

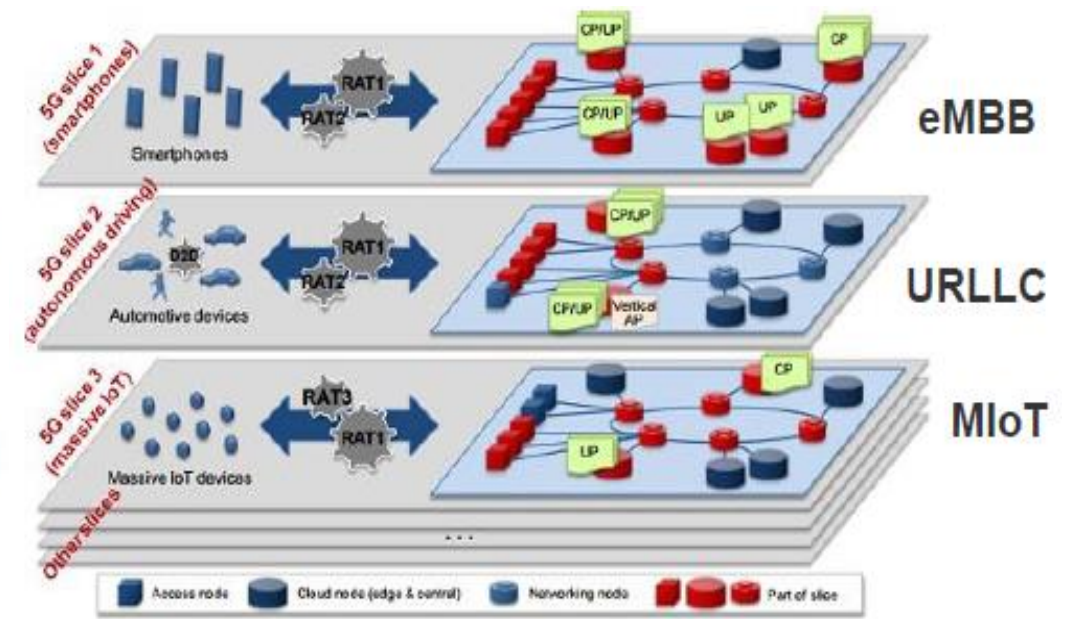
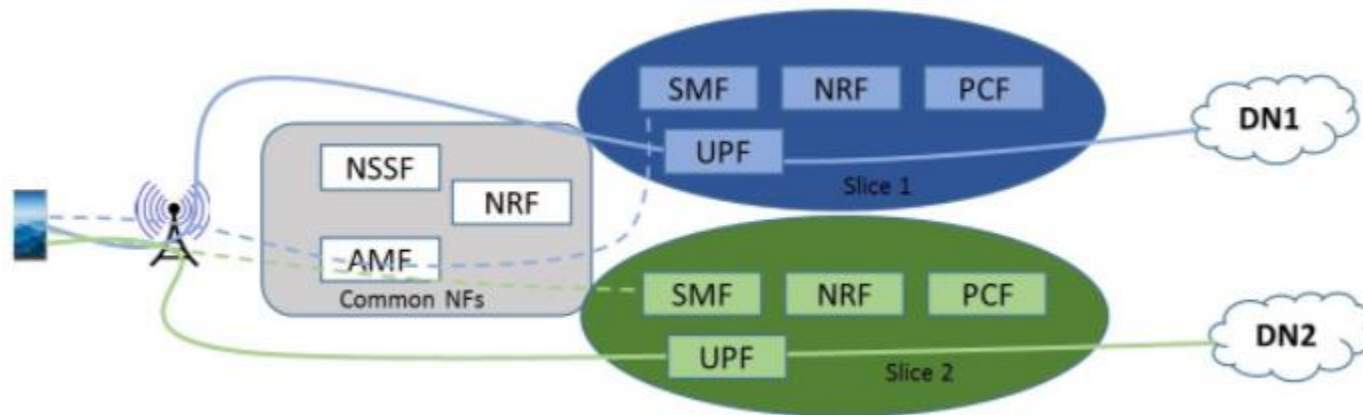
Open Source MANO

OSM-MR#10 – HD3.3 – Network Slicing

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Network Slicing Overview

- In the scope of 5G, a Network Slice is a logical network that provides specific network capabilities and network characteristics, through a set of Network Function instances and the required resources (e.g. compute, storage and networking resources).
- Different network slices addressing different types of usage requiring different levels of functionality, performance and reliability.



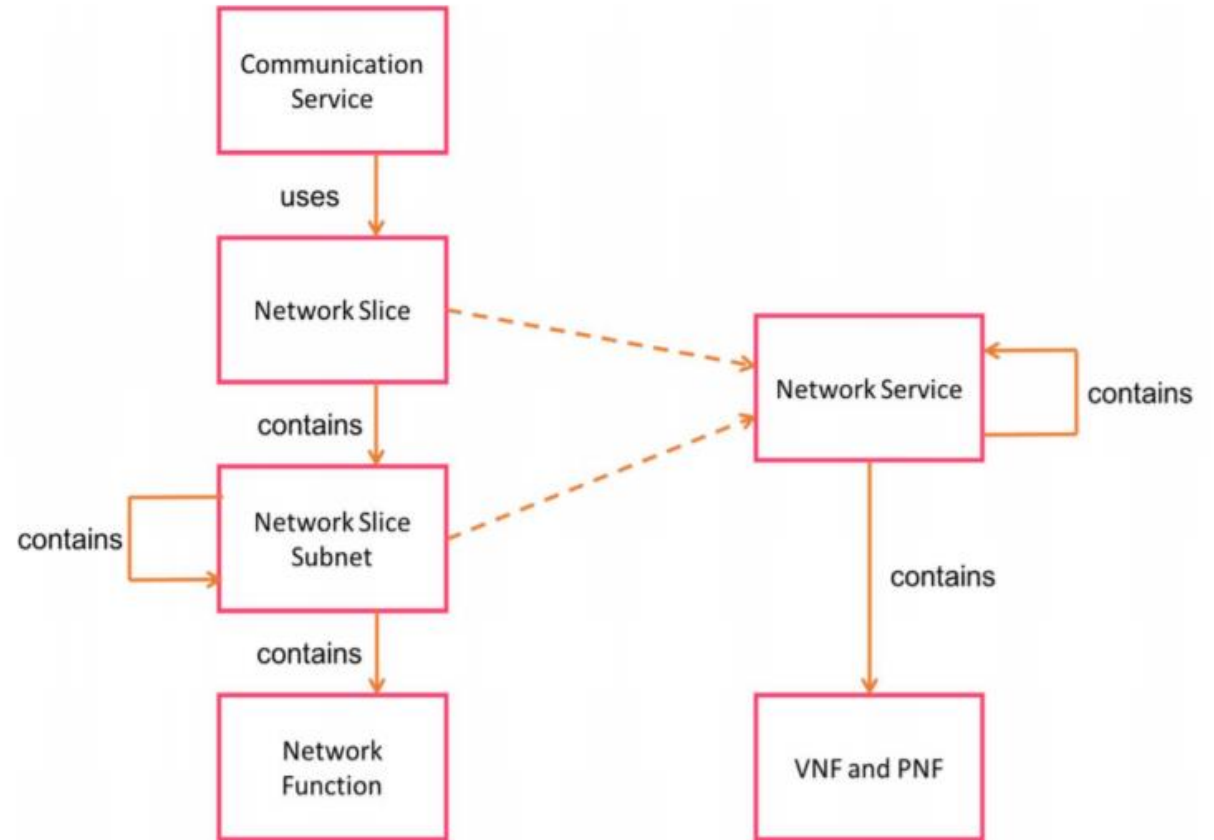
Source: NGMN

ETSI NFV Framework for Network Slicing

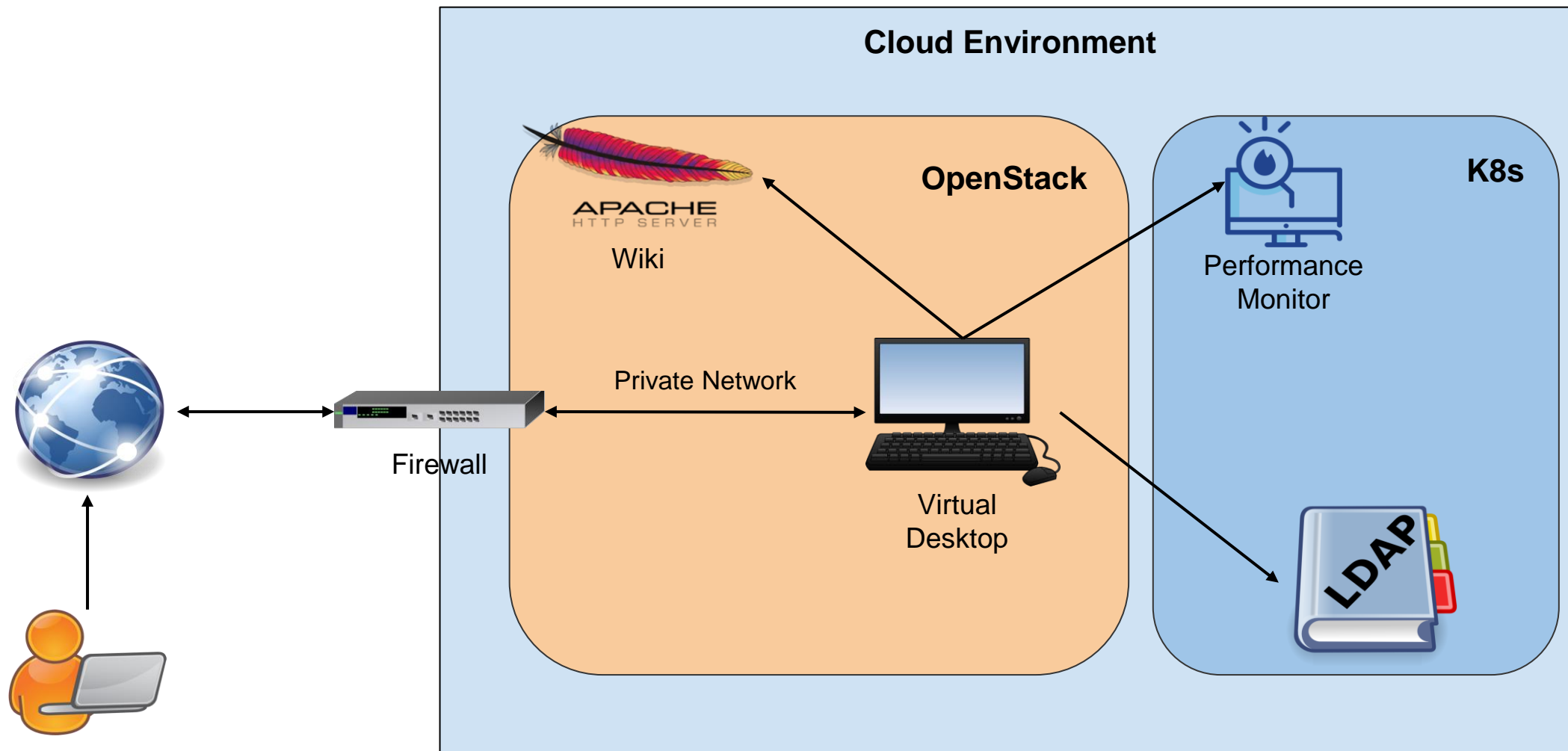
Analysis of 3GPP and alignment of NFV architecture in the ETSI GR NFV-EVE 012

Considerations:

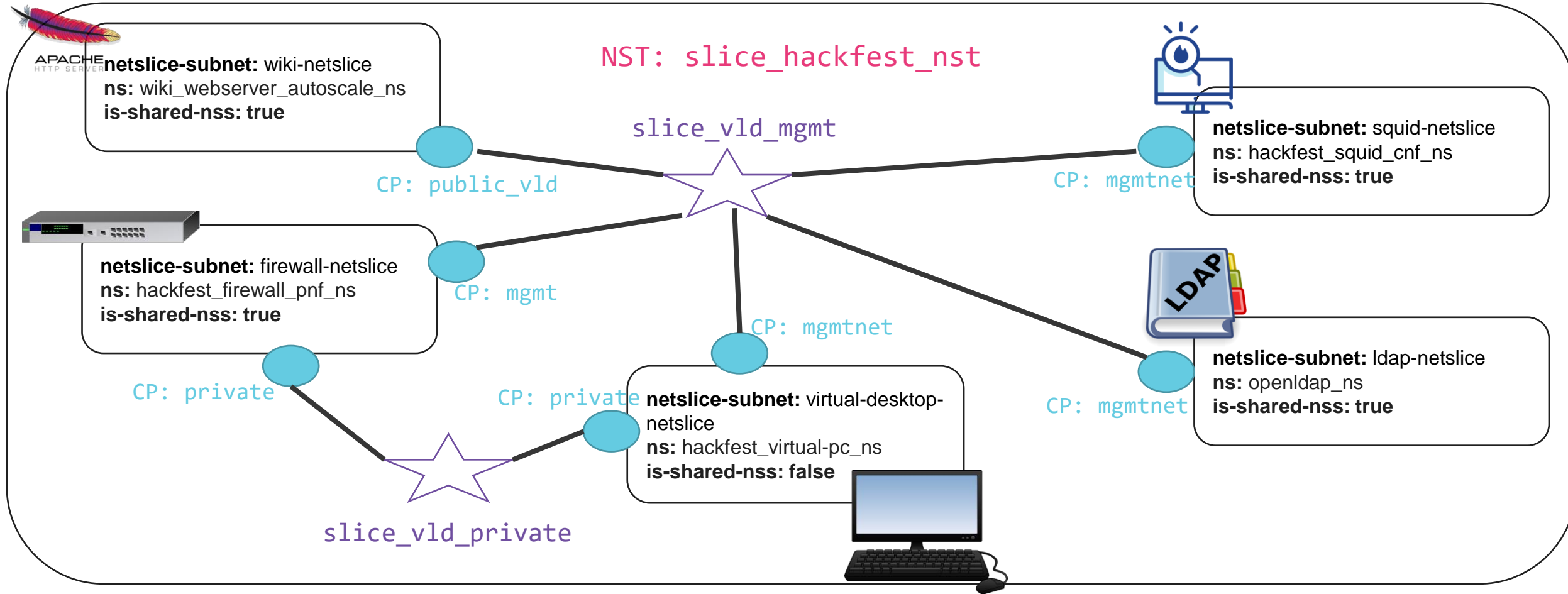
- Network Slice Subnet can be considered as an NFV Network Service.
- Network Slice Subnets can be shared between different Network Slices



Title and Content Layout with List



Network Slice Template



Network Slice Template File

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

netslice-subnet:
- description: Whatever NSS1
  id: slice_subnet_nsd1
  is-shared-nss: true/false
  nsd-ref: nsd1_nsd
- description: Whatever NSS2
  id: slice_subnet_nsd2
  is-shared-nss: true/false
  nsd-ref: nsd2_nsd

netslice-vld:
- id: slice_vld_mgmt
  mgmt-network: true
  name: slice_vld_mgmt
  nss-connection-point-ref:
  - nsd-connection-point-ref: mgmt
    nss-ref: nsd1_nsd
  - nsd-connection-point-ref: mgmt
    nss-ref: nsd2_nsd
  type: ELAN
```

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

Network Slice Template File

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

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

Network Slice Template File

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
| +-----
```



```
netslice-subnet:
- id: virtual-desktop-netslice
  is-shared-nss: false
  description: NetSlice Subnet for the virtual desktop
  nsd-ref: hackfest_virtual-pc_ns
- id: wiki-netslice
  is-shared-nss: true
  description: NetSlice Subnet for the wiki
  nsd-ref: wiki_webserver_autoscale_ns
- id: firewall-netslice
  is-shared-nss: true
  description: NetSlice Subnet for the firewall
  nsd-ref: hackfest_firewall_pnf_ns
- id: ldap-netslice
  is-shared-nss: true
  description: NetSlice Subnet for the LDAP
  nsd-ref: openldap_ns
- id: squid-netslice
  is-shared-nss: true
  description: NetSlice Subnet for SQUID
  nsd-ref: squid_metrics_cnf_ns
```

- The Information model for the NST is available:

http://osm-download.etsi.org/repository/osm/debian/ReleaseSEVEN/docs/osm-im/osm_im_trees/nst.html

Network Slice Template File

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
```



```
netslice-vld:
- id: slice_vld_mgmt
  name: slice_vld_mgmt
  type: ELAN
  mgmt-network: true
  nss-connection-point-ref:
  - nss-ref: hackfest_virtual-pc_ns
    nsd-connection-point-ref: mgmtnet
  - nss-ref: wiki_webserver_autoscale_ns
    nsd-connection-point-ref: public_vld
  - nss-ref: hackfest_firewall_pnf_ns
    nsd-connection-point-ref: mgmt
  - nss-ref: openldap_ns
    nsd-connection-point-ref: mgmtnet
  - nss-ref: squid_metrics_cnf_ns
    nsd-connection-point-ref: mgmtnet
- id: slice_vld_private
  name: slice_vld_private
  type: ELAN
  nss-connection-point-ref:
  - nss-ref: hackfest_virtual-pc_ns
    nsd-connection-point-ref: private
  - nss-ref: hackfest_firewall_pnf_ns
    nsd-connection-point-ref: private
```

• The Information model for the NST is available:

http://osm-download.etsi.org/repository/osm/debian/ReleaseSEVEN/docs/osm-im/osm_im_trees/nst.html

Network Slice Template requirements

VNFD:

- `hackfest_firewall_pnf`
- `hackfest_virtual-pc_vnf`
- `openldap_knf`
- `squid_metrics_cnf`
- `wiki_webserver_autoscale_vnf`

NSD:

- `hackfest_firewall_pnf_ns`
- `hackfest_virtual-pc_ns`
- `openldap_ns`
- `squid_metrics_cnf_ns`
- `wiki_webserver_autoscale_ns`

NST:

- [`slice_hackfest_nst.yaml`](#)

Managing Network Slice Templates (via CLI)

- 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`

Creating a Network Slice Instance

- `osm nsi-create --help`

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

Options:

<code>--nsi_name TEXT</code>	name of the Network Slice Instance
<code>--nst_name TEXT</code>	name of the Network Slice Template
<code>--vim_account TEXT</code>	default VIM account id or name for the deployment
<code>--ssh_keys TEXT</code>	comma separated list of keys to inject to vnfs
<code>--config TEXT</code>	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]
<code>--config_file TEXT</code>	nsi specific yaml configuration file
<code>--help</code>	Show this message and exit.

Creating a Network Slice Instance(2)

Parameters config file

```
netslice-subnet:  
- id: ldap-netslice  
  additionalParamsForVnf:  
  - member-vmf-index: 'openldap'  
  additionalParamsForKdu:  
  - kdu_name: ldap  
    additionalParams:  
    service:  
      type: LoadBalancer  
      loadBalancerIP: '172.21.251.X'  
    adminPassword: osm4u  
    configPassword: osm4u  
  env:  
    LDAP_ORGANISATION: "Example Inc."  
    LDAP_DOMAIN: "example.org"  
    LDAP_BACKEND: "hdb"  
    LDAP_TLS: "true"  
    LDAP_TLS_ENFORCE: "false"  
    LDAP_REMOVE_CONFIG_AFTER_SETUP: "true"
```

Managing Network Slice Instances (via CLI)

- 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 Network Slice Instance(NSI)
 - `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`

Creating a Network Slice Instance(3)

launch-slice.sh script

```
osm nst-create slice_hackfest_nst.yaml
```

```
sed -i "s/loadBalancerIP:.*/loadBalancerIP: '172.21.251.${HFID}'/" params.yaml
```

```
osm nsi-create --nsi_name virtual-desktop-env1 \  
--nst_name slice_hackfest_nst \  
--vim_account $OSM_USER \  
--config_file params.yaml
```

Creating a Network Slice Instance(4)




- How to verify your slice?
 - Check descriptors NSs are being created, and our network slice too:











```
osm ns-list  
osm nsi-list
```

- Also using the GUI

Creating a Network Slice Instance(5)


NS Instances

 init  running / configured  failed

Name	Identifier	Nsd name	Operational Status	Config Status	Detailed Status
<input type="text" value="Name"/>	<input type="text" value="Identifier"/>	<input type="text" value="Nsd name"/>	<input type="text" value="Select"/>	<input type="text" value="Select"/>	<input type="text" value="Detailed Status"/>
virtual-desktop-env1.firewall-netslice	a313b01e-56f6-4a01-9caa-1cd1c78c0015	hackfest_firewall_pnf_ns			Done
virtual-desktop-env1.ldap-netslice	e3a23ba5-1755-4cd8-8bc2-8984d0189d29	openldap_ns			Done
virtual-desktop-env1.squid-netslice	cc90a2e2-f8d4-43bd-95d4-a0089bcd4d51	squid_metrics_cnf_ns			Done
virtual-desktop-env1.virtual-desktop-netslice	84f42740-df3f-472d-8610-4414313f5c1c	hackfest_virtual-pc_ns			Done
virtual-desktop-env1.wiki-netslice	78d5a119-c59c-428b-be23-cc2f43a38c3f	wiki_webserver_autoscale_ns			Done

NetSlice Instances

 init  running / configured  failed

Name	Identifier	Nst name	Operational Status	Config Status	Detailed Status
<input type="text" value="Name"/>	<input type="text" value="Identifier"/>	<input type="text" value="Nst name"/>	<input type="text" value="Select"/>	<input type="text" value="Select"/>	<input type="text" value="Detailed Status"/>
virtual-desktop-env1	6748f3a9-7c33-4060-b2e5-c0e3b70b4b35	slice_hackfest_nst			done



Creating the second Network Slice Instance(1)













- Let's deploy our Second slice!

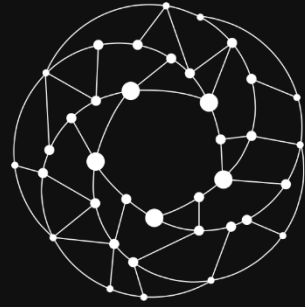
```
osm nsi-create --nsi_name virtual-desktop-env2 --nst_name  
slice_hackfest_nst --vim_account $OSM_USER
```

Creating the second Network Slice Instance(2)

NS Instances

 init  running / configured  failed

Name	Identifier	Nsd name	Operational Status	Config Status	Detailed Status
<input type="text" value="Name"/>	<input type="text" value="Identifier"/>	<input type="text" value="Nsd name"/>	<input type="text" value="Select"/>	<input type="text" value="Select"/>	<input type="text" value="Detailed Status"/>
virtual-desktop-env1.firewall-netslice	a313b01e-56f6-4a01-9caa-1cd1c78c0015	hackfest_firewall_pnf_ns			Done
virtual-desktop-env1.idap-netslice	e3a23ba5-1755-4cd8-8bc2-8984d0189d29	openldap_ns			Done
virtual-desktop-env1.squid-netslice	cc90a2e2-f8d4-43bd-95d4-a0089bcd4d51	squid_metrics_cnf_ns			Done
virtual-desktop-env1.virtual-desktop-netslice	84f42740-df3f-472d-8610-4414313f5c1c	hackfest_virtual-pc_ns			Done
virtual-desktop-env1.virtual-desktop-netslice	25424276-0266-40c5-97b6-d0fafb0e22c2	hackfest_virtual-pc_ns			Stage 2/5: deployment of KDUs, VMs and execution environments. 0/2. Deployed at VIM
virtual-desktop-env1.wiki-netslice	78d5a119-c59c-428b-be23-cc2f43a38c3f	wiki_webserver_autoscale_ns			Done



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Thanks!