E2E Network Slicing Management using ONAP

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December, 2019

Context: What is important for network operators?

Provide **services tailored** to customers needs → dynamicity, adaptability of the network

Automating the **life-cycle management of slices :**

network efficiency, OPEX savings, and time-to-market acceleration.

We are interested on

the modeling

the orchestration and

the enforcement

of an end-to-end (E2E) network slice which involves the RAN and Core networks.

How do we define a slice?

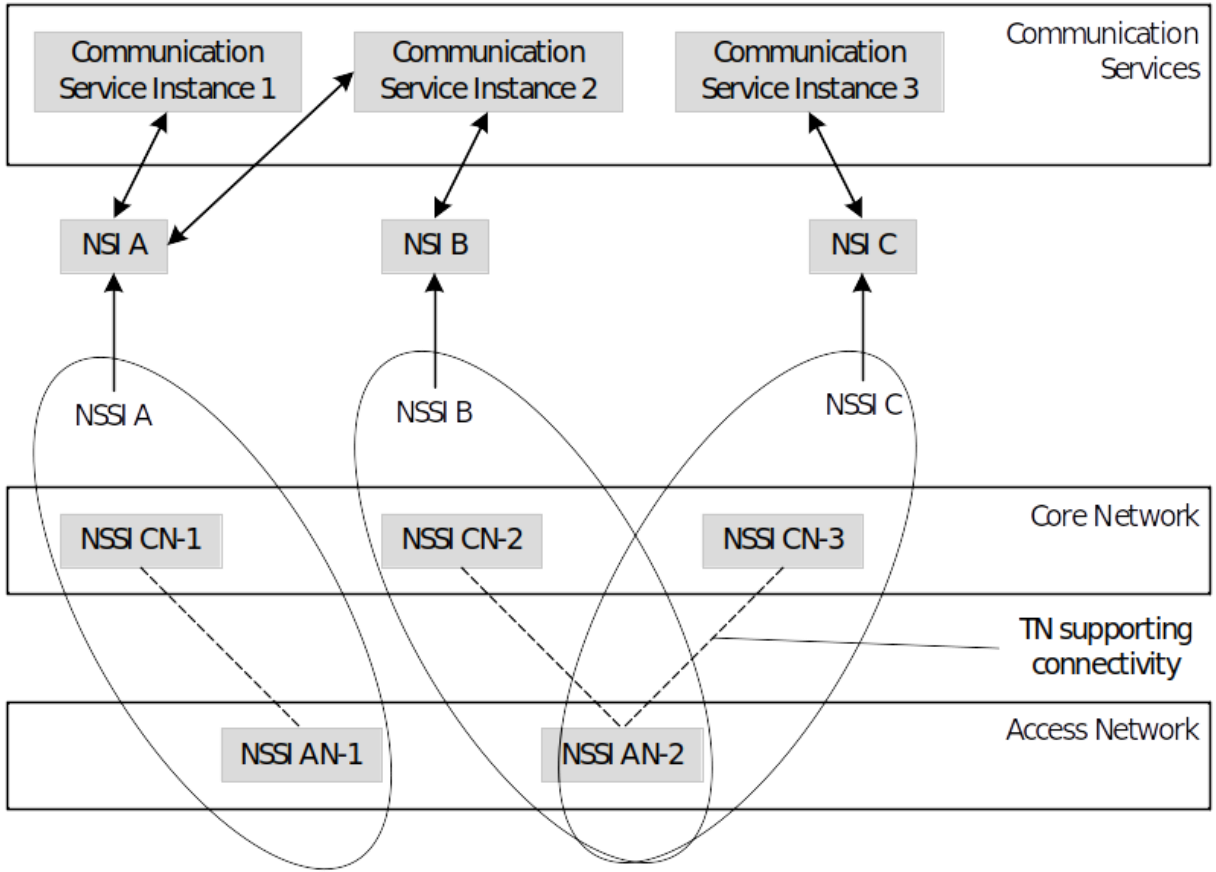
A network slice is established via a negotiation between the **customer** and the network **operator**

A network slice is fundamentally defined as a bundle of network services (a logical network)

A slice requires the **coordination** of the various network **segments** (core, access and transport networks) and aims at meeting **specific requirements** (e.g., vertical markets)

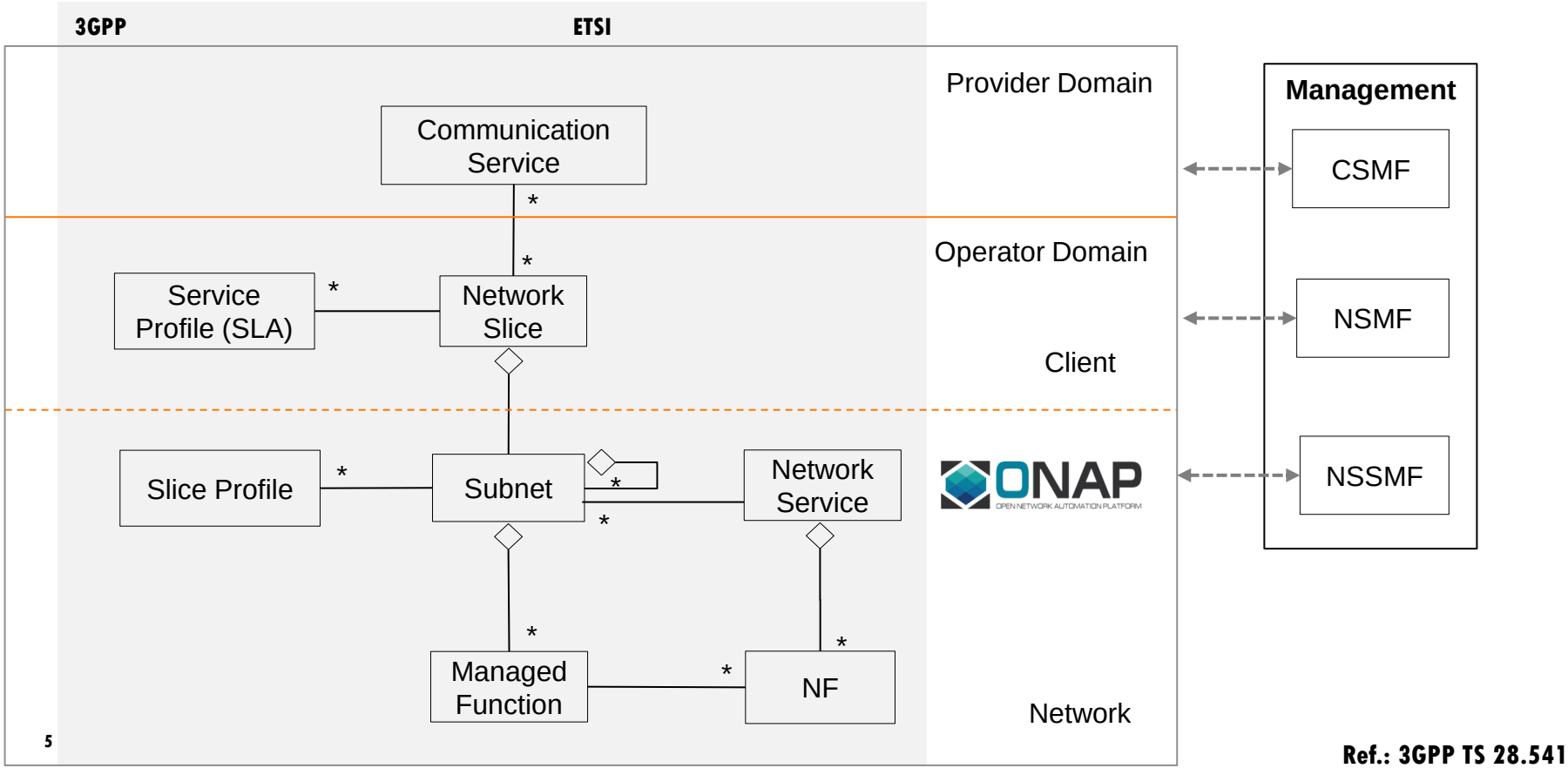
3GPP has introduced network slices according to 3 QoS classes: eMBB, uRLLC, and mMTC.

Network Slicing according to 3GPP



Ref.: 3GPP TS 28.530

Network slicing model (3GPP)



Ref.: 3GPP TS 28.541

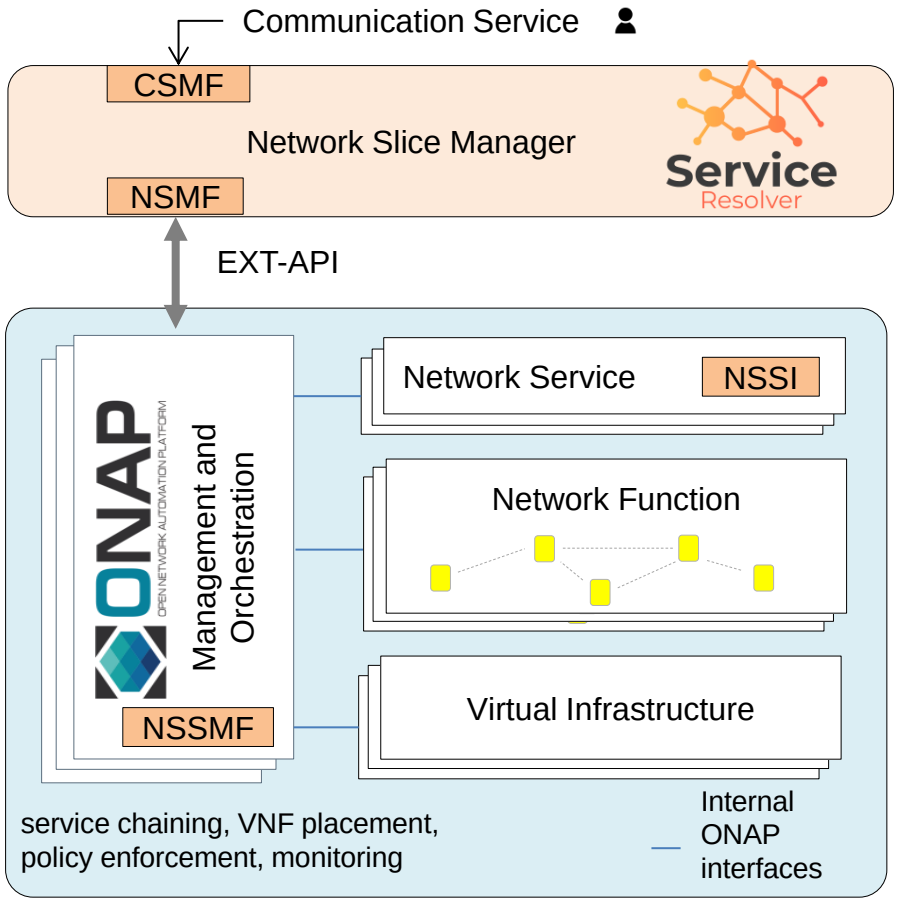
Slice management architecture

We propose a **slice manager placed on the top** of the service orchestration platform.

Motivation: develop a **global view of a network slice** via **monitoring** and implementing **rules** in order to maintain negotiated SLAs.

The end-to-end slice performance is given by the **conjunction of individual performances** of the various network services composing a slice.

Maintaining negotiated SLAs requires an enforcement infrastructure: monitoring, analytics, actions. They are supported by ONAP.



Proposed scenarios (arc subcommitte)

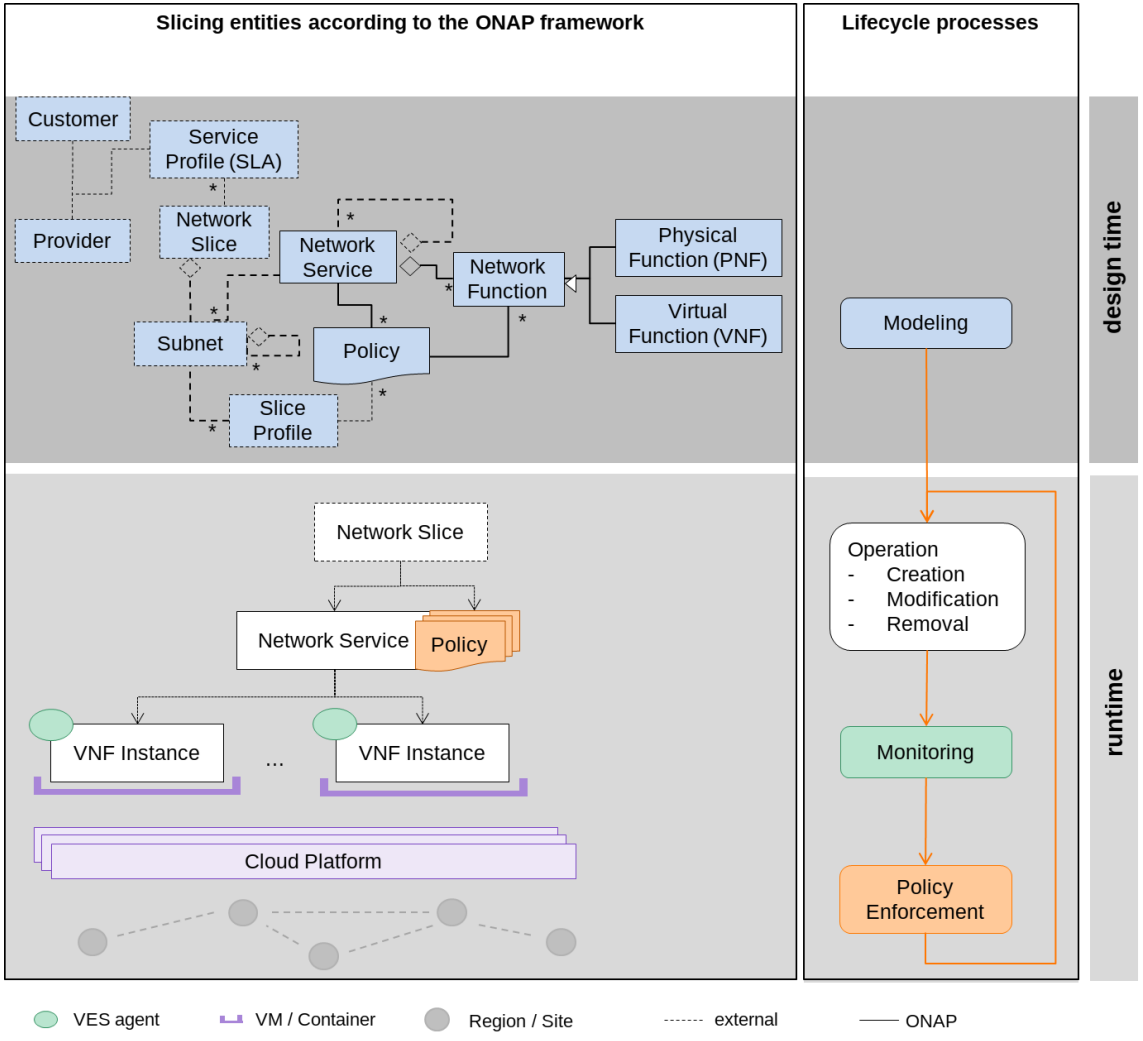
Scenario	CSMF	NSMF	NSSMF*
1	ONAP	ONAP	ONAP
2	3rd party	ONAP	ONAP
3	3rd party	ONAP	3rd party
4	ONAP	ONAP	3rd party

?	3rd party	Service Resolver*	ONAP*

Note: Hybrid NSSMF mapping is also possible, i.e., some NSSMFs within ONAP and some outside ONAP.

E2E Network Slicing use case:
Frankfurt scope and future steps
Lin Meng (China Mobile), Wei Chen (Tencent), Chuanyu Chen (Huawei)

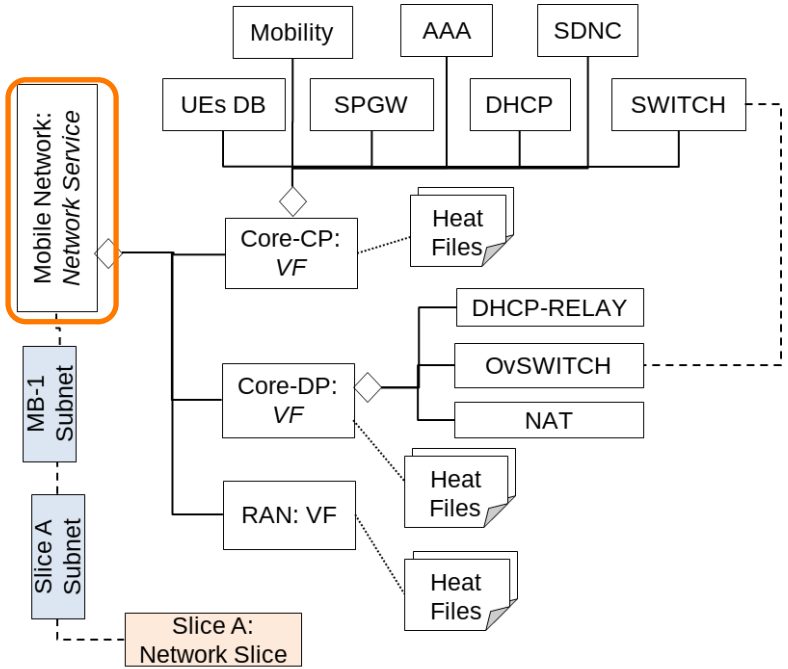
Slicing Lifecycle

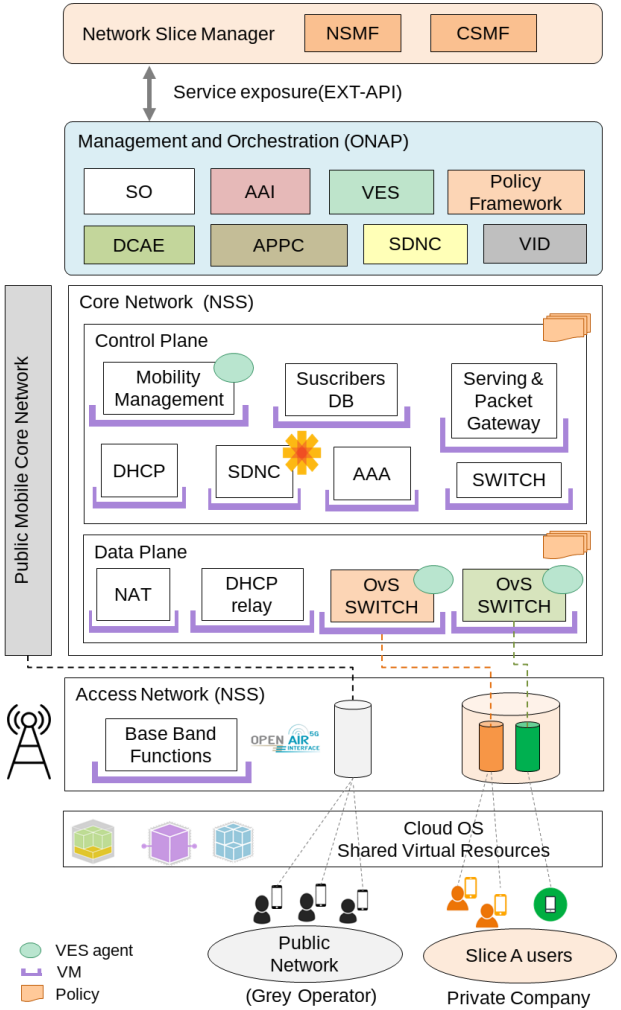


A network slice constitutes one or various network services enriched by policies

Slicing usecase: A Private Mobile Network:
Wireless Edge Factory (WEF)- b<>com
Testbed Architecture

Model





Slicing usecase: A Private Mobile Network:
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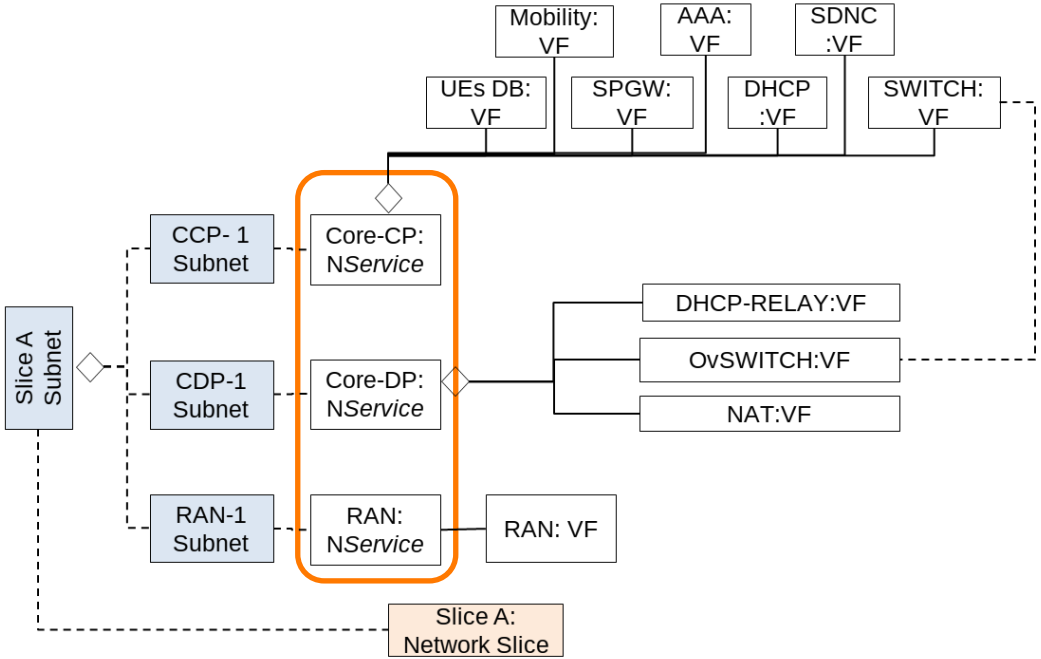
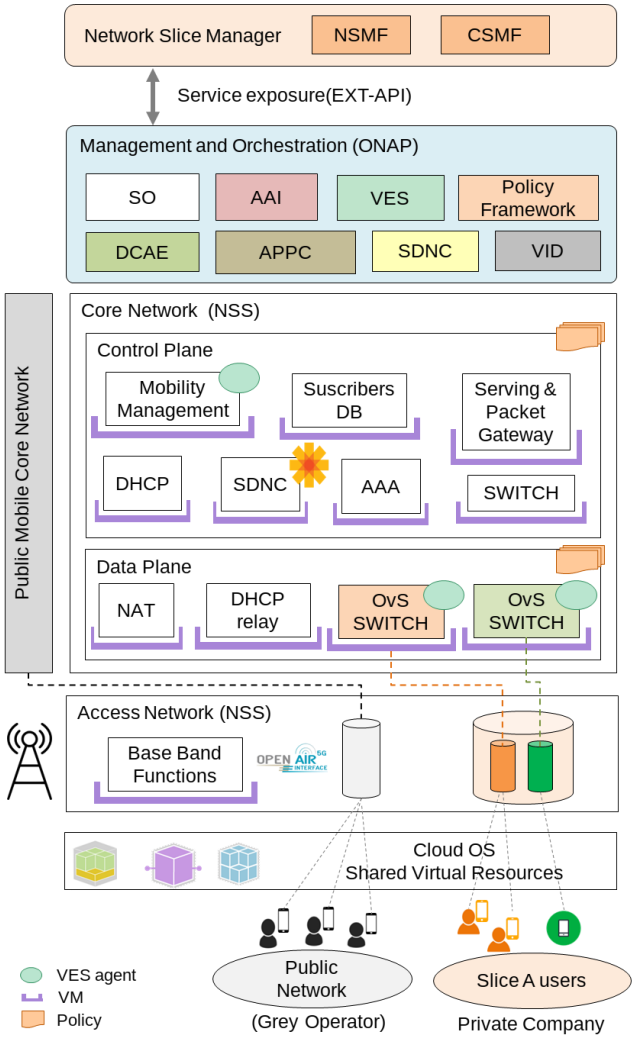
Model’





Slicing usecase: A Private Mobile Network:
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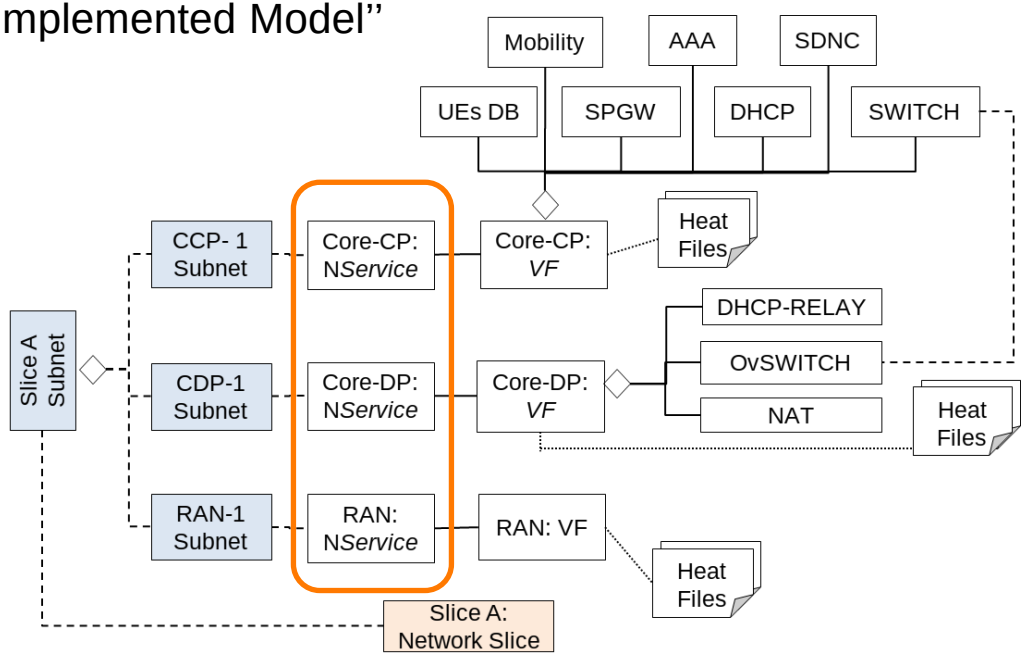
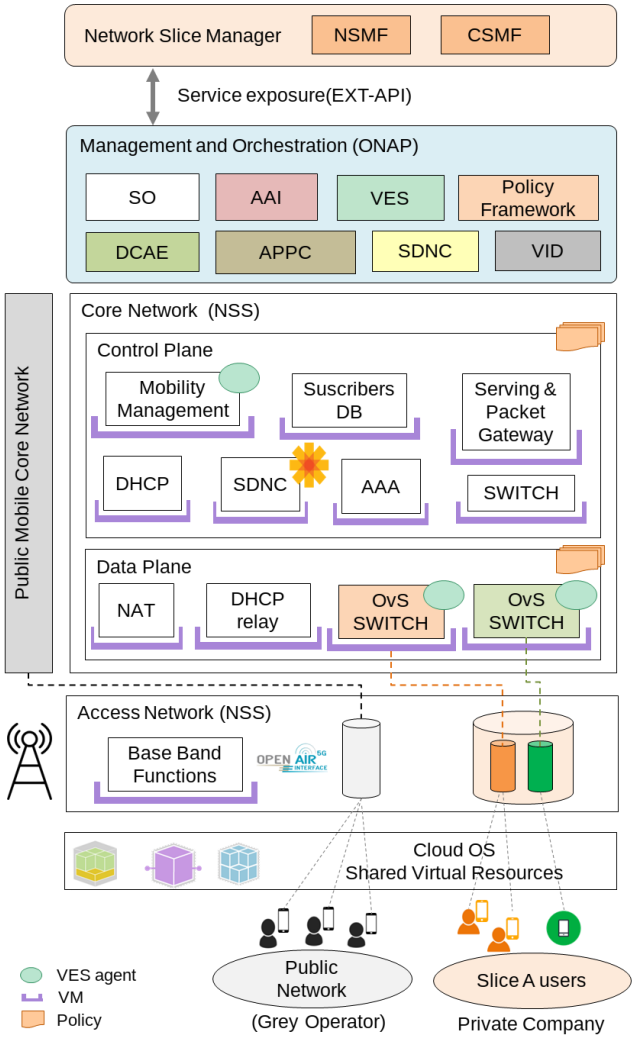
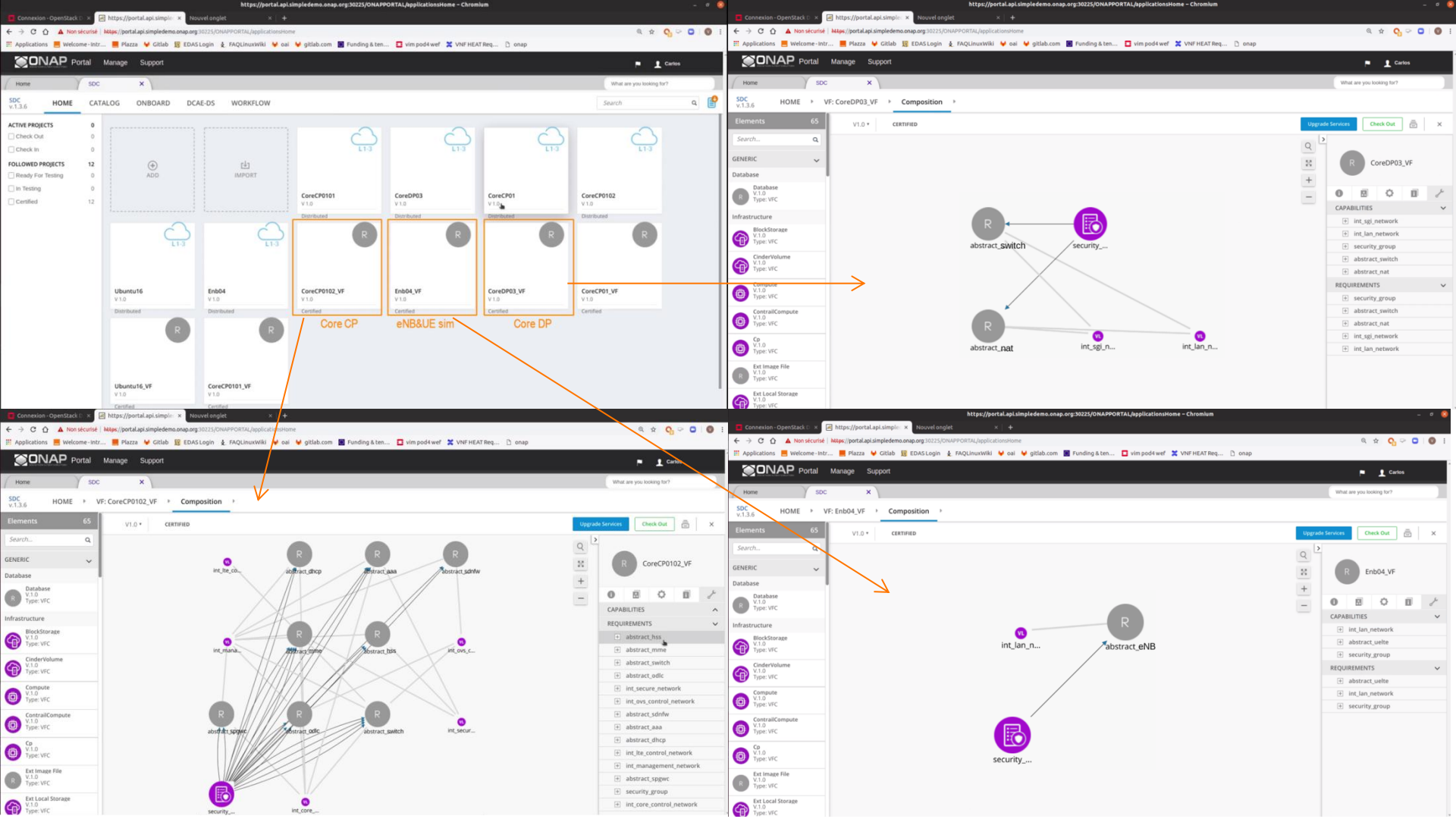
Implemented Model”






https://portal.api.simpledemo.onap.org:30225/ONAPPORTAL/applicationsHome – Chromium
ONAP Portal
Manage
Support
HOME
CATALOG
ONBOARD
DCAE-DS
WORKFLOW
CoreCP0101
CoreDP03
CoreCP01
CoreCP0102
Ubuntu16
Enb04
CoreCP0102_VF
Enb04_VF
CoreDP03_VF
CoreCP01_VF
Ubuntu16_VF
CoreCP0101_VF
Core CP
eNB&UE sim
Core DP
VF: CoreDP03_VF
Composition
abstract_switch
security_...
abstract_nat
int_sgi_n...
int_lan_n...
VF: CoreCP0102_VF
abstract_dhcp
abstract_aaa
abstract_sdnfw
abstract_mme
abstract_hss
abstract_sgwc
abstract_odlc
int_lte_co...
int_mana...
int_ovs_c...
int_secur...
int_core_...
VF: Enb04_VF
abstract_eNB

VID

VID Home

Search for Existing Service Instances

Create New Service Instance

Browse SDC Service Models

VNF Changes

Admin

VID

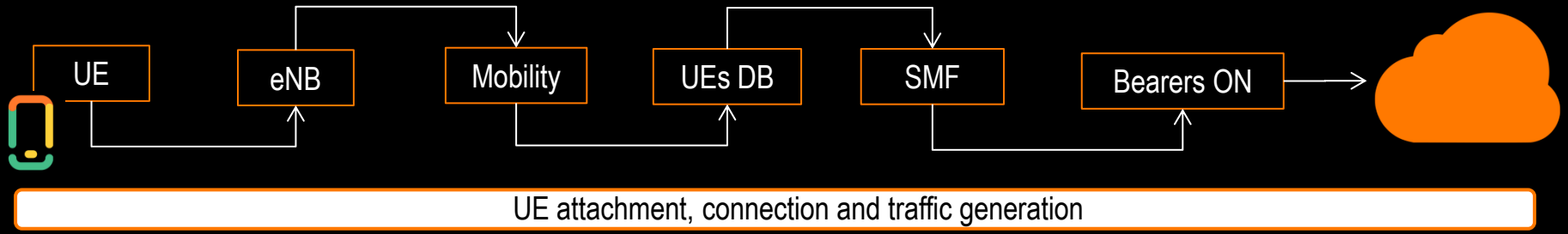
Subscriber Details for Generic-Vendor (Generic-Vendor)

Filter:

View/Edit	Global Customer ID	Subscriber Name	Service Type	Service Instance Name	Service Instance ID
View/Edit	Generic-Vendor	Generic-Vendor	CoreCP01	CoreCP01-service-instance-SW5ITX	13b85725-147f-439f-83db-b24e9a8219d5
View/Edit	Generic-Vendor	Generic-Vendor	CoreCP0101	CoreCP0101-service-instance-9H7RWY	6a34177f-a8d3-4433-8f5b-6c591ad4ef46
View/Edit	Generic-Vendor	Generic-Vendor	CoreCP0102	CoreCP0102-service-instance-ICO7YF	5057ef6c-e6a3-42d3-acb7-85e0b9e15633
View/Edit	Generic-Vendor	Generic-Vendor	CoreDP03	CoreDP03-service-instance-OR8FRA	8dcb74a3-9f0e-4c64-b285-55897c294270
View/Edit	Generic-Vendor	Generic-Vendor	Enb04	Enb04-service-instance-EGLE1I	eb163ea4-c540-4d33-9f2f-5f64c9aa2e86
View/Edit	Generic-Vendor	Generic-Vendor	ubuntu16	ubuntu16-service-instance-Y38ACQ	3d211d71-717d-49c1-9abb-af0435a241d4
View/Edit	Generic-Vendor	Generic-Vendor	ubuntu16	ubuntu_dashboard	70c38bee-dc13-4a6b-8293-2f8c71380aa0

Jump to page: 1 Results per page: 10 | 25 | 50

End-to-end Validation:



UE attachment, connection and traffic generation

```
Sending 96b data on connection {----} TCP,#39->172.16.5.13(3868)
  ======================================== STATISTICS ==================

                |   Current Status|  Added since last display|  Removed

  Connected eNBs |          1      |             0            |

  Attached UEs   |          1      |             0            |

  Connected UEs  |          1      |             0            |

  Default Bearers|          1      |             0            |

  S1-U Bearers   |          1      |             0            |

  ======================================== STATISTICS ==================
```

Conclusions:

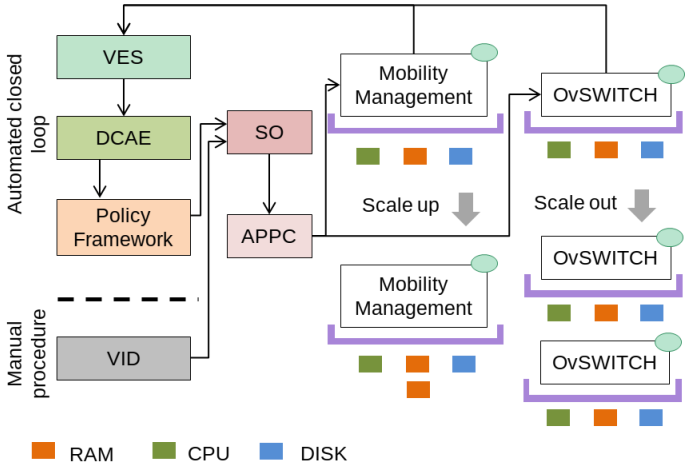
A **slice manager** (~ service resolver) **on the top** of ONAP for specifying end-to-end network slices and deploying them with ONAP

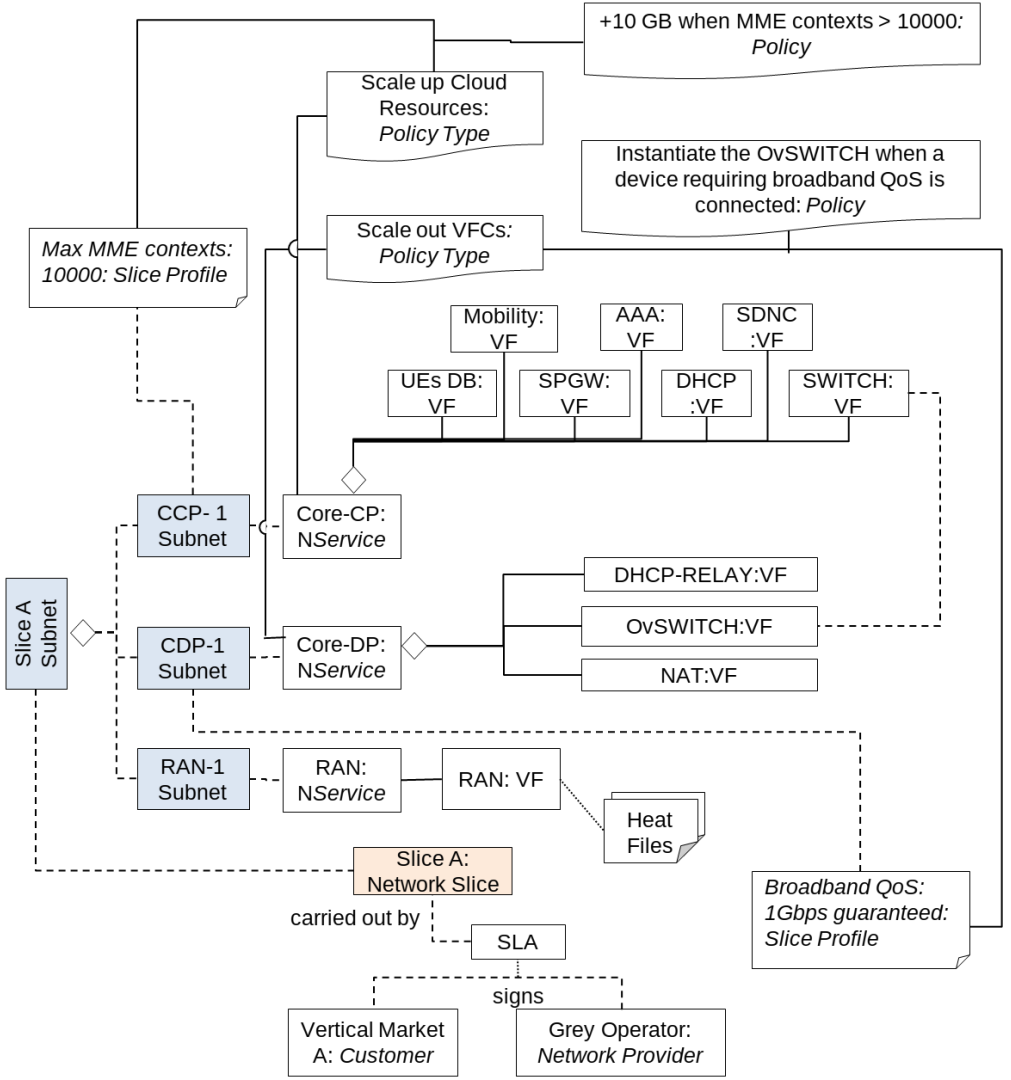
The **real challenge** in network slicing, beyond the design and the deployment, is to define **adequate policies to monitor and to guarantee** the end-to-end slice behavior.

ONAP actually offers **all the features** in terms of monitoring and policy enforcement to maintain the negotiated SLAs of end-to-end slices → KPIs aggregation from individual NSs, NFs, infra.

Next Steps

Model





Thank you