NS diagram

NS: hackfest_multivdu_nsd

- VNF: hackfest_multivdu_vnfd
  - CP: vnf-data
    - VL: datanet
  - CP: vnf-mgmt
    - VL: mgmtnet

- VNF: hackfest_multivdu_vnfd
  - CP: vnf-data
    - VL: datanet
  - CP: vnf-mgmt
    - VL: mgmtnet
VNF: hackfest_multivdu_vnfd

External Connection point: vnf-mgmt

VDU: mgmtVM
- Image name: US1604
- VM Flavor: 1 CPU, 1GB RAM, 10 GB disk
- Interfaces:
  - mgmtVM-eth0: VIRTIO
  - mgmtVM-eth1: VIRTIO

External Connection point: vnf-data

VDU: dataVM
- Image name: US1604
- VM Flavor: 1 CPU, 1GB RAM, 10 GB disk
- Interfaces:
  - dataVM-eth0: VIRTIO
  - dataVM-xe0: VIRTIO

VL: internal

ICP: mgmtVM-internal

ICP: dataVM-internal
Final Multi-VDU Picture

NS: hackfest_multivdu-ns

VNF: hackfest_multivdu-vnf

VNF 1 / VDU: mgmtVM
VNF 1 / VDU: dataVM

VNF 2 / VDU: mgmtVM
VNF 2 / VDU: dataVM

VNF: hackfest_multivdu-vnf

Internal VLDs & CPs

External VLDs & CPs
VNF/NS Compose

• Compose a VNF or NS graphically.
VNF diagram

External Connection point: vnf-mgmt

VNF: hackfest_multivdu_vnfd

VL: internal

External Connection point: vnf-data

VDU: mgmtVM
- Image name: US1604
- VM Flavor: 1 CPU, 1GB RAM, 10 GB disk
- Interfaces:
  - mgmtVM-eth0: VIRTIO
  - mgmtVM-eth1: VIRTIO

ICP: mgmtVM-internal

mgmtVM-eth0
mgmtVM-eth1

ICP: dataVM-internal

dataVM-eth0
dataVM-xe0

VDU: dataVM
- Image name: US1604
- VM Flavor: 1 CPU, 1GB RAM, 10 GB disk
- Interfaces:
  - dataVM-eth0: VIRTIO
  - dataVM-xe0: VIRTIO
User Interface

• Steps:
  • Compose a new VNF
  • Create new Package
VNFD Composer

- Steps
  - VNFD Composer

- Keyboard shortcuts

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Creating the new multi-VDU VNF (1/4)

**Steps**

• Create VDUs
  - mgmtVM
  - dataVM

(Drag and drop)

• Edit the descriptor to add the flavor:
Creating the new multi-VDU VNF (2/4)

• Steps
  • Create Connection Points: (Drag and drop)
    - vnf-mgmt
    - vnf-data
  • Link CPs with VDUs (Shift + Left Click)
Creating the new multi-VDU VNF (3/4)

**Steps**

- **Create Internal VL:** (Drag and drop)
  - Short-name: internal
  - Name: internal
  - Ip-profile-ref: internal
  - Type: ELAN
  - Id: internal

- **Link internal VL with VDUs (Shift + Left Click)**
  - VNFD composer automatically create the internal connection points:

- **Edit the descriptor**

```plaintext
mgmt-internal
mgmt-interface:
  cp: vnf-mgmt
```
Creating the new multi-VDU VNF (4/4)

• Final Scenario multiVDU_vnfd

And finally, this is the sample file:
Hackfest Multi VDU VNF Descriptor - [https://osm-download.etsi.org/ftp/osm-5.0-five/5th-hackfest/packages/hackfest_multivdu_vnf.tar.gz](https://osm-download.etsi.org/ftp/osm-5.0-five/5th-hackfest/packages/hackfest_multivdu_vnf.tar.gz)
NS diagram

NS: hackfest_multivdu_nsd

VNF: hackfest_multivdu_vnfd
CP: vnf-data

VL: mgmtnet
CP: vnf-mgmt

VL: datanet
CP: vnf-data

VNF: hackfest_multivdu_vnfd
User Interface

• Steps:
  • Compose a new NS
  • Create new Package
NSD Composer

• Steps
  • NSD Composer

• Keyboard shortcuts
Creating the NSD (1/3)

- Select VNFs: (Drag and drop)

  - VNF
    - member-vnf-index: 1
    - vnfd-id-ref: MultiVOU_vnfd

  - VNF
    - member-vnf-index: 2
    - vnfd-id-ref: MultiVOU_vnfd

- Create VLs: (Drag and drop)

  - Virtual Link
    - VIM network name: PUBLIC
    - Name: mgmtnet
    - Mgmt network: true
    - Type: ELAN
    - Id: mgmtnet

  - Virtual Link
    - VIM network name: 
    - Name: datanet
    - Mgmt network: false
    - Type: ELAN
    - Id: datanet
Creating the NSD (2/3)

• Steps
  • Link VLs with VNFs (Shift + Left Click)
    • You need to know the name for the CPs (vnf-data and vnf-mgmt)

• Final Scenario
Creating the NSD (3/3)

• And finally, against the sample file:
  Hackfest MultiVDU NS Descriptor - https://osm-download.etsi.org/ftp/osm-5.0-five/5th-hackfest/packages/hackfest_multivdu_ns.tar.gz
Deploying NS in the UI

- Onboard VNFD and NSD to catalog using the UI
- Launch the NS from the UI
  - Depending on the VIM, specify a VIM network name to map MGMTNET
  - If you need to change the VIM, change the network name using config:
    ```json
    {vld: [{name: mgmtnet, vim-network-name: PUBLIC}]}
    ```
- Click the info button to see the mgmt IP address of each VNF
- Connect to each VNF:
  - `ssh osm@<IP>` (pwd: osm4u)
Final Multi-VDU Picture

- VNF: hackfest_multivdu-vnf
- VNF 1 / VDU: mgmtVM
- VNF 1 / VDU: dataVM
- VNF 2 / VDU: mgmtVM
- VNF 2 / VDU: dataVM

Internal VLDs & CPs
External VLDs & CPs
Network modelling with IP Profiles

• Using IP Profiles, we can configure the attributes of subnets that are created by OSM. We can do it for internal or external VLDs.

• Subnet's DHCP server will not deliver a default gateway if explicitly set to 0.0.0.0

External VLD with IP Profile (NSD level)

```
...  
  - id: NS1-nsd  
  ...  
  ip-profiles:  
    - name: profile_external1  
      description: external network  
      ip-profile-params:  
        ip-version: ipv4  
        dns-server: 8.8.8.8  
        gateway-address: 192.168.17.0/24  
        subnet-address: 192.168.17.0/24  
        dhcp-params:  
          enabled: true  
  vld:  
    - id: external1  
      ip-profile-ref: profile_external1  
...  
```

Internal VLD with IP Profile (VNFD level)

```
...  
  - id: VNF1-vnfd  
  ...  
  ip-profiles:  
    - name: p1  
      description: p1  
      ip-profile-params:  
        ip-version: ipv4  
        gateway-address: 0.0.0.0  
        subnet-address: 192.168.100.0/24  
        dhcp-params:  
          enabled: true  
  internal-vld:  
    - id: internal  
      ip-profile-ref: p1  
...  
```

Note: attributes with no values are informational only, they can be removed.
Network modelling with Static IPs

- We can also set static IP addresses, having IP Profile and DHCP enabled.

**External VLD with IP Profile (NSD level)**

```xml
...  
- id: NS1-nsd  
  ...  
  ip-profiles:  
  - name: profile_external1  
    description: external network  
    ip-profile-params:  
      ip-version: ipv4  
      subnet-address: 192.168.17.0/24  
    dhcp-params:  
      enabled: true  
  vld:  
  - id: external1  
    ip-profile-ref: profile_external1  
    ...  
    vnfd-connection-point-ref:  
    - ...  
    ip-address: 192.168.17.100
```

**Internal VLD with IP Profile (VNFD level)**

```xml
...  
- id: VNF1-vnfd  
  ...  
  ip-profiles:  
  - name: p1  
    description: p1  
    ip-profile-params:  
      ip-version: ipv4  
    subnet-address: 192.168.100.0/24  
    dhcp-params:  
      enabled: true  
  internal-vld:  
  - id: internal  
    ip-profile-ref: p1  
    ...  
    internal-connection-point:  
    - id-ref: mgmtVM-internal  
    ip-address: 192.168.100.100
```
Network modelling with MACs

- We can set MAC addresses as well, just set them up at the VDU level.

```
Changing MAC (VNFD level)
...
interface:
- name: mgmtVM-eth0
  position: '1'
  type: EXTERNAL
  virtual-interface:
    type: VIRTIO
    external-connection-point-ref: vnf-mgmt
    mac-address: '01:02:03:01:02:03'
- name: mgmtVM-eth1
  position: '2'
  type: INTERNAL
  virtual-interface:
    type: VIRTIO
    internal-connection-point-ref: mgmtVM-internal
    mac-address: '03:02:01:03:02:01'
...
```

--> Be careful about duplicated MACs!