
```
osm ns-create \
 --ns_name NS-NAME \
 --nsd_name NSD-PACKAGE-NAME \
 --vim_account VIM-ACCOUNT-NAME  \
 --ssh_keys SSH-PUBLIC-KEY\
 --config '{vld: [ {name: MANAGEMENT-NETWORK-NAME, vim-network-name: DATA-NETWORK} ] }'
```
- For example:
  -
```
osm ns-create \
 --ns_name hf-basic \
 --nsd_name hackfest-basic_nsd \
 --vim_account vim_name  \
 --ssh_keys ~/.ssh/id_rsa.pub \
 --config '{vld: [ {name: mgmtnet, vim-network-name: osm-ext} ] }'
```

Deploying NS with the client

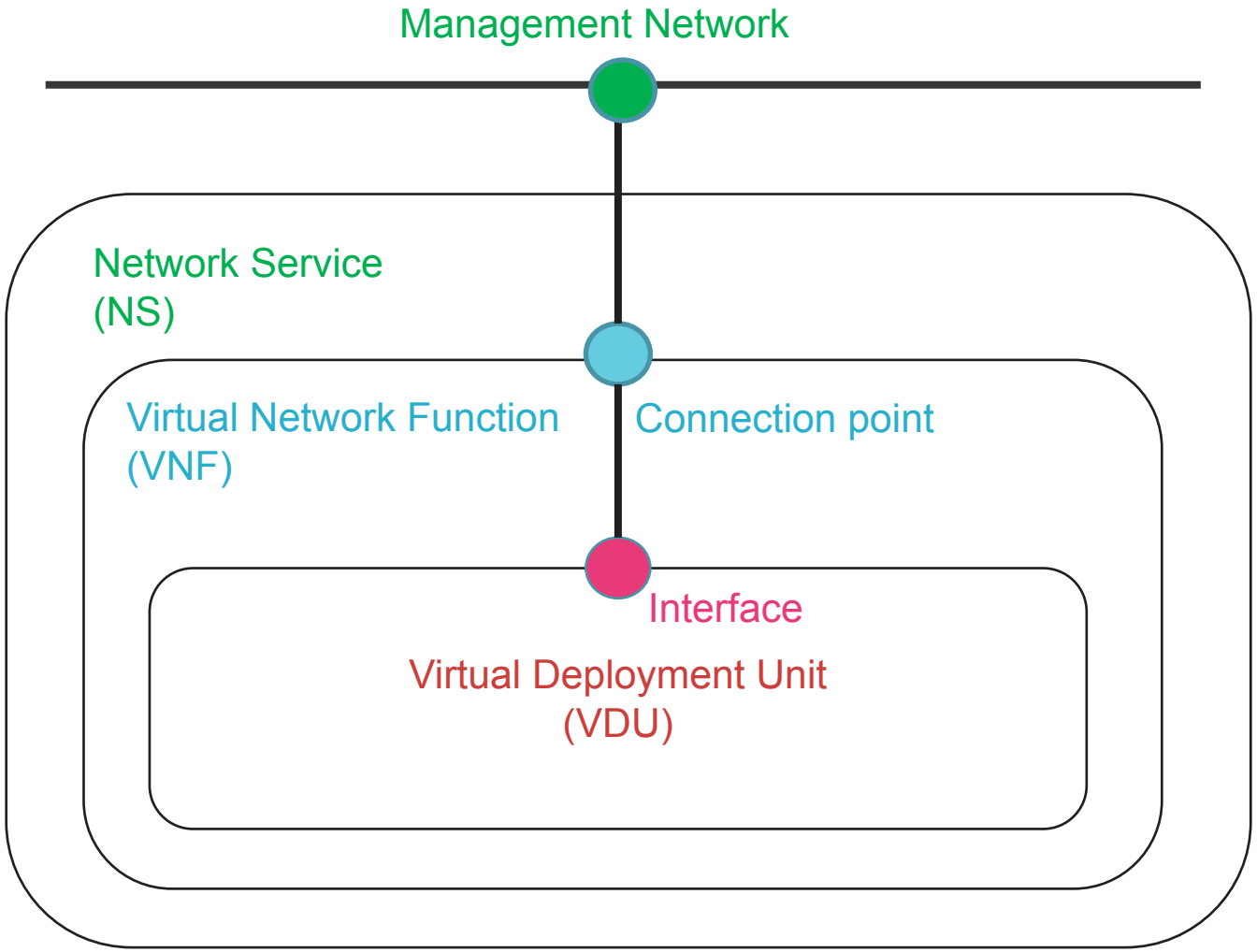
- List instantiated NS
  - `osm ns-list`
- Show instantiated NS details
  - `osm ns-show hf-basic`
- List instantiated VNF instances :
  - `osm vnf-list`
- Show the instantiated VNF instance details:
  - `osm vnf-show VNF-NAM`
- Remote login to VNF instance :
  - `ssh username@instance-ip-address`

Basic VNF and NS Deployment Review

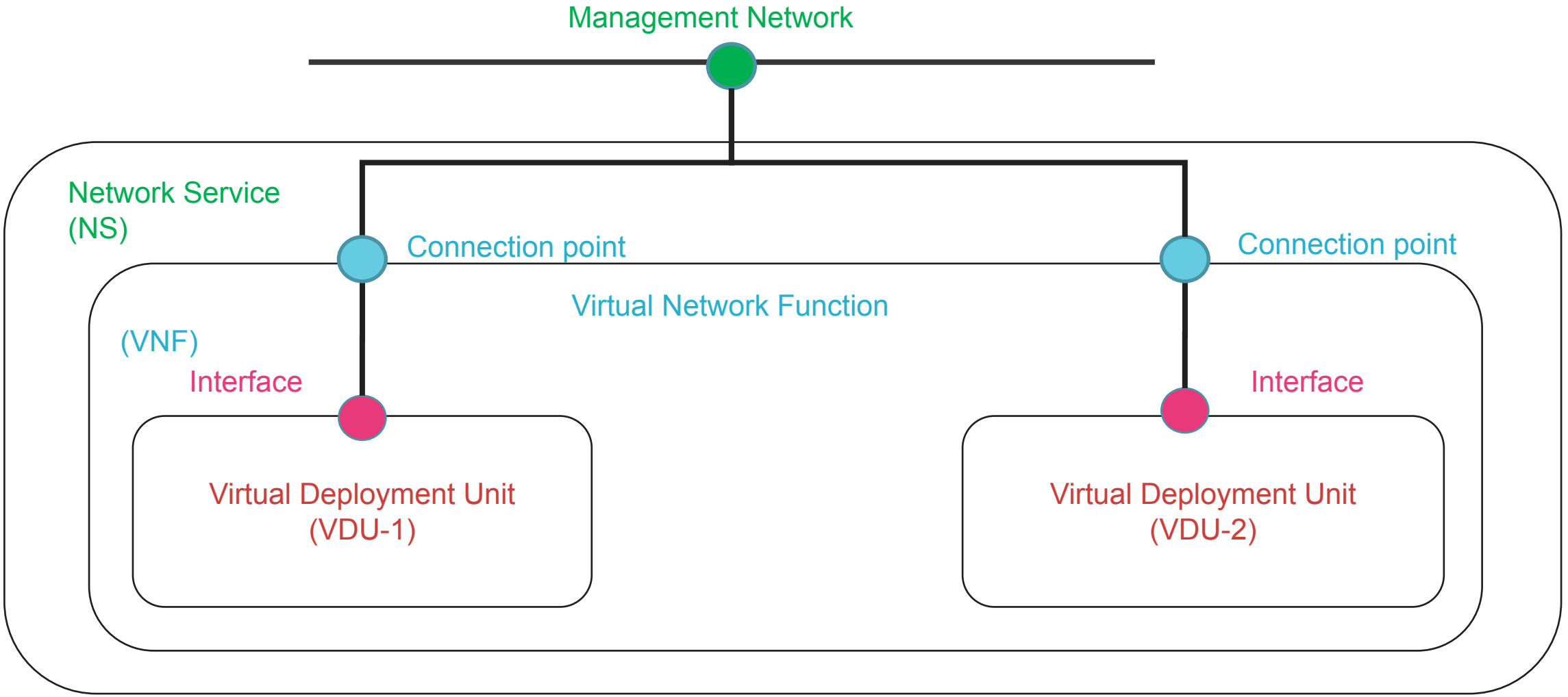
1. Decide what network function to deploy
2. Define the required specifications
3. Preparing Descriptor:
4. Onboard packages
5. Instantiate the NSD

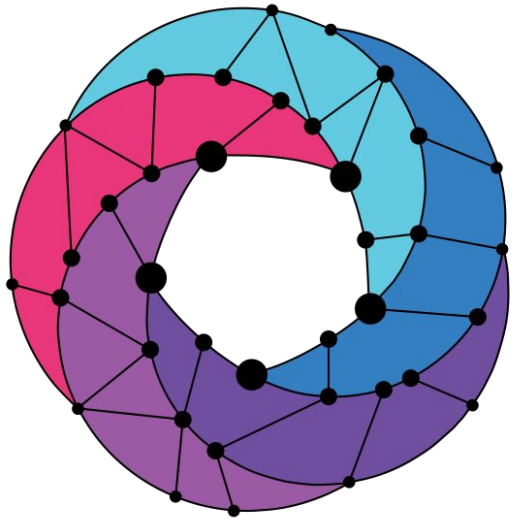


Basic Virtual Network Function Diagram



2 VDUs Virtual Network Function Diagram





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