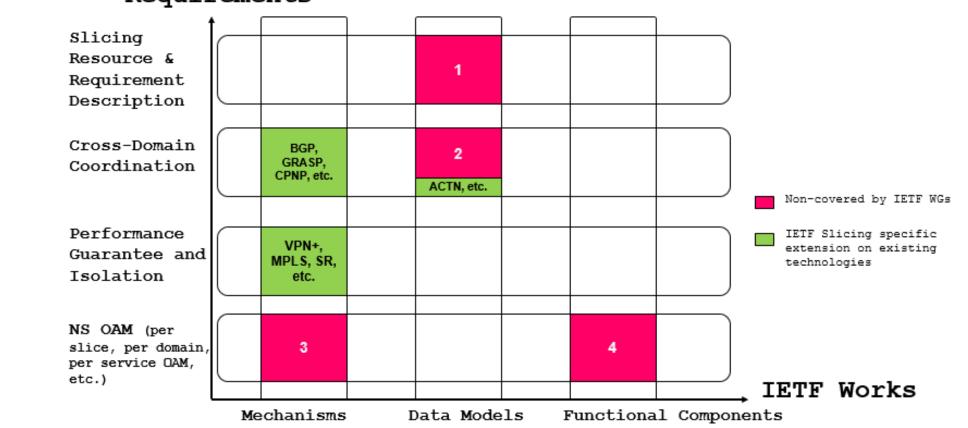# Network Slicing Management and Orchestration

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Scope of the presentation: Impact of Slice Orchestration and Management
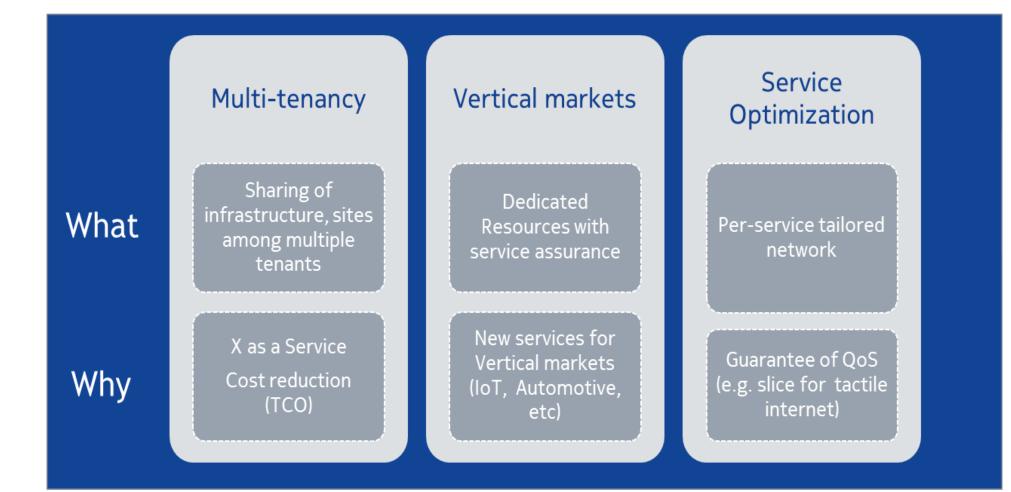draft-flinck-slicing-management-00

Key impact areas:

2, 3 and 4 of

the gap analysis

Source: **draft-qiang-netslices-gap-analysis-01**

Rational for Network Slicing

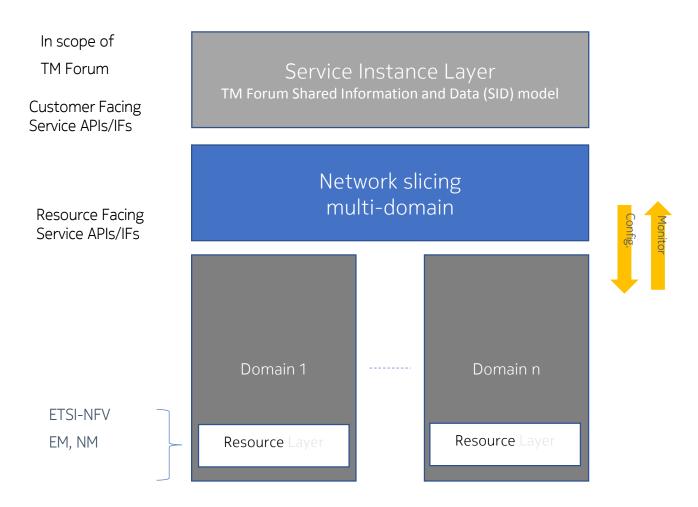|	Multi-tenancy	Vertical markets	Service Optimization
What	Sharing of infrastructure, sites among multiple tenants	Dedicated Resources with service assurance	Per-service tailored network
Why	X as a Service Cost reduction (TCO)	New services for Vertical markets (IoT, Automotive, etc)	Guarantee of QoS (e.g. slice for tactile internet)

Network slicing defined by NGMN, further worked by 3GPP and ETSI

• Network Slicing provides multiple logical networks on top of a partially shared network infrastructure.

• Each instance of a network slice represents an independent end-to-end network.

• A slice may include several network components, (Network Slice Subnetwork according to 3GPP terminology).

• Transport network (e.g. ACTN) is a Network Slice Subnet in the 3GPP model. Transport networks are out of the scope for 3GPP.

• Recursion can be applied to slices as well as to Network Slices Subnets.

• A slice may be deployed and/or operated by the slice provider, or by the tenant who requested the slice.

Source: 3GPP SA5

Network slice management in multi-domain context

In scope of
TM Forum

Customer Facing
Service APIs/IFs

Resource Facing
Service APIs/IFs

ETSI-NFV

EM, NM

Service Instance Layer
TM Forum Shared Information and Data (SID) model

Network slicing
multi-domain

Config.

Monitor

Domain 1

Domain n

Resource Layer

Resource Layer

Ngmn definition:
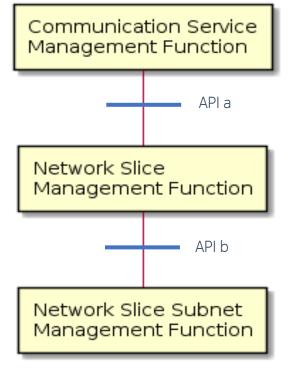Network slicing concept consists of 3 layers:
1. Service Instance Layer,
2. Network Slice Instance Layer, and
3. Resource layer.

A Network Slice Instance may be composed of Sub-network Instances ("cross network segments"), which in turn may be shared by multiple network slice instances

Multi-tenancy support of slicing leads to recursion

- Orchestration creates slices and associates network functions to them. It sets up connectivity between network functions. VNF and PNF live cycle managements has to be coordinated.

- Strong need for service fulfilment assurance and monitoring of SLA based Connectivity, Mobility, Capacity, Security and QoS.

- Isolation of resources and ability of the operator to support multiple tenants with varying levels of control.

```
┌─────────────────────────┐
│  Communication Service  │
│    Management Function   │
└─────────────────────────┘
            │
        ──── API a
            │
┌─────────────────────────┐
│   Network Slice         │
│   Management Function   │
└─────────────────────────┘
            │
        ──── API b
            │
┌─────────────────────────┐
│  Network Slice Subnet   │
│   Management Function   │
└─────────────────────────┘
```
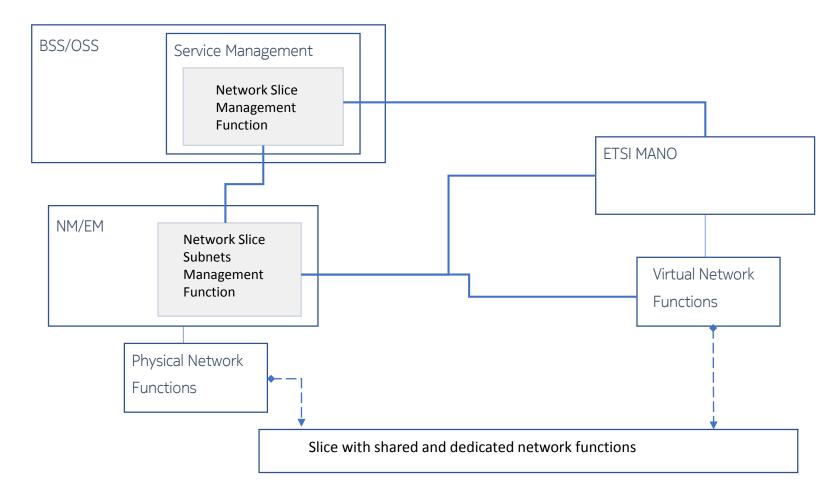
Source: 3GPP SA5

New challenges:

- Brokering across domains/tenants.

- Relationship to wide area infrastructure management.

- Automated VNFs instantiation and self discovery functions.

Different levels of Network Slice Control exposure

1. Slice consumer is allowed to only monitoring selected KPIs.
   - Slice Provider offers only an API to monitor the slice KPIs as agreed in the contract.

2. Limited control to Slice Consumer to compose of network slices.
   - Slice Consumer can change configuration of deployed network functions and /or onboard own certified network functions.

3. Slice consumer operates its own Management and Orchestration stack
   - The Slice consumer has tight control over its own network functions and services

- Need for an management entity that deals with new abstractions and offers access to lower level functions: Network Slice Management Function (NSMF).

Network Slice Management Function

BSS/OSS

Service Management

Network Slice
Management
Function

ETSI MANO

NM/EM

Network Slice
Subnets
Management
Function

Virtual Network
Functions

Physical Network
Functions

Slice with shared and dedicated network functions

NSMF has full visibility to and control over the end-to-end slice, its resources and performance (FCAPS)

Source: draft-flinck-slicing-management-00

Conclusions

- Alignment with non-IETF work on management aspects is needed to ensure painless reuse of the IETF work:

  - Abstractions and data models that support multi-domain and multi-tenant operations.

  - Interfaces (i.e. protocols, APIs) between the relevant functions.

  - Support for recursion and varying levels to exposed control for tenants with different capabilities.

  - Need for a functionality that consolidates the FCAPs information for the whole slice.