Telefónica

FUSECO Forum 2019
FUTURE SEAMLESS COMMUNICATION

SLICE AND EXPOSE

Enhancing Network Slicing Applications
by Means of Capability Exposure

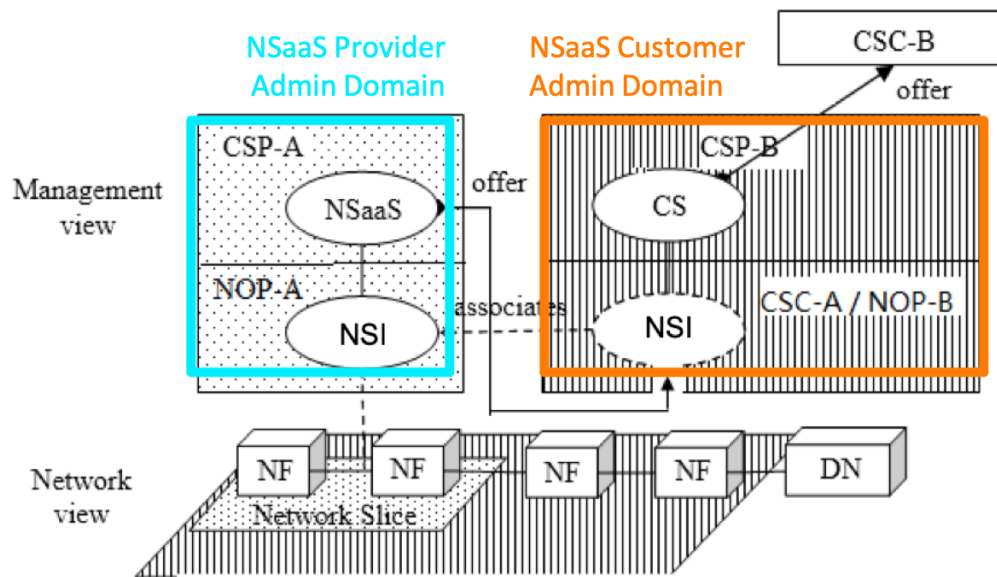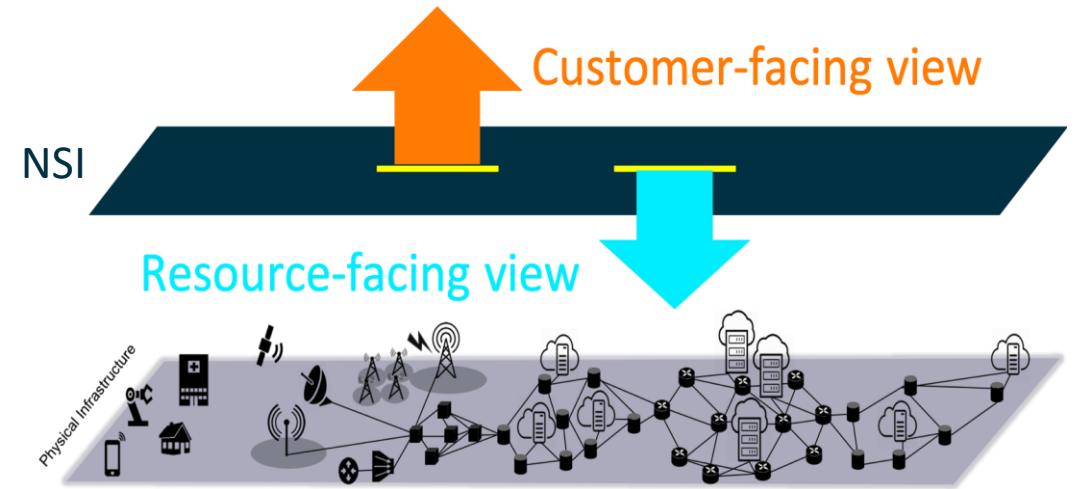Jose Ordonez-Lucena, Telefónica I+D

Berlin, 7th November 2019

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Introduction

- **NSaaS is a future-proof service delivery model**
  - ☛ NSI on demand, as a service.
 - ☛ NSaaS provider and NSaaS customer roles

- **Two complementary service views on an NSI:**
  - ☛ **Resource-facing** (NSI deployment details) **VS Customer-facing** (NSI exposed capabilities)
  - ☛ **Abstraction** to preserve the required **demarcation point** between the provider and the customer.

Experimentation before commercialization

- First Proof of Concepts on NSaaS carried out in the context of 5GPPP Phase 3 projects
  - ☞ **ICT-17 projects**: design and deploy a large-scale, E2E facility infrastructure with in-built orchestration and testing tools for KPI validation in realistic 5G scenarios.

  - ☞ **ICT-19 projects:** deploy, configure and test vertical use cases using ICT-17 facilities, assessing the readiness of these use cases and validating their KPIs under different load conditions.

- ICT-17 facilities offers ICT-19 industry verticals tailored service platforms for use case trialling activities.

- NSaaS roles and projects
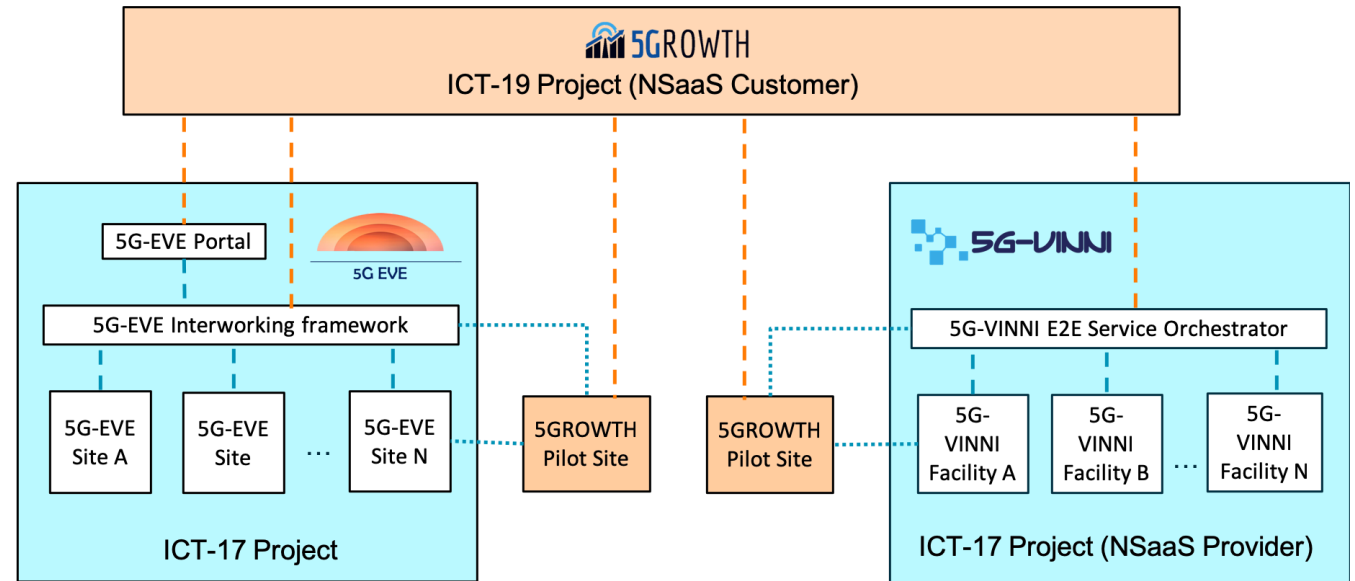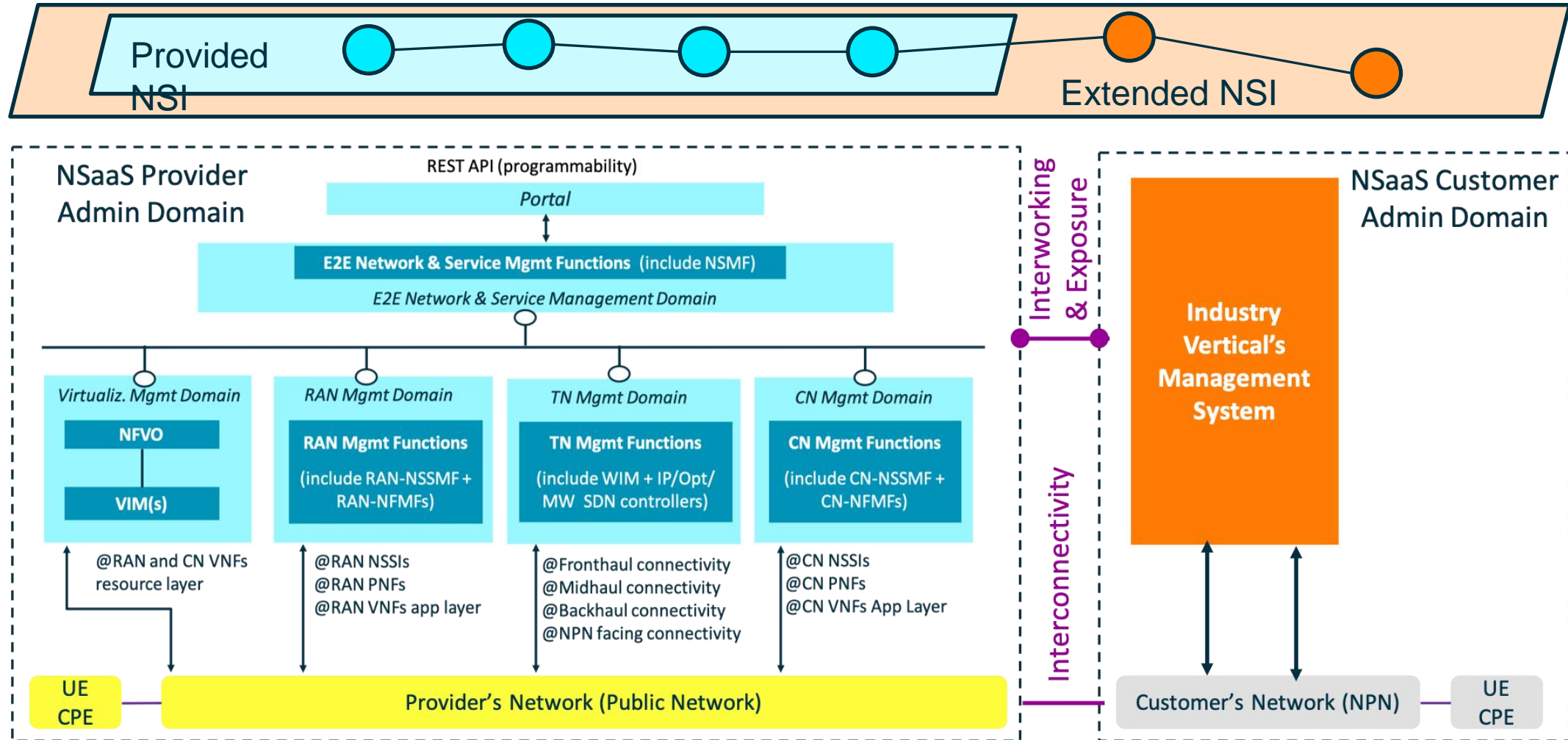
Some lessons learned from experimentation

- A vertical use case may involve the combination of public networks and NPNs.
  - ☞ Not only connectivity, but also interworking
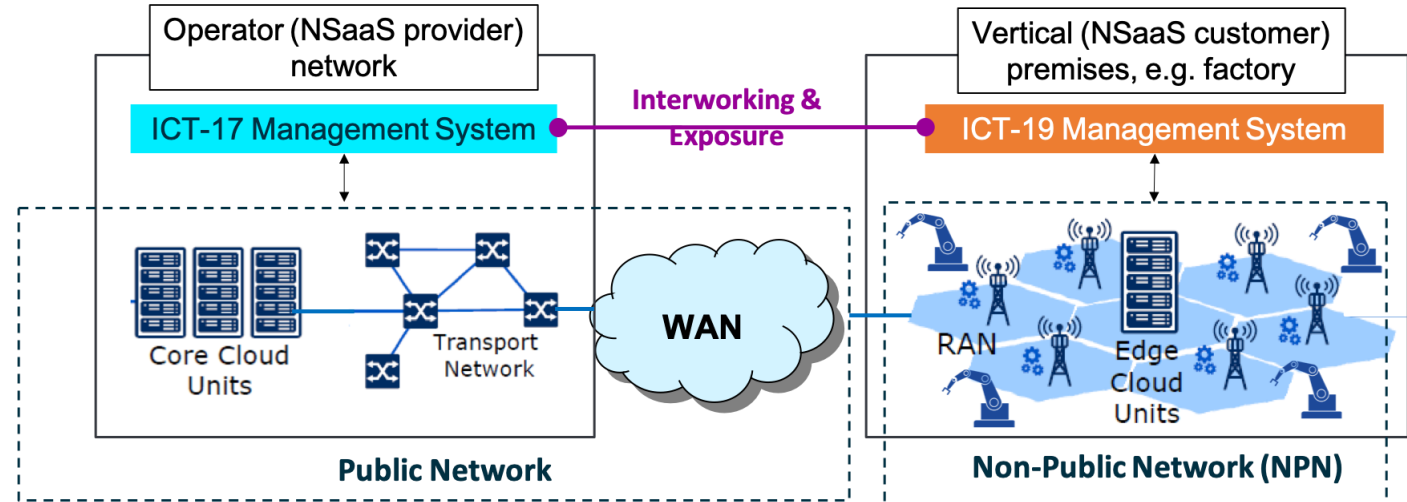
- A vertical typically want to retain some control over the NSI provided as a service
  - ☞ Get involved beyond passive monitoring
  - ☞ Means for 3rd party VNF hosting
  - ☞ Possible recursive B2B2X models in future commercial scenarios.

- Tailored customer-facing view of the NSI -> SLICE CAPABILITY EXPOSURE
  - ☞ Allows NSaaS provider to grant each NSaaS customer with necessary control capabilities over the NSI.

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Reference architectural framework in NSaaS

Provided NSI

Extended NSI

NSaaS Provider Admin Domain

REST API (programmability)

Portal

E2E Network & Service Mgmt Functions (include NSMF)

E2E Network & Service Management Domain

Virtualiz. Mgmt Domain

NFVO

VIM(s)

@RAN and CN VNFs resource layer

RAN Mgmt Domain

RAN Mgmt Functions

(include RAN-NSSMF + RAN-NFMFs)

@RAN NSSIs
@RAN PNFs
@RAN VNFs app layer

TN Mgmt Domain

TN Mgmt Functions

(include WIM + IP/Opt/ MW SDN controllers)

@Fronthaul connectivity
@Midhaul connectivity
@Backhaul connectivity
@NPN facing connectivity

CN Mgmt Domain

CN Mgmt Functions

(include CN-NSSMF + CN-NFMFs)

@CN NSSIs
@CN PNFs
@CN VNFs App Layer

Interworking & Exposure

Interconnectivity

NSaaS Customer Admin Domain

Industry Vertical's Management System

UE CPE

Provider's Network (Public Network)

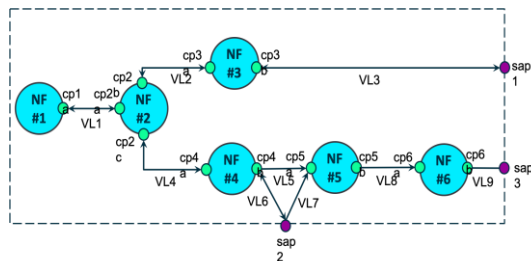Customer's Network (NPN)

UE CPE

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NSaaS phases

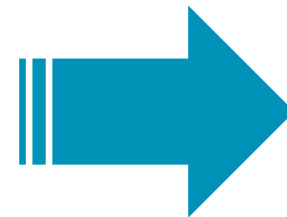- Two main phases

Network Slice (aaS) Request

The NSaaS customer issues a service order towards NSaaS provider, requesting the deployment of a tailored network slice.

Slice Topology

Slice Requirements

NSI is deployed and activated

Network Slice (aaS) Operation

The NSaaS customer monitors and takes (some) control over the network slice, deployed and made available by the NSaaS provider.
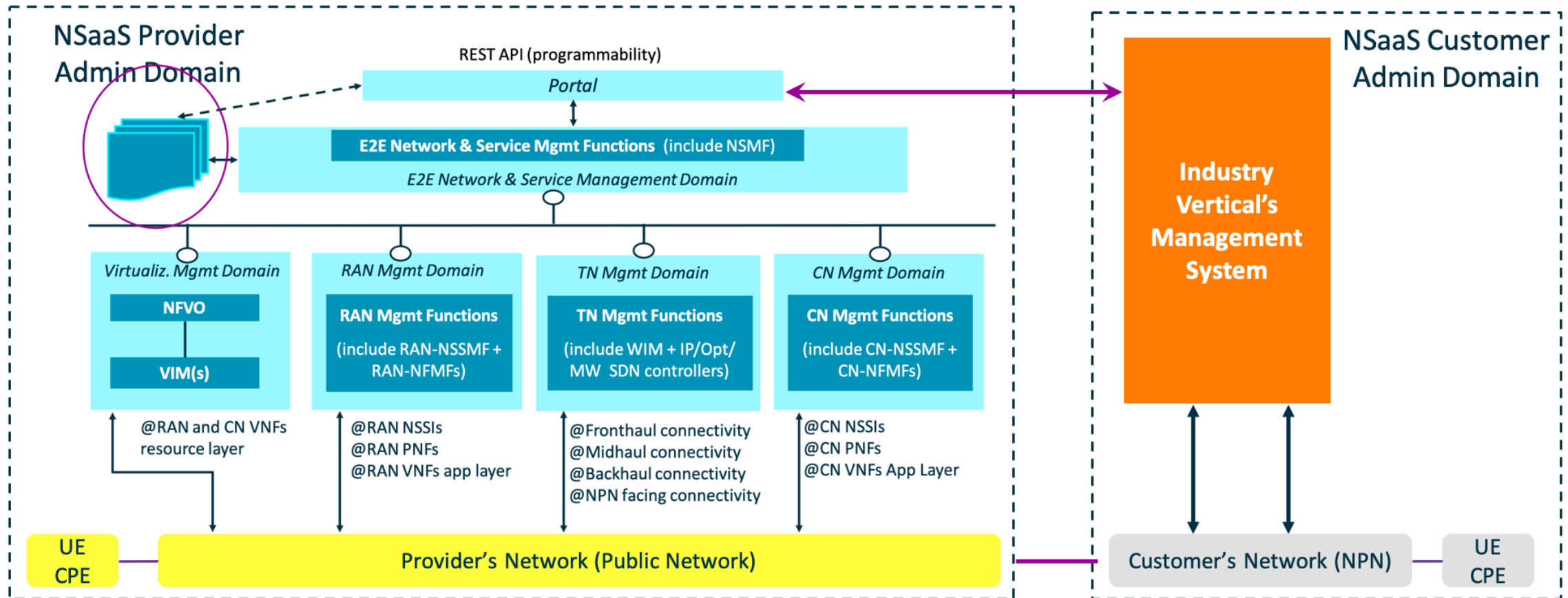

Slice performance assurance and fault supervision

Slice Management & Control

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Network Slice (aaS) request

- Templates

Network Slice (aaS) request

- Templates with information on
  - ☛ Default slice topology, e.g. 3GPP NST.
  - ☛ Supported service requirements, e.g. GSMA NEST.

- Default topology can be extended by attaching 3rd party service functions to slice service access points
  - ☛ 3rd party PNFs/VNFs, MEC apps and app servers
  - ☛ Vertical-driven activity
  - ☛ Allows going from a baseline topology to a vertical, service-tailored topology.
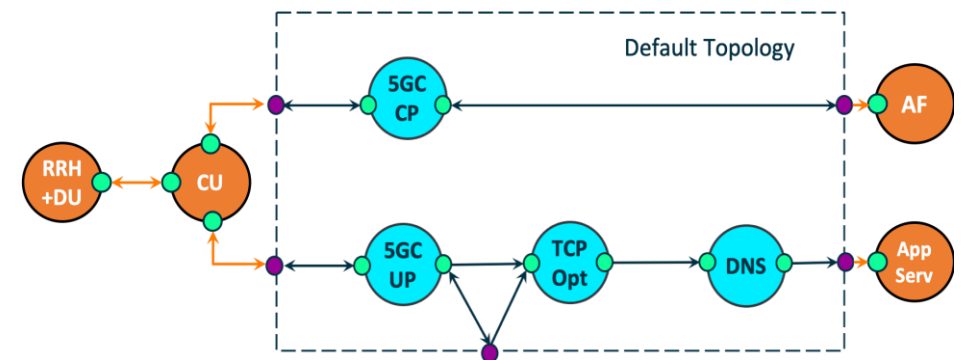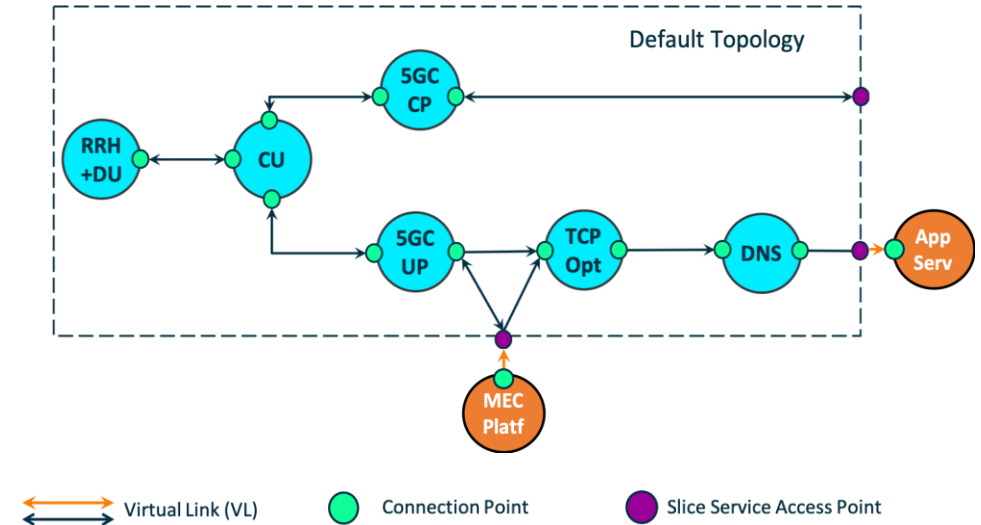
Network Slice (aaS) operation – Exposure levels

- In NSaaS scenarios, different verticals may want to take a more or less proactive role in the operation of their slices.

- Exposure levels -> levels of control the vertical can take over the provided slice.

Customer is able to consume operations related to…	Level 1	Level 2	Level 3	Level 4
E2E network slice <u>application layer</u> config & management	✓	✓	✓	✓
Network slice subnet (and NF) <u>application layer</u> config & management -> 3GPP scope for RAN and CN, IETF scope for TN.	✗	✓	✓	✓
Network slice subnet (and NF) <u>virtualized resource layer</u> config & management -> ETSI NFV network service (and VNF) orchestration	✗	✗	✓	✓
Resource control and management at the <u>virtual infrastructure layer</u> -> NFVI with optional EPA capabilities and infrastructural SDN control	✗	✗	✗	✓

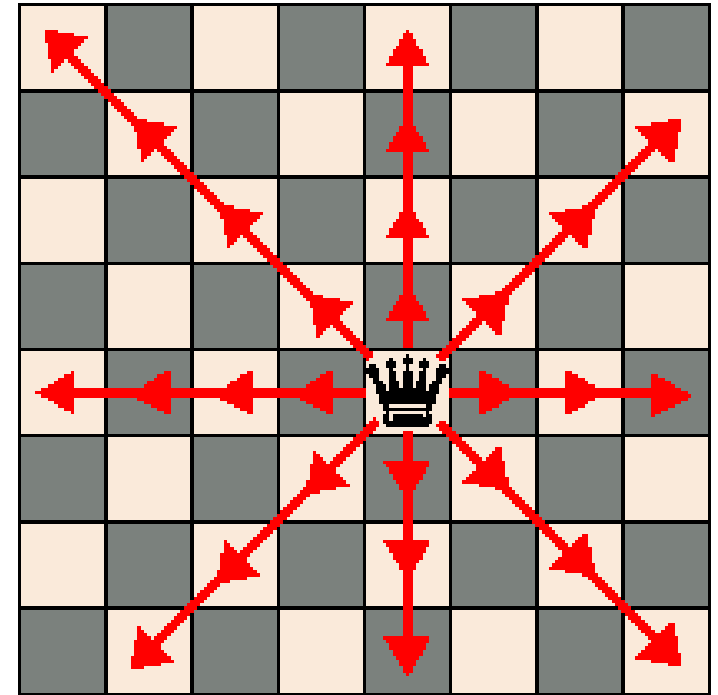# Network Slice (aaS) operation – Exposure levels

- Token-based authentication
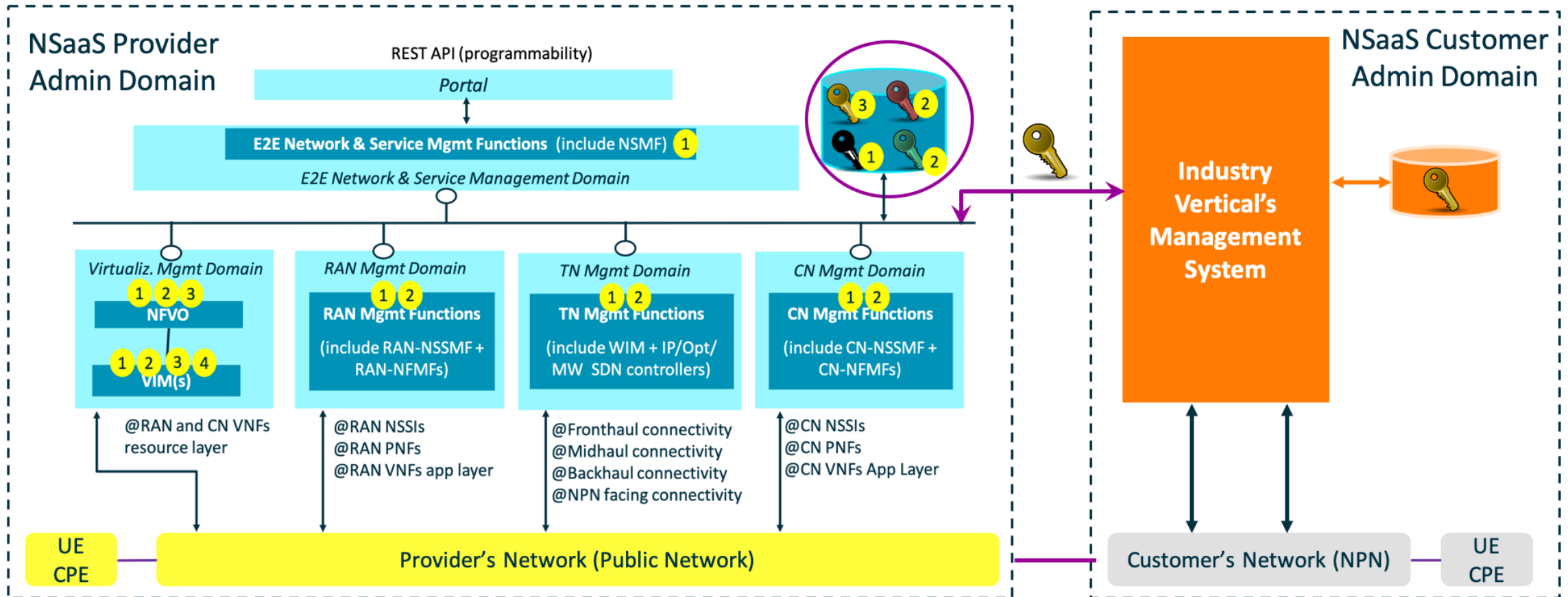
The next moves

- Explore the feasibility of exposure levels in open source environments like OSM and OpenStack

  ☛ Leveraging the multi-tenancy support capabilities that OSM and OpenStack claim to have

- Integration of non-repudation mechanisms to allow secure and verifiable interactions between the NSaaS providers and customers

  ☛ Ensure system auditability
  ☛ Relevant in public network integrated NPNs.

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