

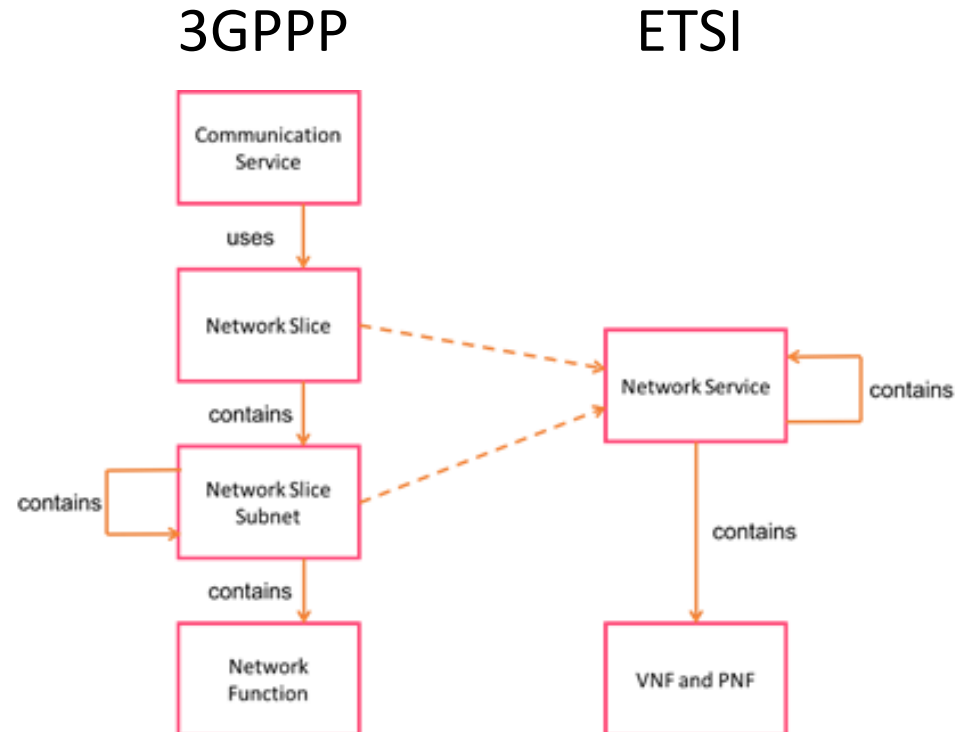
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OSM Hackfest – Session 8 5G Network Slicing with OSM

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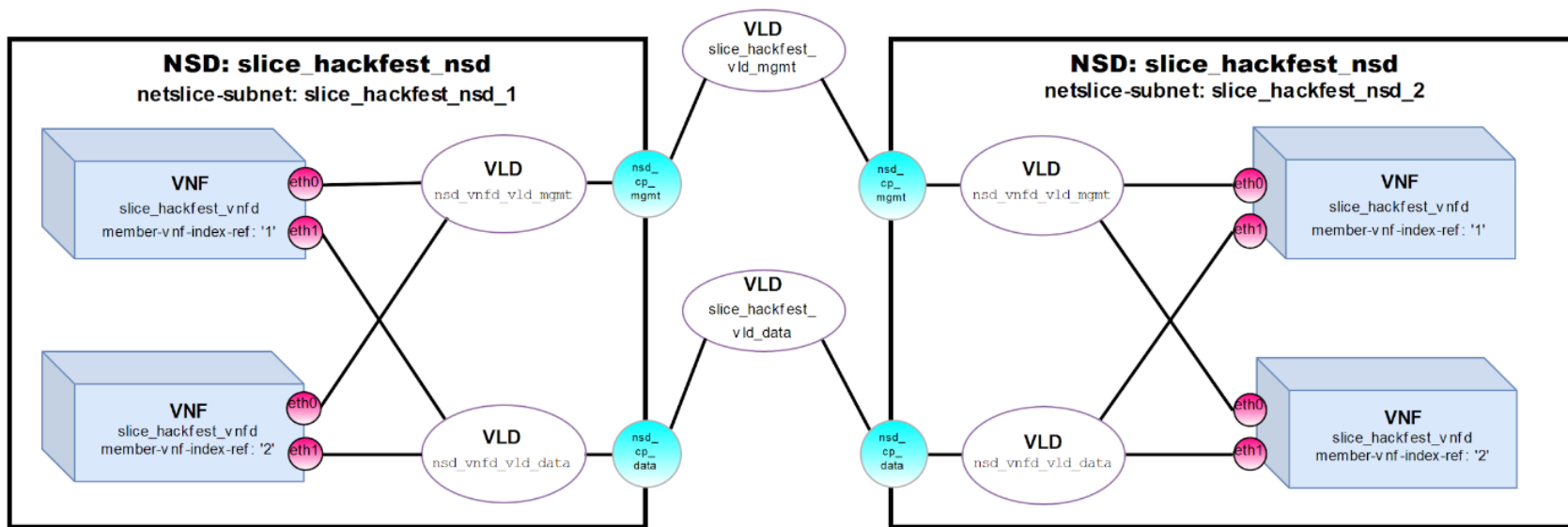
Network Slicing 101

- Major development under 5G
- Two key attributes
 - Composition of NSs
 - ‘Normal’ NS in NS
 - Sharing of a single NS instance between more than one slice
 - Quite different to normal NS in NS and is not normal containment relationship
- Also more generally, the difference between static and dynamic behaviour NSs and network slices
 - An instance can easily evolve well away from its original creation template



NST diagram

NST: slice_hackfest_nst



Network Slice Template Requirements



VNFD:

- slice_hackfest_vnfd.tar.gz

NSD:

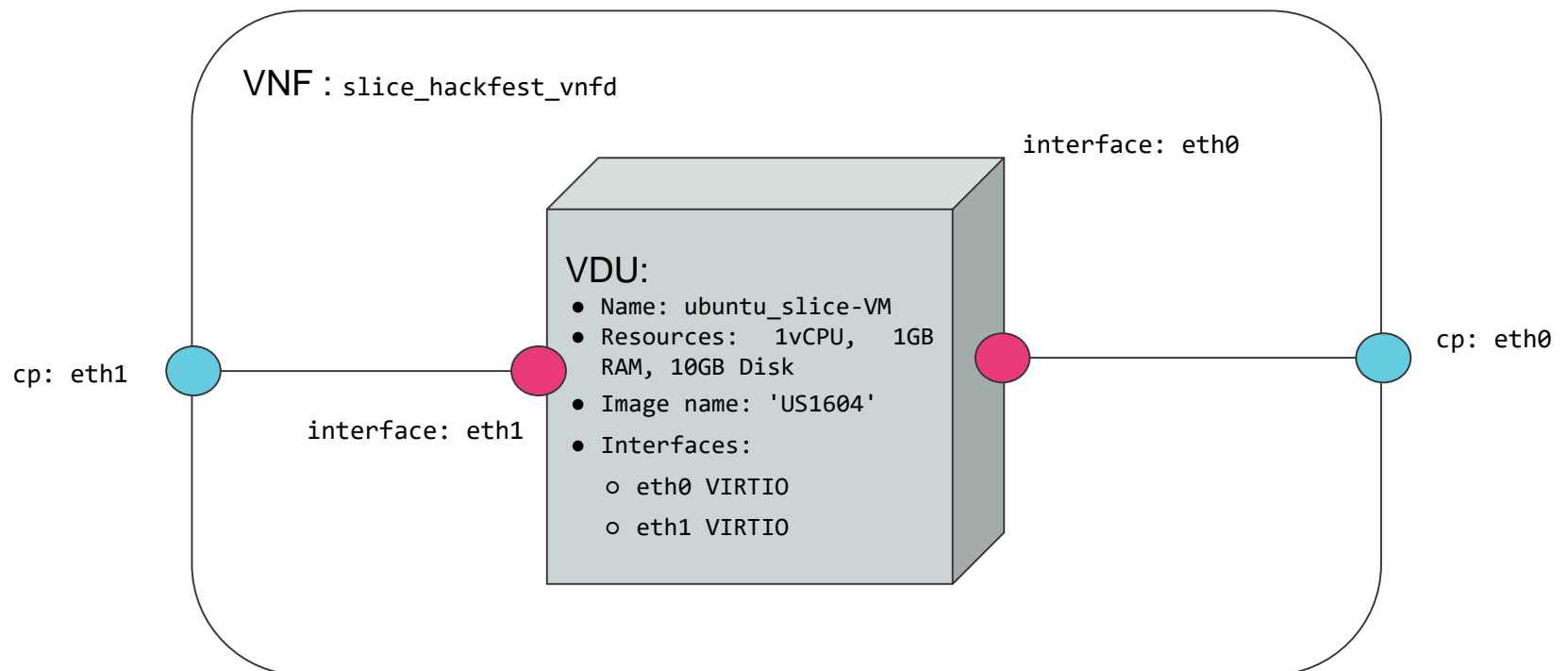
- slice_hackfest_nsd.tar.gz

NST:

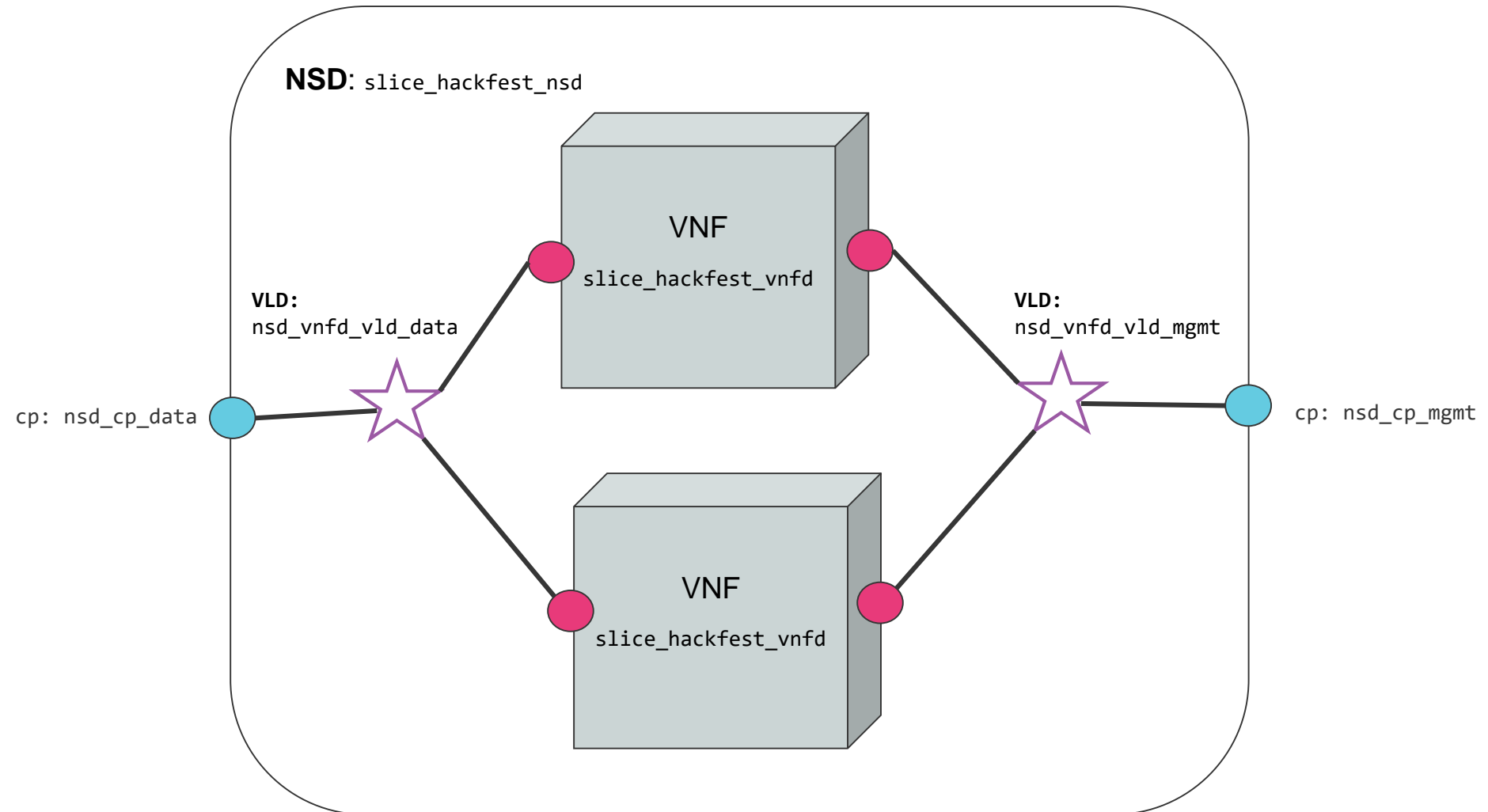
- slice_hackfest_nst.yaml

- The descriptors for the slice hackfest session are available:
 - <https://osm-download.etsi.org/ftp/osm-5.0-five/5th-hackfest/packages/>

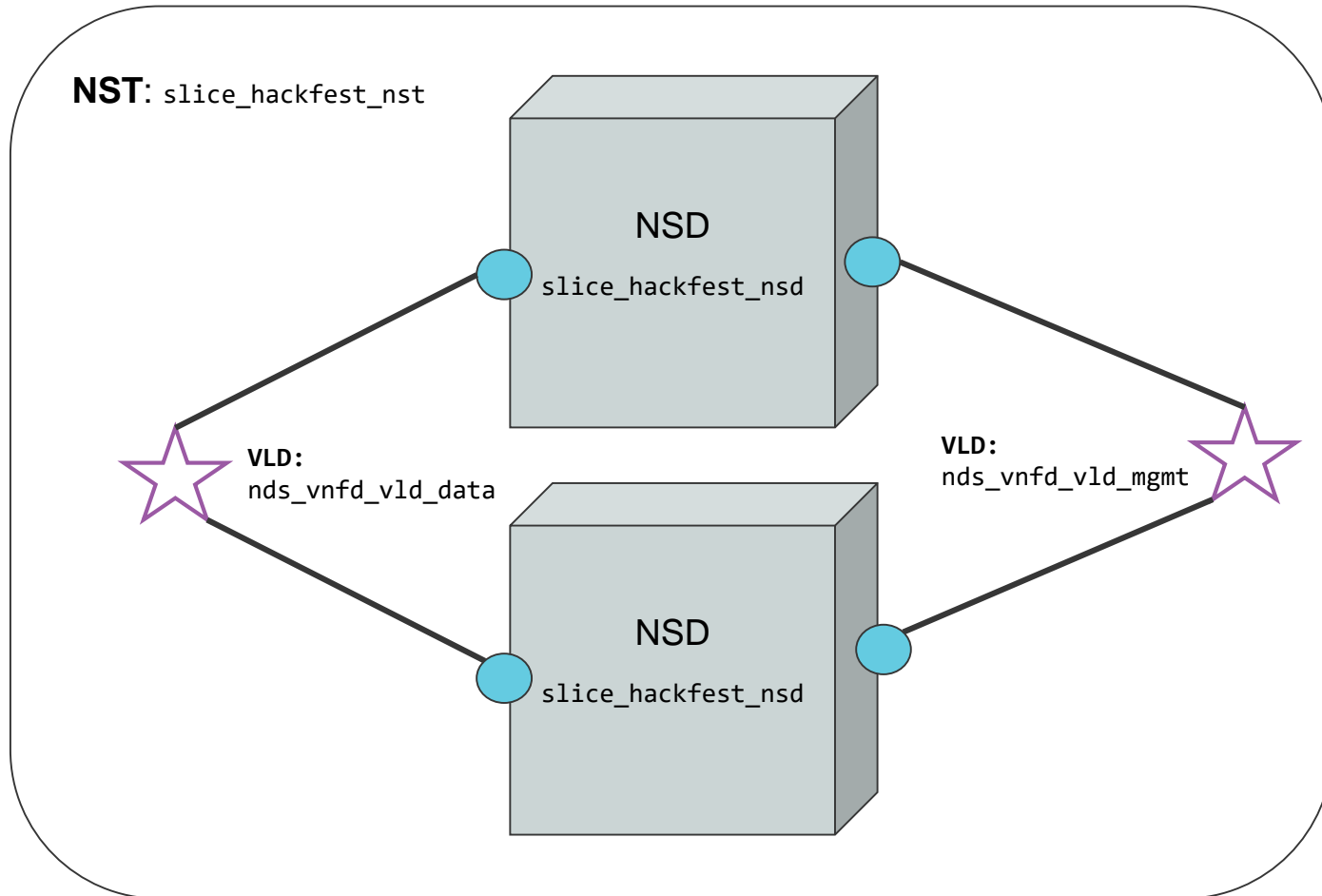
VNFD - slice_hackfest_vnfd



NSD - slice_hackfest_nsd



NST - slice_hackfest_nst



Network Slice Template

```
nst:
- id: slice_hackfest_nst
  name: slice_hackfest_nst
  SNSSAI-identifier:
    slice-service-type: eMBB
  quality-of-service:
    id: 1

netslice-subnet:
- id: slice_hackfest_nsd_1
  is-shared-nss: 'false'
  description: NetSlice Subnet (service) composed by 2 vnfs and 4 cp (2 mgmt and 2 data)
  nsd-ref: slice_hackfest_nsd
- id: slice_hackfest_nsd_2
  is-shared-nss: 'false'
  description: NetSlice Subnet (service) composed by 2 vnfs and 4 cp (2 mgmt and 2 data)
  nsd-ref: slice_hackfest_nsd

netslice-vld:
- id: slice_hackfest_vld_mgmt
  name: slice_hackfest_vld_mgmt
  type: ELAN
  mgmt-network: 'true'
  nss-connection-point-ref:
  - nss-ref: slice_hackfest_nsd_1
    nsd-connection-point-ref: nsd_cp_mgmt
  - nss-ref: slice_hackfest_nsd_2
    nsd-connection-point-ref: nsd_cp_mgmt
- id: slice_hackfest_vld_data
  name: slice_hackfest_vld_data
  type: ELAN
  nss-connection-point-ref:
  - nss-ref: slice_hackfest_nsd_1
    nsd-connection-point-ref: nsd_cp_data
  - nss-ref: slice_hackfest_nsd_2
    nsd-connection-point-ref: nsd_cp_data
```


Creating a Network Slice Template (NST)

Information Model

```
module: nst
+--rw nst* [id]
  +--rw id string
  +--rw name string
  +--rw SNSSAI-identifier
  | +--rw slice-service-type network-slice-type
  | +--rw slice-differentiator? string
+--rw quality-of-service
  | +--rw id uint16
  | +--rw resource-type? resource-type
  | +--rw priority-level? uint16
  | +--rw packet-delay-budget? uint16
  | +--rw packet-error-rate? uint16
  | +--rw default-max-data-burst? uint16
```



NST - id, name, and slice parameters section

```
nst:
- id: slice_hackfest_nst
  name: slice_hackfest_nst
  SNSSAI-identifier:
    slice-service-type: eMBB
  quality-of-service:
    id: 1
```

- The Information model for the NST is available:
 - http://osm-download.etsi.org/repository/osm/debian/ReleaseFIVE/docs/osm-im/osm_im_trees/nst.html

Creating a Network Slice Template (NST)

Information Model

```
+--rw netslice-subnet*           [id]
| +--rw id                       string
| +--rw description?            string
| +--rw is-shared-nss?          boolean
| +--rw nsd-ref                  -> /nsd:nsd-catalog/nsd/id
| +--rw instantiation-parameters
| +-----
```



NST - netslice-subnet section

```
netslice-subnet:
- id: slice_hackfest_nsd_1
  is-shared-nss: 'false'
  description: NetSlice Subnet (service) composed
  by 2 vnfs and 4 cp (2 mgmt and 2 data)
  nsd-ref: slice_hackfest_nsd
- id: slice_hackfest_nsd_2
  is-shared-nss: 'false'
  description: NetSlice Subnet (service) composed
  by 2 vnfs and 4 cp (2 mgmt and 2 data)
  nsd-ref: slice_hackfest_nsd
```

- The Information model for the NST is available:
 - http://osm-download.etsi.org/repository/osm/debian/ReleaseFIVE/docs/osm-im/osm_im_trees/nst.html

Creating a Network Slice Template (NST)

NST - netslice-subnet section

netslice-subnet:

- id: **slice_hackfest_nsd_1**
is-shared-nss: 'false'
description: NetSlice Subnet (service) composed by 2 vnfs and 4 cp (2 mgmt and 2 data)
nsd-ref: **slice_hackfest_nsd**
- id: **slice_hackfest_nsd_2**
is-shared-nss: 'false'
description: NetSlice Subnet (service) composed by 2 vnfs and 4 cp (2 mgmt and 2 data)
nsd-ref: **slice_hackfest_nsd**

NSD - id, name, and NS parameters section

nsd-catalog:

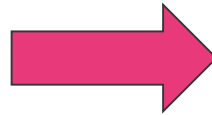
- nsd:
 - id: **slice_hackfest_nsd**
name: slice_hackfest_nsd
short-name: slice_hackfest_ns
description: NetServiceDescriptor with 2 vnfs and 2 vld (mgmt and data networks)
vendor: OSM
version: '1.0'
logo: osm_2x.png

- The Information model for the NST is available:
 - http://osm-download.etsi.org/repository/osm/debian/ReleaseFIVE/docs/osm-im/osm_im_trees/nst.html

Creating a Network Slice Template (NST)

Information Model

```
+--rw netslice-vld* [id]
|
|  +--rw id                string
|  +--rw name?            string
|  +--rw short-name?     string
|  +--rw vendor?         string
|  +--rw description?    string
|  +--rw version?        string
|  +--rw type?           manotypes:virtual-link-type
|  +--rw root-bandwidth? uint64
|  +--rw leaf-bandwidth? uint64
|  +--rw provider-network
|  |  +--rw physical-network? string
|  |  +--rw segmentation_id? uint32
|  +--rw mgmt-network?   boolean
|  +--rw nss-connection-point-ref* [nss-ref nsd-connection-point-
ref]
|  |  +--rw nss-ref        -> /nst/netslice-subnet/id
|  |  +--rw nsd-connection-point-ref -> /nsd:nsd-catalog/
|  |  |                   nsd/connection-point/name
|  |  +--rw ip-address?   inet:ip-address
```



NST - netslice-vld section

```
netslice-vld:
- id: slice_hackfest_vld_mgmt
  name: slice_hackfest_vld_mgmt
  type: ELAN
  mgmt-network: 'true'
  nss-connection-point-ref:
  - nss-ref: slice_hackfest_nsd_1
    nsd-connection-point-ref: nsd_cp_mgmt
  - nss-ref: slice_hackfest_nsd_2
    nsd-connection-point-ref: nsd_cp_mgmt
- id: slice_hackfest_vld_data
  name: slice_hackfest_vld_data
  type: ELAN
  nss-connection-point-ref:
  - nss-ref: slice_hackfest_nsd_1
    nsd-connection-point-ref: nsd_cp_data
  - nss-ref: slice_hackfest_nsd_2
    nsd-connection-point-ref: nsd_cp_data
```

- The Information model for the NST is available:
 - http://osm-download.etsi.org/repository/osm/debian/ReleaseFIVE/docs/osm-im/osm_im_trees/nst.html

Creating a Network Slice Template (NST)

NST - netslice-subnet section

```
netslice-subnet:
```

```
- id: slice_hackfest_nsd_1  
  nsd-ref: slice_hackfest_nsd
```

NSD - id, name, and NS parameters section

```
nsd-catalog:
```

```
  nsd:  
    id: slice_hackfest_nsd  
    name: slice_hackfest_nsd  
    short-name: slice_hackfest_ns
```

NST - netslice-vld section

```
netslice-vld:
```

```
- id: slice_hackfest_vld_mgmt  
  name: slice_hackfest_vld_mgmt  
  type: ELAN  
  mgmt-network: 'true'  
  nss-connection-point-ref:  
  - nss-ref: slice_hackfest_nsd_1  
    nsd-connection-point-ref: nsd_cp_mgmt
```

NSD - connection-point section

```
connection-point:
```

```
  name: nsd_cp_mgmt  
  vld-id-ref: nsd_vnfd_vld_mgmt
```

- The Information model for the NST is available:
 - http://osm-download.etsi.org/repository/osm/debian/ReleaseFIVE/docs/osm-im/osm_im_trees/nst.html

Before the netslice instantiation, Adding VNF, NS packages and NST

- VNF package:
 - `osm vnfd-list`
 - `osm vnfd-create hackfest_slice_vnfd.tar.gz`
 - `osm vnfd-show hackfest_slice_vnfd`

- NS package:
 - `osm nsd-list`
 - `osm nsd-create hackfest_slice_nsd.tar.gz`
 - `osm nsd-show hackfest_slice_nsd`

- NST:
 - `osm nst-list`
 - `osm nst-create hackfest_slice_nst.yaml`
 - `osm nst-show hackfest_slice_nst`

Creating a Network Slice Instance (CLI)



- `osm nsi-create --help`

```
Usage: osm nsi-create [OPTIONS]
       creates a new Network Slice Instance (NSI)
```

Options:

```
--nsi_name TEXT      name of the Network Slice Instance
--nst_name TEXT      name of the Network Slice Template
--vim_account TEXT   default VIM account id or name for the deployment
--ssh_keys TEXT      comma separated list of keys to inject to vnfs
--config TEXT        Netslice specific yaml configuration:
                    netslice_subnet: [
                    id: TEXT, vim_account: TEXT,
                    vnf: [member-vnf-index:
                    TEXT, vim_account: TEXT]
                    vld: [name: TEXT, vim-network-
                    name: TEXT or DICT with vim_account, vim_net entries]],
                    netslice-vld: [name: TEXT, vim-network-name: TEXT or
                    DICT with vim_account, vim_net entries]
--config_file TEXT   nsi specific yaml configuration file
--help              Show this message and exit.
```

- `osm nsi-create --nsi-name my_fist_slice --nst_name slice_hackfest_nst --vim-account <replace_vim_account_id>`

Listing and Deleting a Network Slice Instance (CLI)

- List Network Slice Instances
 - `osm nsi-list`
- Delete Network Slice Instance
 - `osm nsi-delete <nsi_name> or <nsi_id>`

Creating a Network Slice Instance using config (CLI)



Using `--config` option to set the `vim-network-id` for a `netslice-vld`:

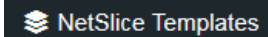
```
--config TEXT      Netslice specific yaml configuration:
                   netslice_subnet: [
                     id: TEXT, vim_account: TEXT,
                     vnf: [member-vnf-index:
                           TEXT, vim_account: TEXT]
                     vld: [name: TEXT, vim-network-
                           name: TEXT or DICT with vim_account, vim_net entries]],
                   netslice-vld: [name: TEXT, vim-network-name: TEXT or
                                   DICT with vim_account, vim_net entries]
```

- `osm nsi-create --nsi_name my_second_slice --nst_name slice_hackfest_nst --vim_account <replace_vim_account_id> --config 'netslice-vld: [{name: slice_hackfest_vld_data, vim-network-id: <replace_vim_network_id>}]'`

Creating a Network Slice Instance (UI)





- List Network Slice Templates

- In the left panel, click on the Netslice Templates icon




Network Slices Templates Home > NetSlice Templates

Show entries Search:

Name	Identifier	Usage State	Actions
slice_hackfest_nst	8b3ce224-0b1c-48af-bdb8-c9d986de0335	NOT_IN_USE	   

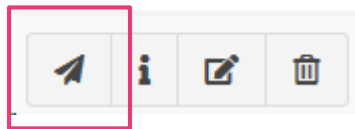
Showing 1 to 1 of 1 entries Previous **1** Next

 Just drag and drop files here

Creating a Network Slice Instance (UI)

- Create Network Slice Template
 - In the Netslice Template view, click on the Instantiate NST icon

Actions



New NSI ×

Name *

Description *

Nst Id *

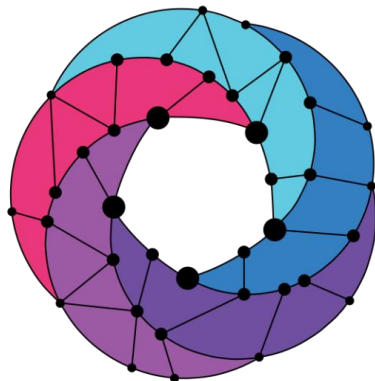
Vim Account Id *

SSH Key

Config

- Creates a new Network Slice Template
 - `netslice-template-create / nst-create`
- Deletes a Network Slice Template
 - `netslice-template-delete / nst-delete`
- List all Network Slice Templates
 - `netslice-template-list / nst-list`
- Shows the content of a Network Slice Template
 - `netslice-template-show / nst-show`
- Updates a Network Slice Template
 - `netslice-template-update / nst-update`

- Creates a new Network Slice Instance
 - `netslice-instance-create / nsi-create`
- Deletes a Network Slice Instance
 - `netslice-instance-delete / nsi-delete`
- List all Network Slice Instances (NSI)
 - `netslice-instance-list / nsi-list`
- Shows the history of operations over a
 - `netslice-instance-op-list / nsi-op-list`
- Shows the info of an operation over a Network Slice Instance(NSI)
 - `netslice-instance-op-show / nsi-op-show`
- Shows the content of a Network Slice Instance (NSI)
 - `netslice-instance-show / nsi-show`



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osm.etsi.org/wikipub

NST Bonus - From multi-vdu session 3

NSD: hackfest_multivdu_ns.tar.gz

VNFD: hackfest_multivdu_vnf.tar.gz

