Update on TM Forum 5G Modelling activities

Topics

- Objectives
- Overview of Proof of Concept 5G Catalyst
- Open Digital Architecture Framework
- ODA Production Models
- Specific modelling challenges
  - Linking TMF Sid Models to other
  - Linking Services and Resource
  - Use of Resource Function

- TMF 664 Resource Function Activation and Configuration
  - Addition of Network resourece Moel

Objective

- Overview of activities
- Selected topics related to 5G with modelling focus
- Identify areas Mutual Interest for deep dive follow-up

Overview Proof of Concept 5G Catalyst

5G Catalysts Digital Transformation World May 2019 Nice(contributing to Collaboration program)

- 5G Riders on the Storm - Phase II

  focuses on the operational use cases required to support lifeline communications both during and after extreme weather events such as storms and flooding. Public safety relies on functional emergency services that in turn rely on CSPs providing an assured level of 5G services that enables first responders to do their job

- 5G Optimized Capacity & E2E Experience - Phase II

  guaranteeing assured service quality across multiple slices requires elimination of prohibitively expensive, resource over-allocation and cross-CSP co-ordination.
  This Catalyst demonstrates real-time, dynamic, automated planning, operation and spectrum optimization for multiple SLA guaranteed slices, with blockchain-based settlement, spanning multiple CSPs.

- Skynet

  advanced eHealth and tele-medicine services across seamlessly coordinated, geographically distributed service providers to support medical crises where global collaboration is needed.
  We will demonstrate the value of industry standard frameworks and APIs to support complex Network Services Orchestration, Service Assurance, monetization and capabilities offered by 5G network slices and physical networks.

5G Catalysts Digital Transformation World May 2019 Nice

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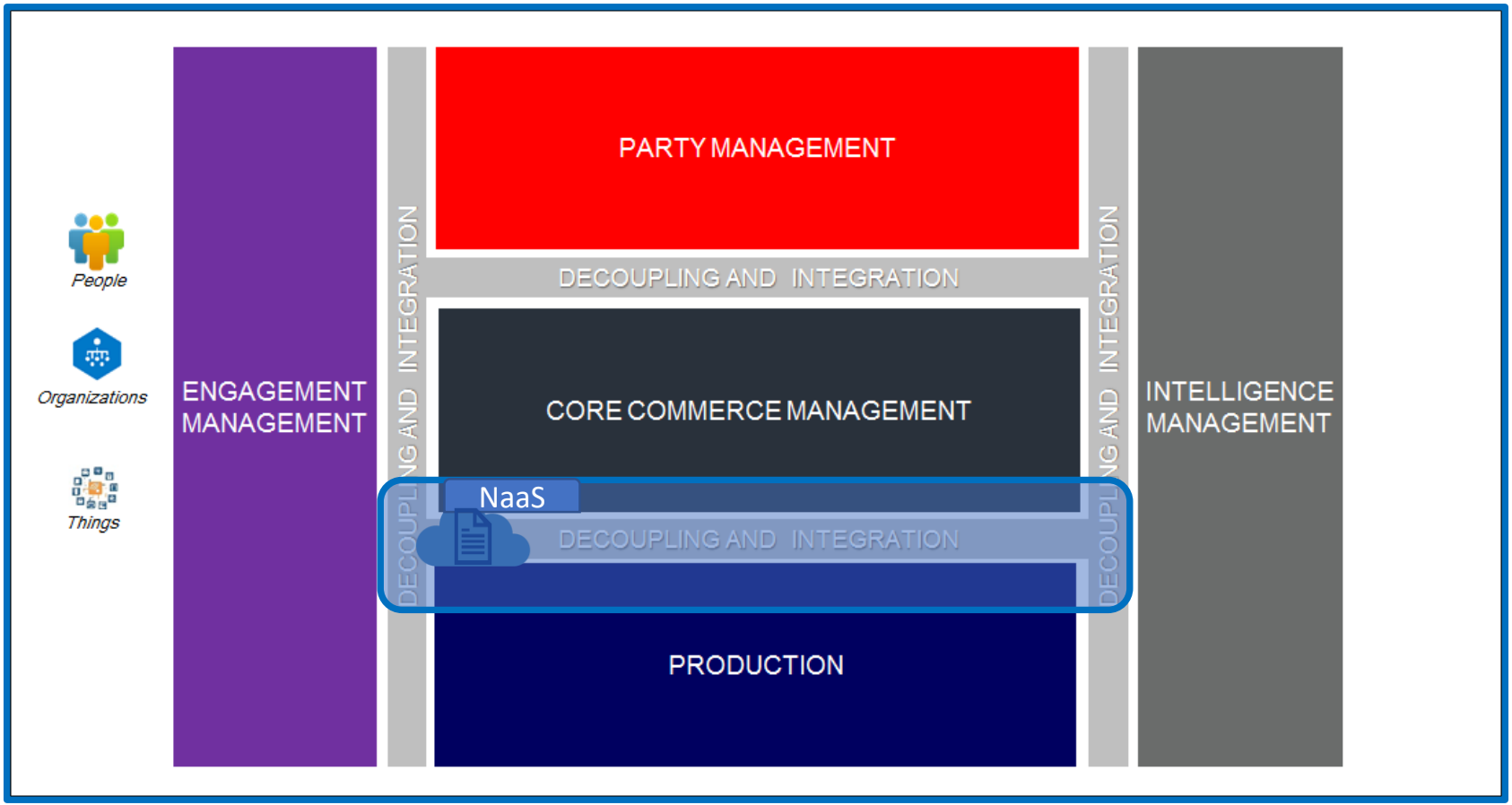
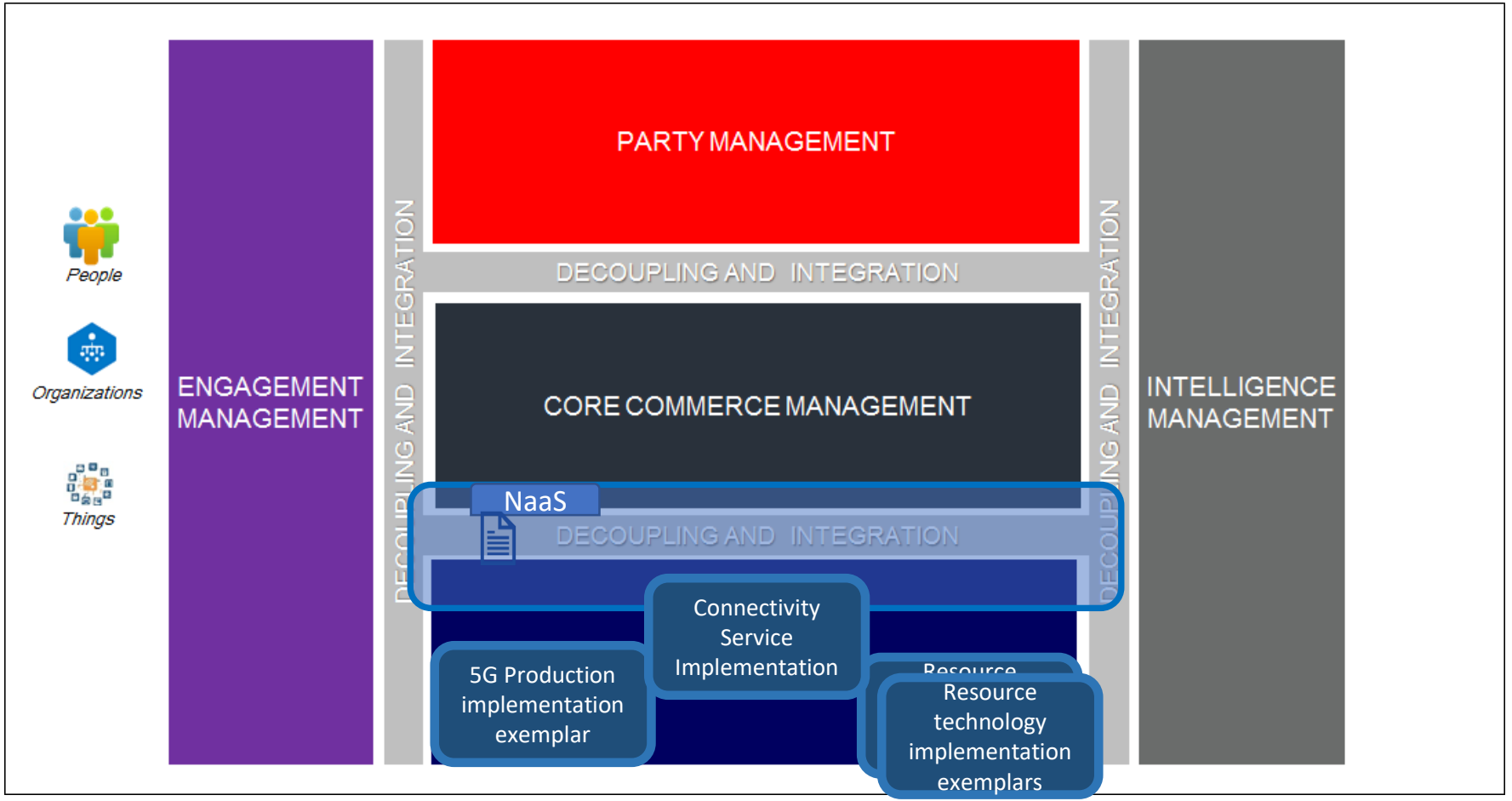
Related DTW 2019 5G catalysts

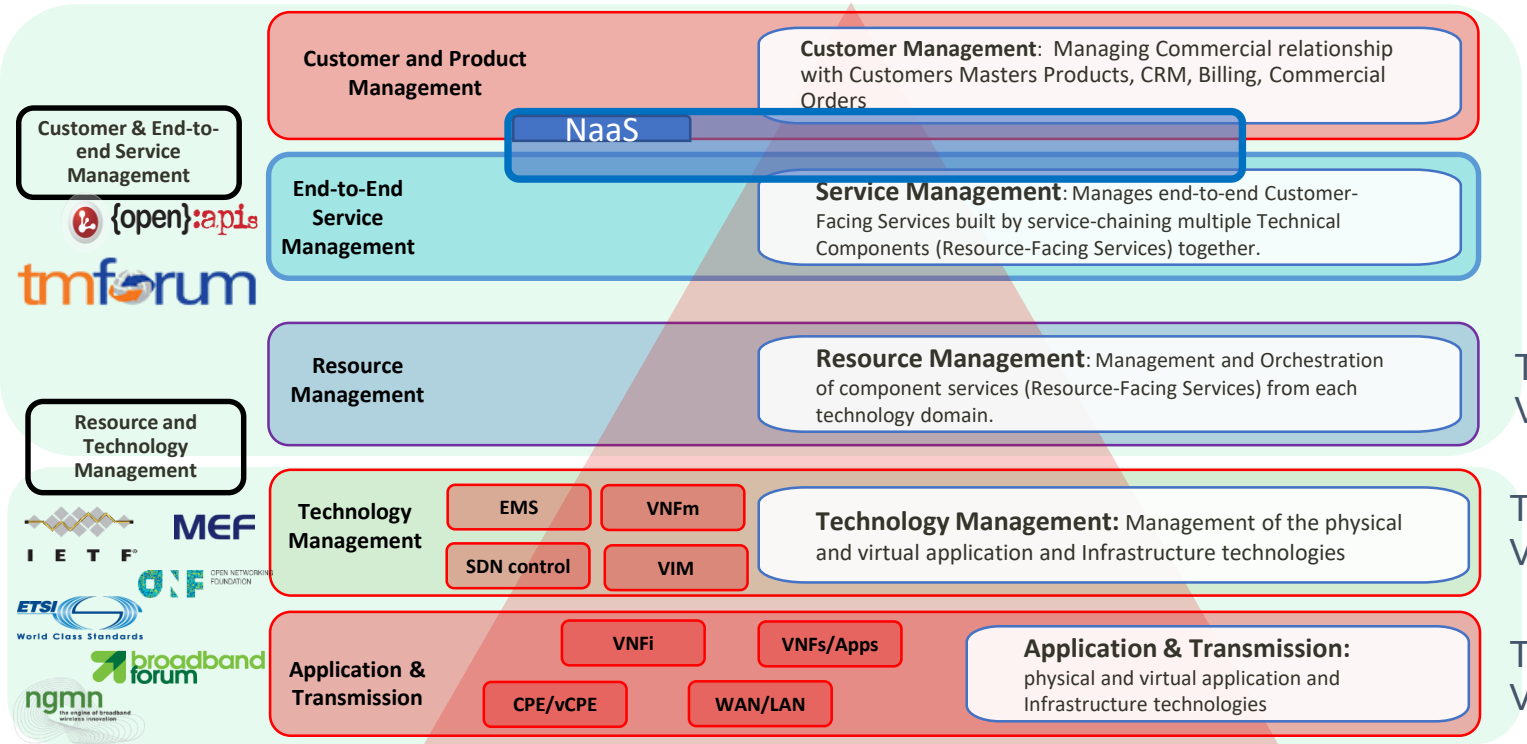
- 4G & 5G NaaS for B2B & B2I Business Ecosystem
- 5G-enabled Tourism Experience
- 5G Operations & Monetization
- 5G Services Validation & Practices - Phase II
- AI for IT & Network Operations (AIOps) - Phase II
- Manufacturing Predictive Maintenance using 5G
- Zero Touch Partnering
- 5G Services Validation & Practices - Phase II

Open Digital Architecture ODA and NaaS




People
Organizations
Things
ENGAGEMENT MANAGEMENT
DECOUPLING AND INTEGRATION
PARTY MANAGEMENT
DECOUPLING AND INTEGRATION
CORE COMMERCE MANAGEMENT
NaaS
DECOUPLING AND INTEGRATION
Connectivity Service Implementation
5G Production implementation exemplar
Resource technology implementation exemplars
DECOUPLING AND INTEGRATION
INTELLIGENCE MANAGEMENT

Deployment Principles

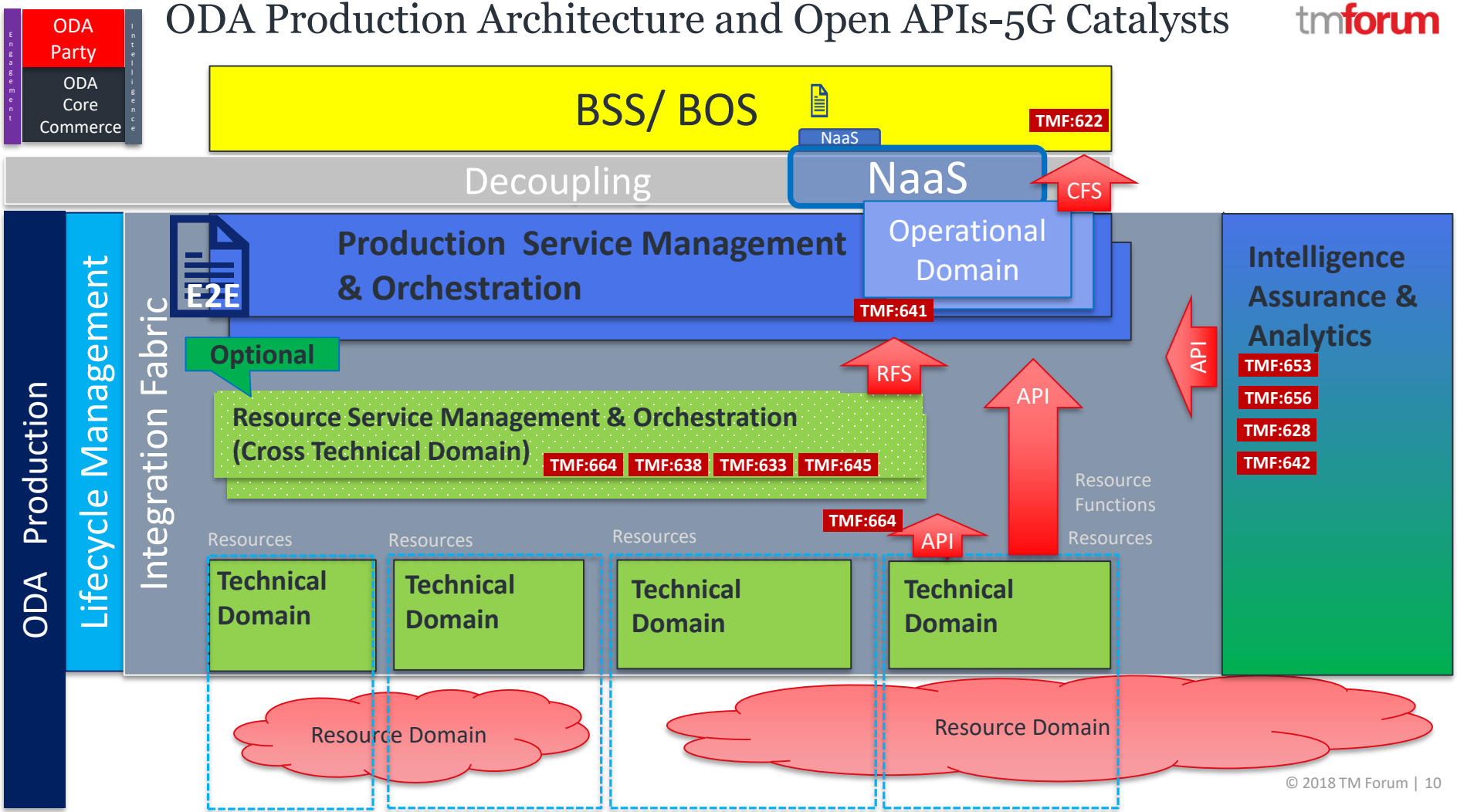


Technology independent
Vendor independent

Technology specific,
Vendor independent

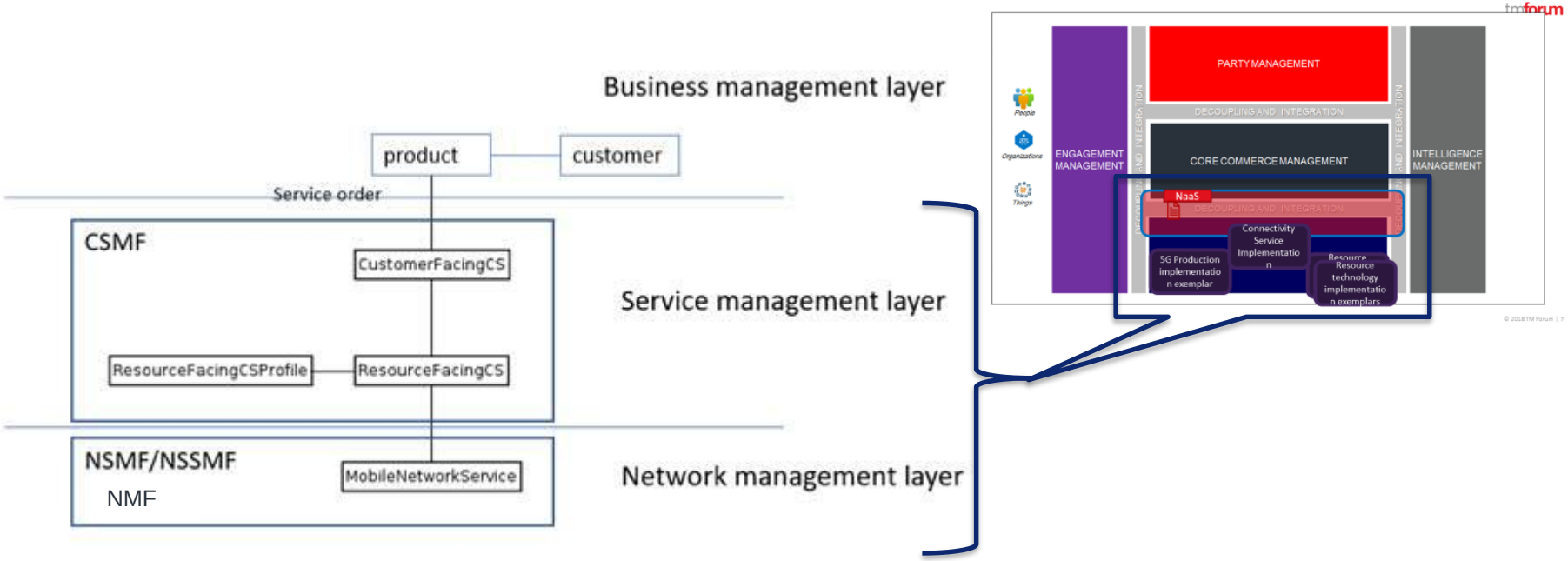
Technology specific ,
Vendor Specific

ODA Production Architecture and Open APIs-5G Catalysts



3GPP Model 28.805

Telecommunication management; Study on management aspects of communication services

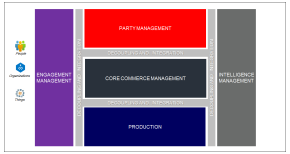


28.805 Figure 4.3.1: Management model for management of communication services

Specific modelling challenges

- Linking TMForum SID Models to other industry standards
- Connectivity Service Models
- Linking Services and Resources
- Use of Resource Functions

ODA Production Functionality and Information Models



NaaS

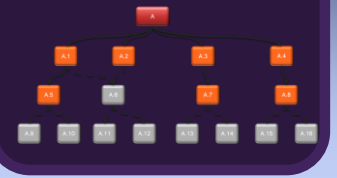
NaaS

ODA Production

Service Management Functionality

Service Management Models

- Service Specification
- CFS Specification
- Connectivity Service Specification
- Service Configuration



SID

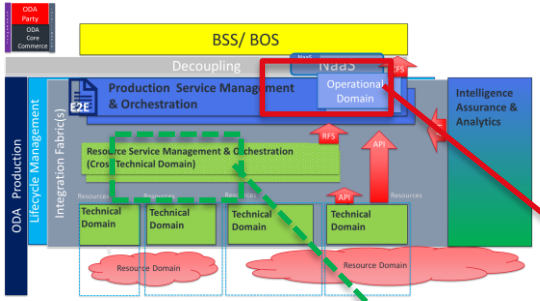
Resource Management Functionality

Resource Management Models

- RFS Specification
- Resource Function Specification
- ONF Common Information Model
- 3GPP 5G Information Model -NRM
- MEF Common Information Model
- ETSI NFV Information Model

SID + Other SDO

Abstraction Concepts R19-5 evolution



NaaS Open APIs

NaaS

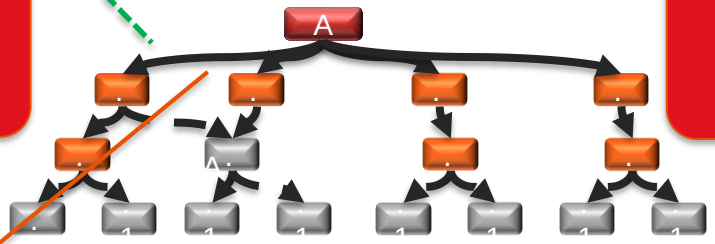
Connectivity Abstraction Model:

- Intent Based:
  Functions/ Features, Service Topology, SAP,
  Flows, Connection Points
- Mapping to internal infrastructure:
  Create Flows, Termination Points, Topology mapping, Feature/ Function constraints
- Defined using TR255A/B Examples TMF070 Series

Connectivity Service Domain
(Type of Operational Domain)
e.g. 5G enabled Service

SAP/ CP/ TP

SAP/ CP/ TP



Detailed Internal Resource Model

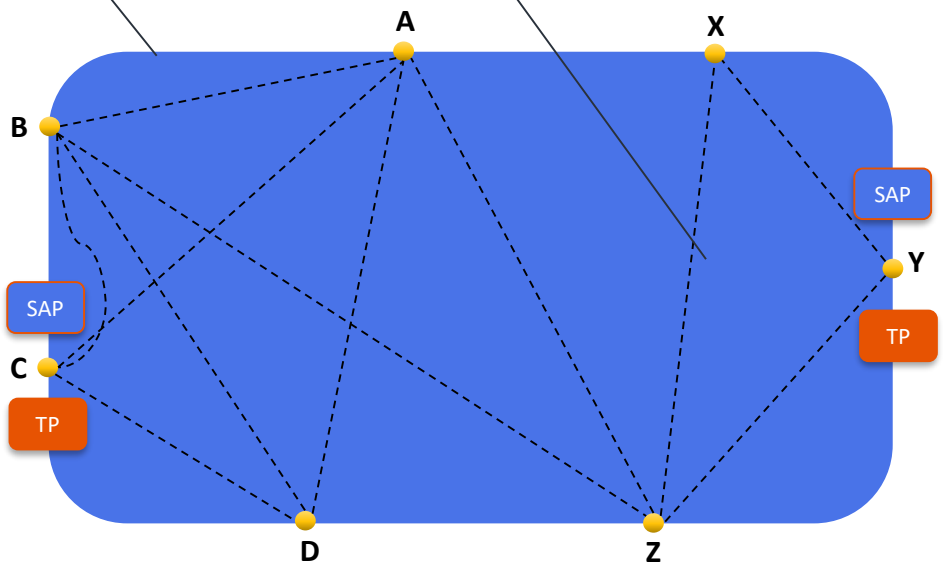
Key:
SAP: Service Access Point
CP: Connection Point
TP: Termination Point

Connectivity Service Domain- Static Connectivity Service elements

Primary focus CFS
Works also for RFS:

Service Topology: Connectivity and Adjacency)

Connectivity Service Domain (new)



Service Access Point (Service logical)

Termination Point Virtual and Physical

Endpoint : Service Access Point/ Termination Point
Points of Presence for Connectivity Service Domain

Connectivity Service Domain- Connectivity Flow elements

Primary focus CFS
Works also for RFS (Resource Technology Specific):

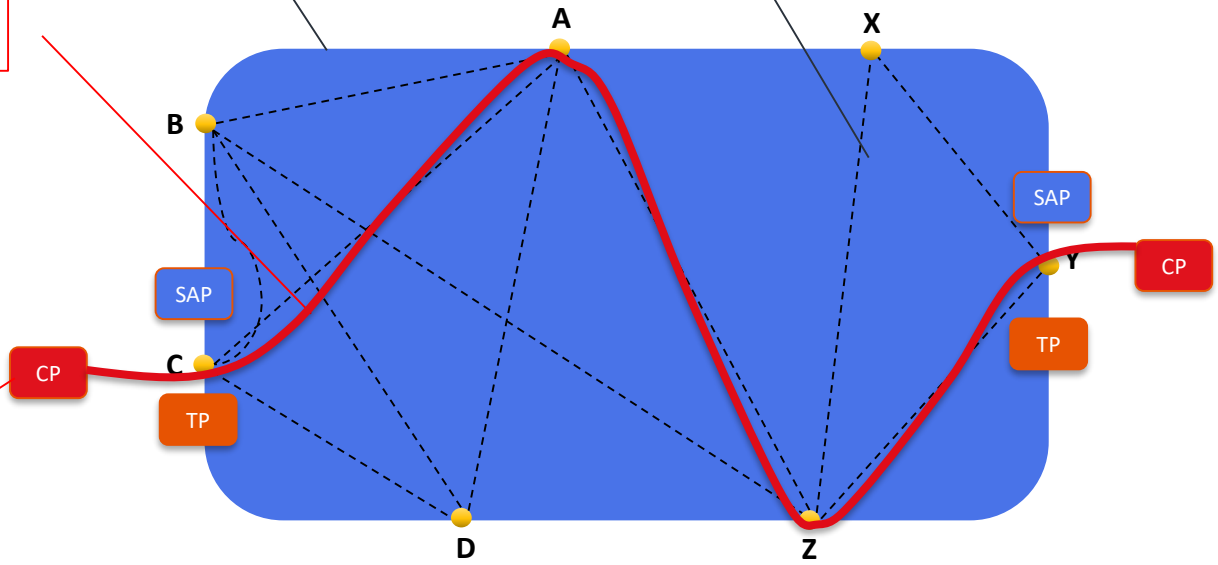
Connectivity Service Domain (new)

Flow / Connection TR255A

Functions
(Feature Groups, Features
SID TR 255B)

Connection Points

Service Topology
Static constraints on Flows



Endpoint : Service Access Point/ Termination Point
Points of Presence for Connectivity Service Domain

DTW Nice 2019 "RIDERS in the STORM" Catalyst

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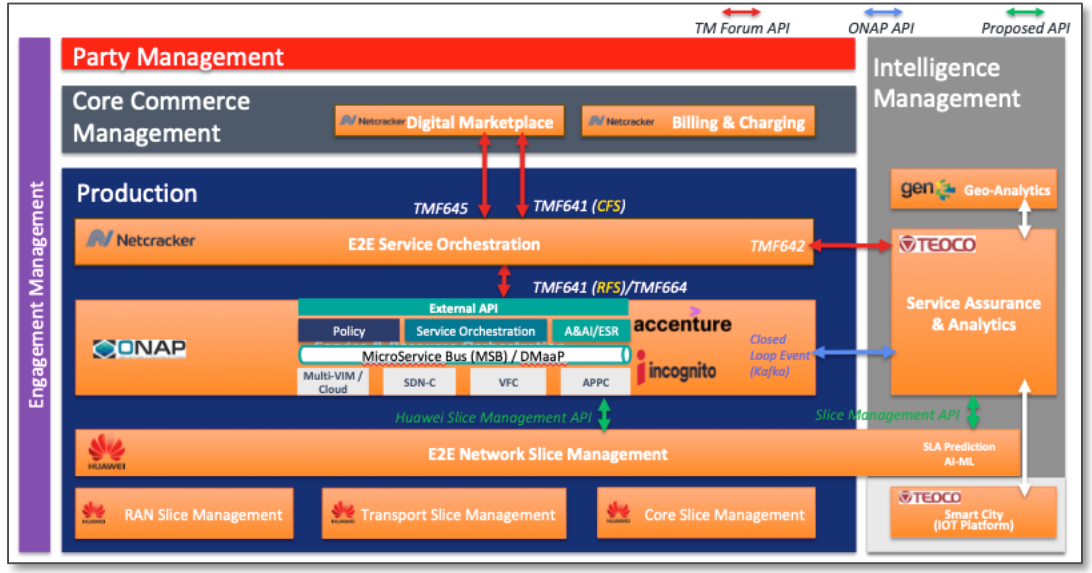
TIM orange telenor A1 KDDI KDDI R&D LABS BT

Supported the fulfillment of

"RIDERS in the STORM"

That thanks to the collaborative work of

Netcracker accenture HUAWEI gen



5G Riders /Skynet ‘Meet in the Middle’

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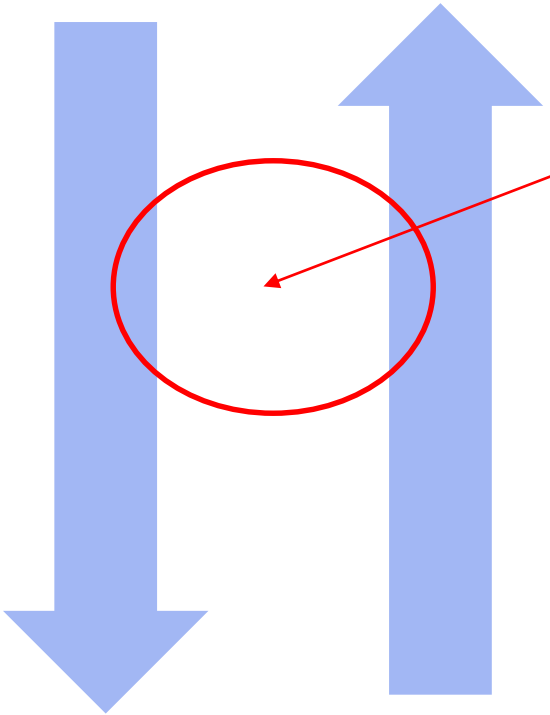
Top-down versus bottom-up perspectives

Meet in the middle



Service focus
- What service(s)
- Where
- Which subscribers
- Using what devices
- When
- What support levels

Start here!

Network focus
- Number of UEs
- Number of connections/UE
- Throughput, latency, pkt loss, …
- Which radio sites
  - which radio access technologies
- Which transport,
- Which core functions, data centers
- Service chaining
- Resource sharing, isolation
- Utilization
- Service level/expectation

Needs → Services → Slices ....FRICTIONLESSLY

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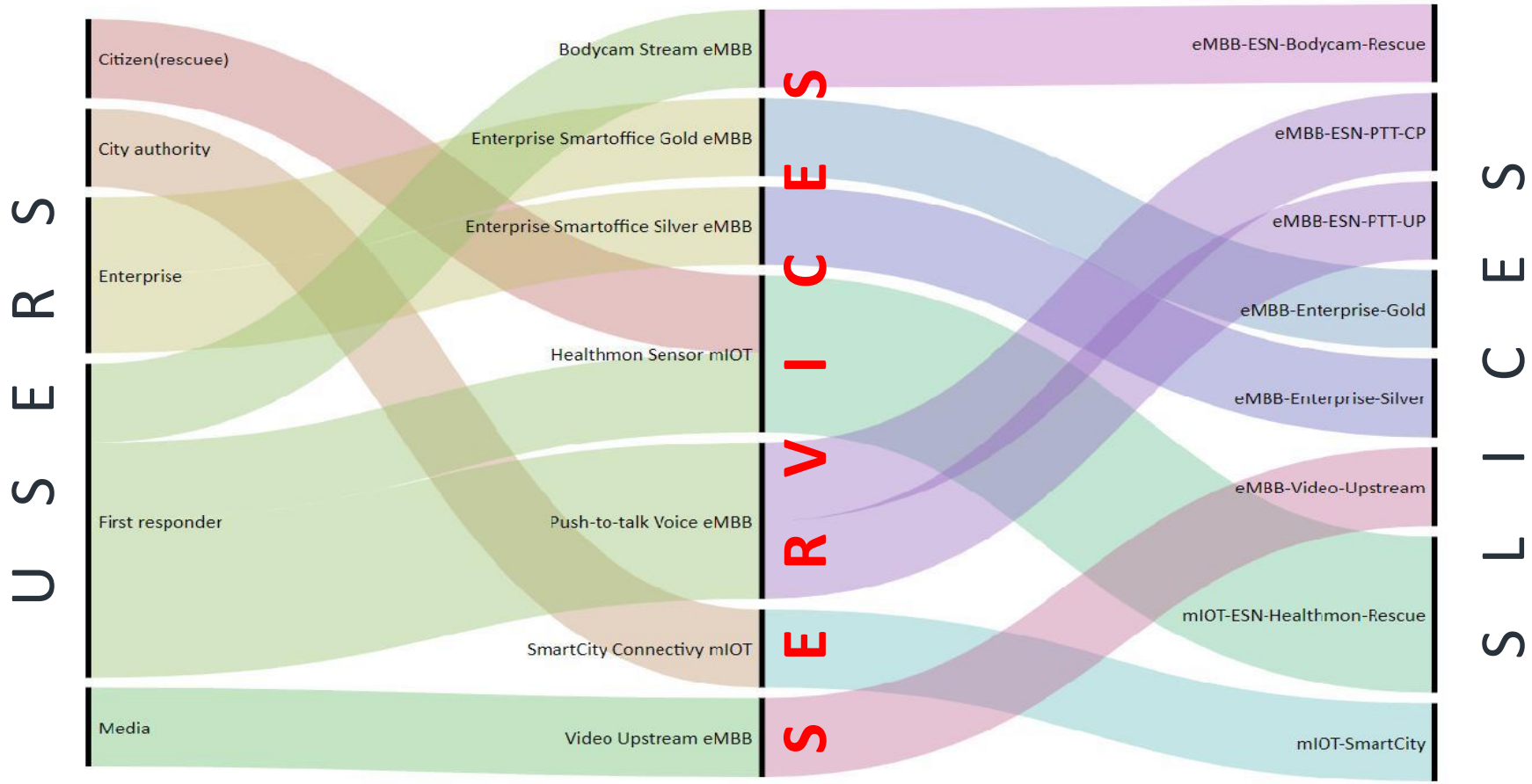


From IG 1194 Services not Slices to be published in R19-5

Slice template blueprint framework

Leverage GSMA NEST GST work and NGMN service categories, apply SID thinking → create programmatic slice blueprint framework

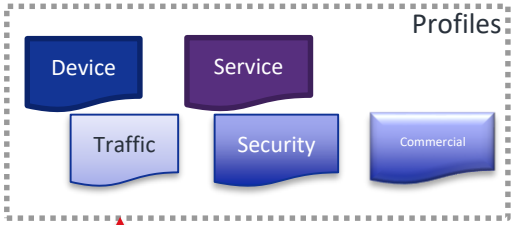
Industry/std inputs

NEST Slice template parameter list

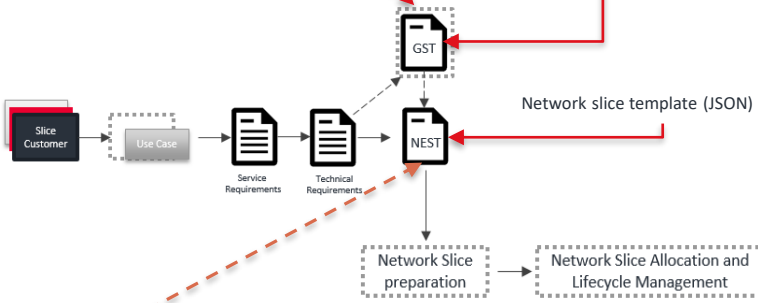
~45 params to fully qualify network characteristics

Use case families with network characteristics

SID/Info Framework "CFS/RFS"



Service to network slice mappings

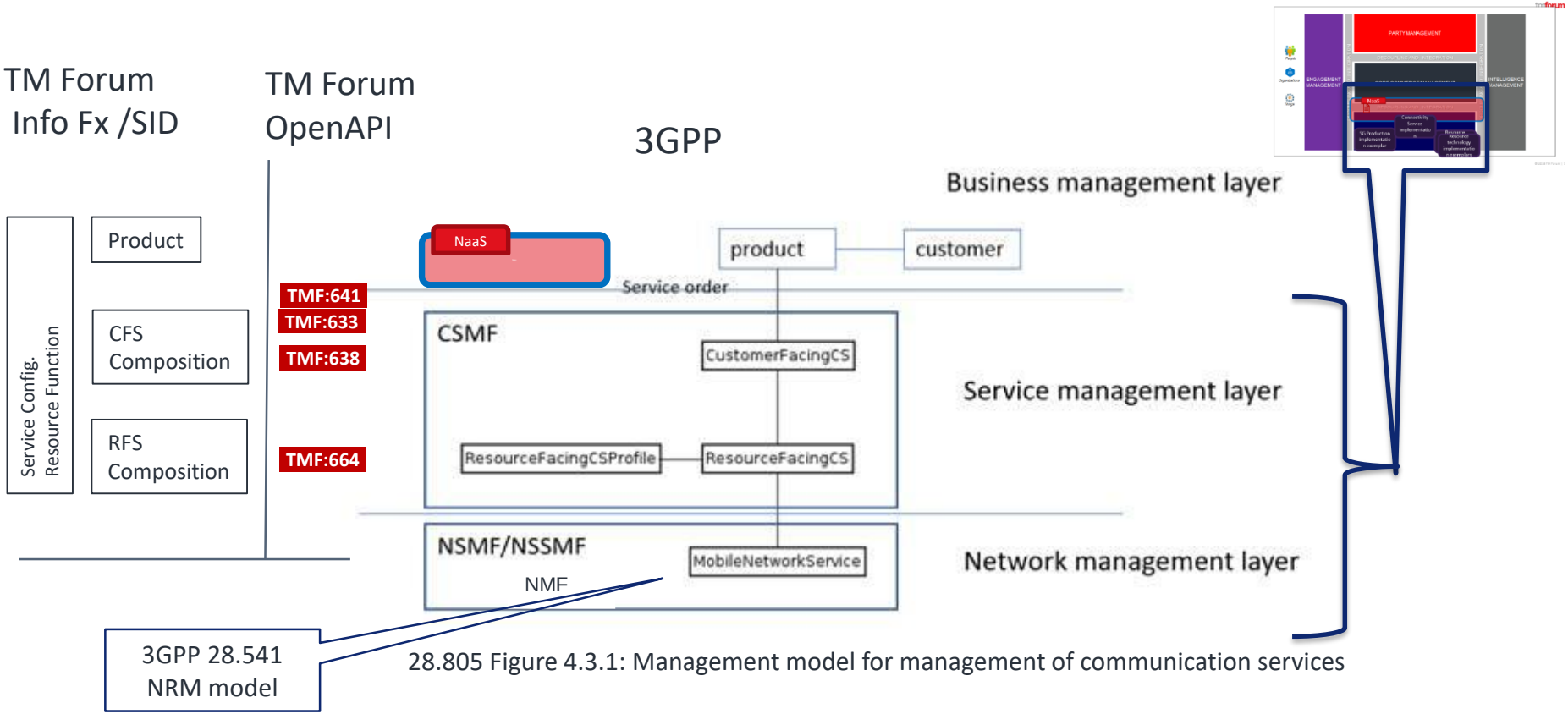


10 created: e.g. low cost connectivity, 50Mbps suburban, smart wearables, high speed train connectivity, video surveillance, etc.

https://github.com/5g-ridersonthestorm/gsma-gst

3GPP Model 28.805 / SID / Open APIs

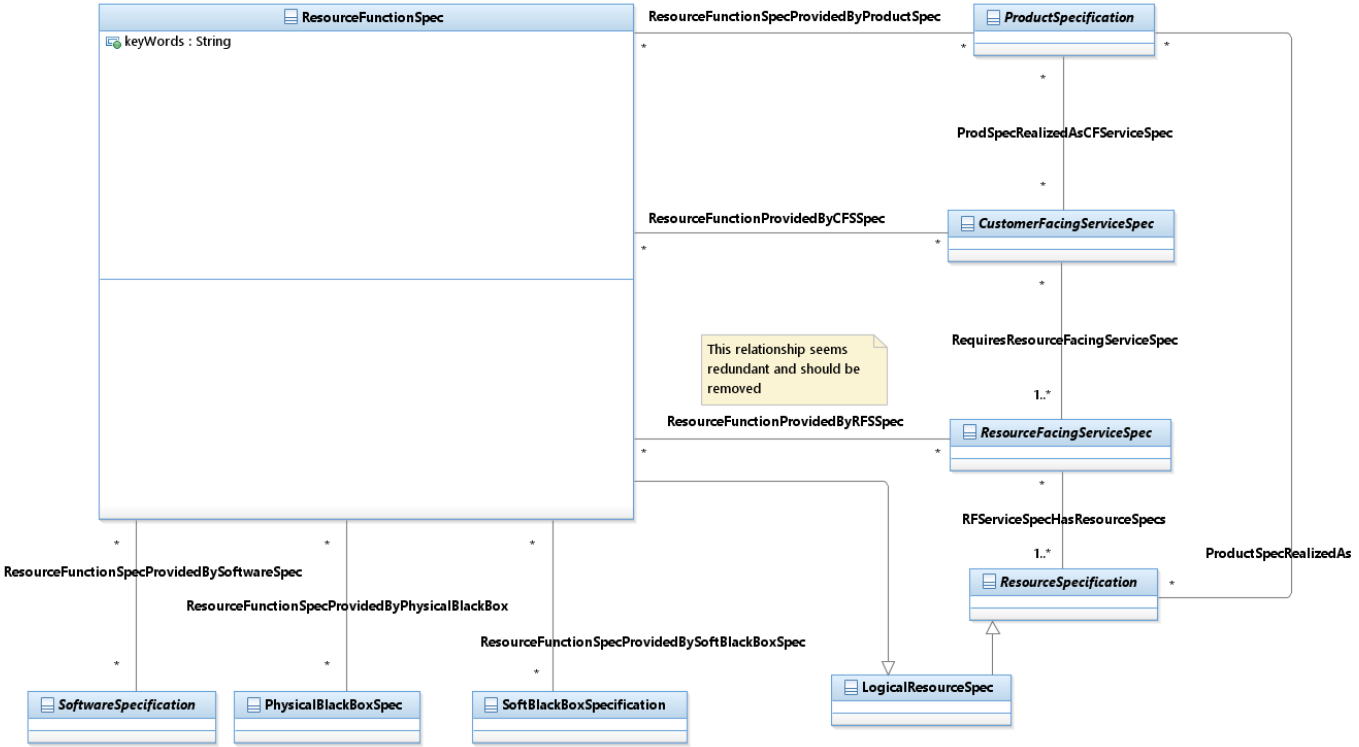
Telecommunication management; Study on management aspects of communication services



28.805 Figure 4.3.1: Management model for management of communication services

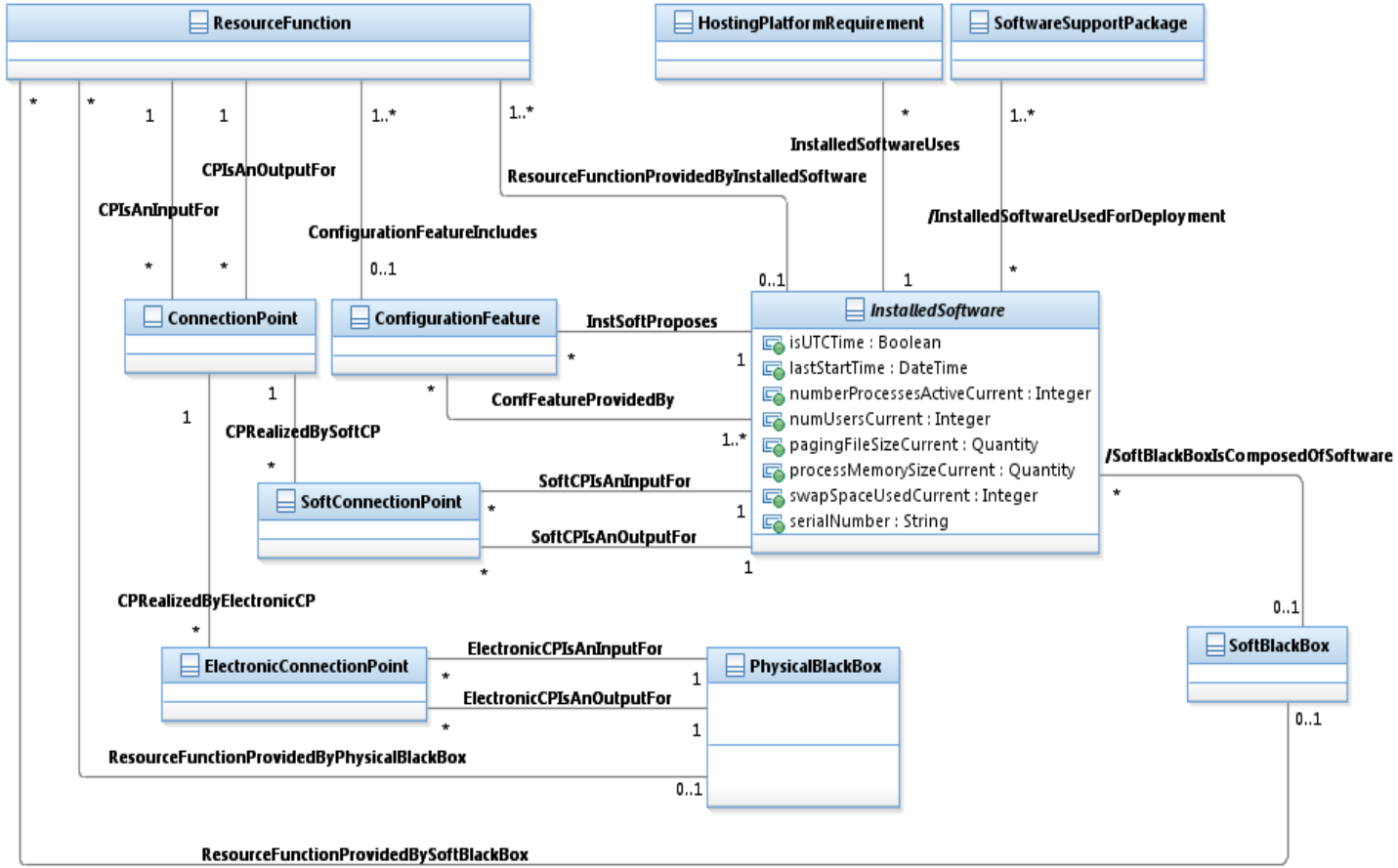
Modelling ResourceFunctions in SID

GB922_Logical_and_Compound_Resource_Computing_and_Software_R19.0.0



ResourceFunctionSpec Inheritance and ”ProvidedBy” relationships

Modelling ResourceFunctions in SID



ResourceFunction

TMF 664 Resource Function Activation and Configuration API

Updates for R19-5

- Designed to support
- Hybrid Networks comprising:
- Legacy Network Appliaces
- Virtualized Network Applications
- Has a super set of ETIS SOL 3/ 5 Fucntons
- E.g. self heal
- Seascal up/down

TMF 664 Resource Function Activation and Configuration API

Key Features

- Designed to support
  Hybrid Networks comprising:
  - Legacy Network Appliances
  - Virtualized Network Applications
- Real Virtuality Catalysts implementation
- Includes ETSI SOL 3/ 5 Function's
  - Self heal
  - Scale up/down
- Based on Resource Functions (RF)
- A functional abstraction of resources
- More flexible than RFS Resource model
  - RF can buse at Product and service level
  - Abstraction /specialisation Can be manged by configurations SID configuration

Updates for R19-5

- Schemafied
- Addition of 3GPP NRM model 28.541
- Numerous corrections

ResourceFunctionSpecification: 5G NetworkSliceSubnet

Features describe configuration intent for compound resource.

Characteristics provide configuration of outer resource.

Relationships describe contained resources.

Connection points describe outer connection endpoints.

Connectivity describes adjacency graph of contained resources.


```
▼ object {17}
    id : 10eff57c-24db-48ab-99e5-d82711e8d315
    href : /resourceCatalog/v4/resourceSpecification/10eff57c-24db-48ab-99e5-d82711e8d315
    name : NetworkSliceSubnet
    description : 5G Network slice subnet resource function specification.
    @type : NetworkSliceSubnetSpecification
    @schemaLocation : /resourceCatalog/v4/schema/NetworkSliceSubnetSpecification
    @baseType : ResourceFunctionSpecification
    version : 1.0
    lifecycleStatus : Active
    isBundle : ☑ true
    category : 5G
  ▶ targetResourceSchema {2}
  ▶ resourceSpecCharacteristic [11]
  ▶ featureSpecification [21]
  ▶ resourceSpecRelationship [16]
  ▶ connectionPointSpecification [3]
  ▶ connectivitySpecification [20]
```

ResourceFunctionSpecification: 5G ManagedFunction

Example is 5G Core AMF

Characteristics include vnfParameters.

Relationships describes the VNFs and other related resources.

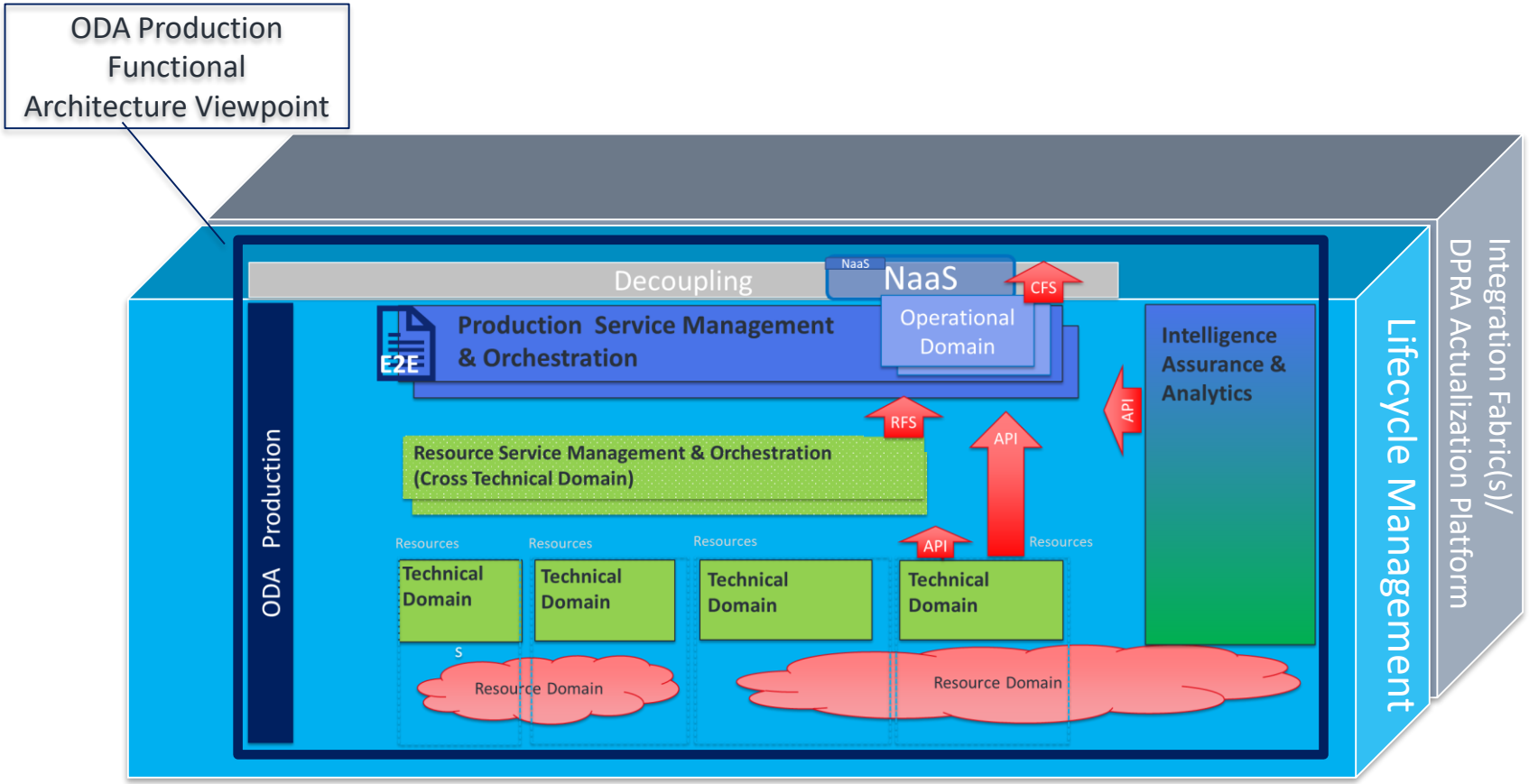
Connection points are reference architecture interfaces (e.g. N2, N8)

Connectivity describes adjacency of contained VNFs.

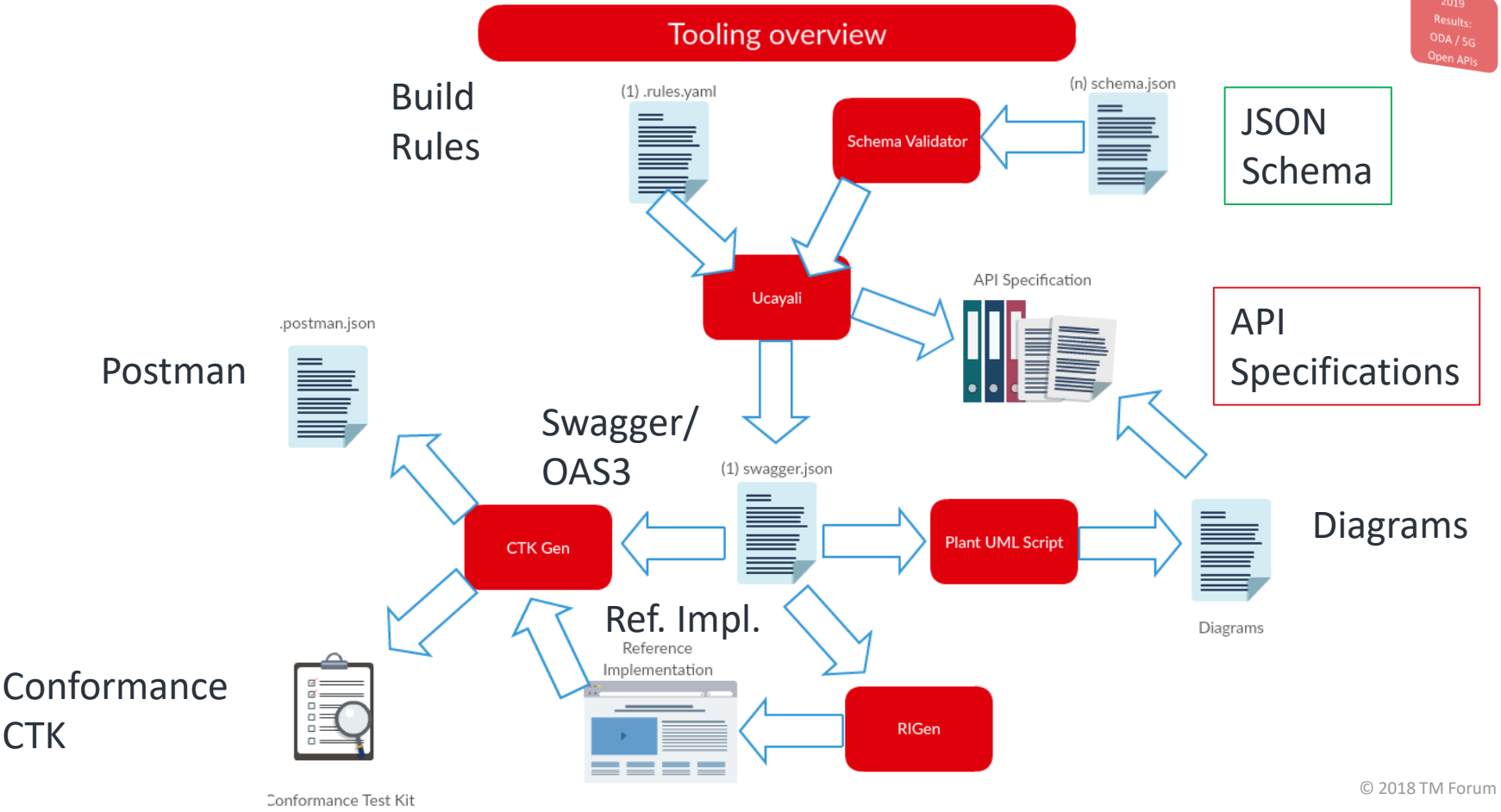

```
▼ object {18}
    id   : 5e86ec0a-2eae-4b92-bfb9-ae89ee335867
    href : /resourceInventory/v4/resource/5e86ec0a-2eae-4b92-bfb9-ae89ee335867
    name : DC=example.net,Subnet=1,NetworkSlice=1,NetworkSliceSubnet=1,AMFFunction=1
    description : 5G Access and Mobility Function (AMF) resource function
    @type : AMFFunction
    @schemaLocation : /resourceInventory/v4/schema/AMFFunction
    @baseType : ResourceFunction
    version : 1.0
    category : 5G
  ▶ resourceSpecification {3}
    lifecycleState : operating
    lifecycleSubState : deactivated
  ▶ resourceCharacteristic [11]
  ▶ feature [0]
  ▶ resourceRelationship [5]
  ▶ sap  [0]
  ▶ connectionPoint [5]
  ▶ connectivity [0]
```

Spares

Orthogonal Lifecycle Management and Integration Fabric



Open API Tooling



List of Identified APIs

ODA Commerce – ODA Production

- TMF622 Product Order API
- TMF641 Service Order API

ODA Production – LCM interfaces (CFSs, RFSs)

- TMF664 Resource Function Activation & Configuration API
- TMF640 Service Activation & Configuration API (Added)
- TMF638 Service Inventory API
- TMF633 Service Catalogue API
- TMF 634 Resource Catalogue API (Added)
- TMF645 Service Qualification API (?)
- Slice & sub-slice management APIs

ODA Assurance Interfaces (CFSs, RFSs)

- TMF653 Service Test API
- TMF656 Service Problem API
- TMF628 Performance Management API
- TMF642 Alarm Management API
- TMF SLA API

Orchestration & Provisioning – API map

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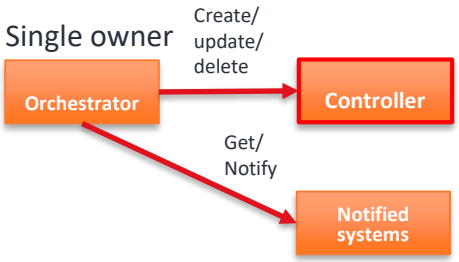
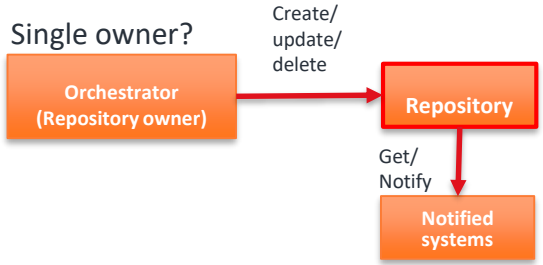
Provisioning & Activation



Entities
CFS
RFS
Resource

API	Name	Level
TMF640	Service Activation & Configuration	CFS
TMF664	Resource Function Activation & Configuration	RFS/ Resource

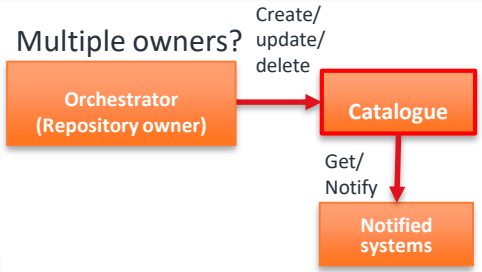
Inventory (Instances)



Entities
CFS
RFS
Resource

API	Name	Level
TMF638	Service Inventory	CFS
TMF639	Resource Inventory	RFS/ Resource?

Catalogue (Metadata, Spec level)



Entities
CFS
RFS
Resource

API	Name	Level
TMF633	Service Catalogue	CFS
TNF634	Resource Catalogue	RFS/ Resource ?

NTT Slice Activation

Demo home

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JP CRM

TMF 641

Service Order(CFS)
UK-JP remote diagnosis service order

JP SO

TOSCA modeling for slice

Resource Order(RFS)
UK-JP eMBB slice service order

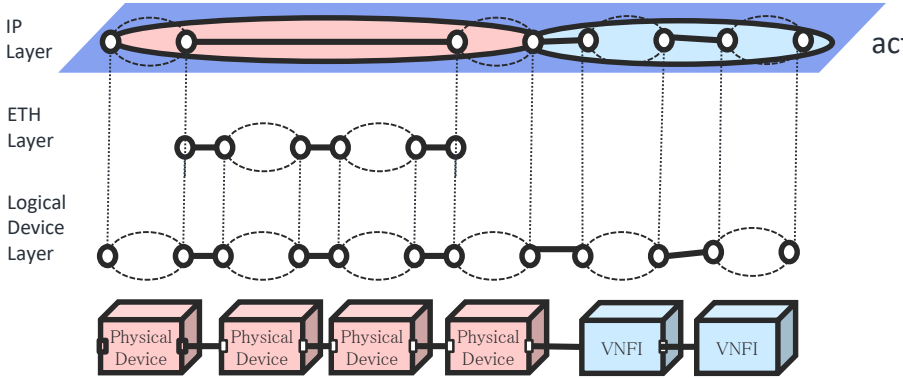
TMF 641

JP DO

extended TOSCA modeling for hybrid network (virtual and non-virtual domains)

Decompose slice service order into resource order

provision and generation of resources according to resource order



activate the slice

Modeling on the basis of TR255 and TR275

Appendix NTT Domain Orchestrator

Demo home

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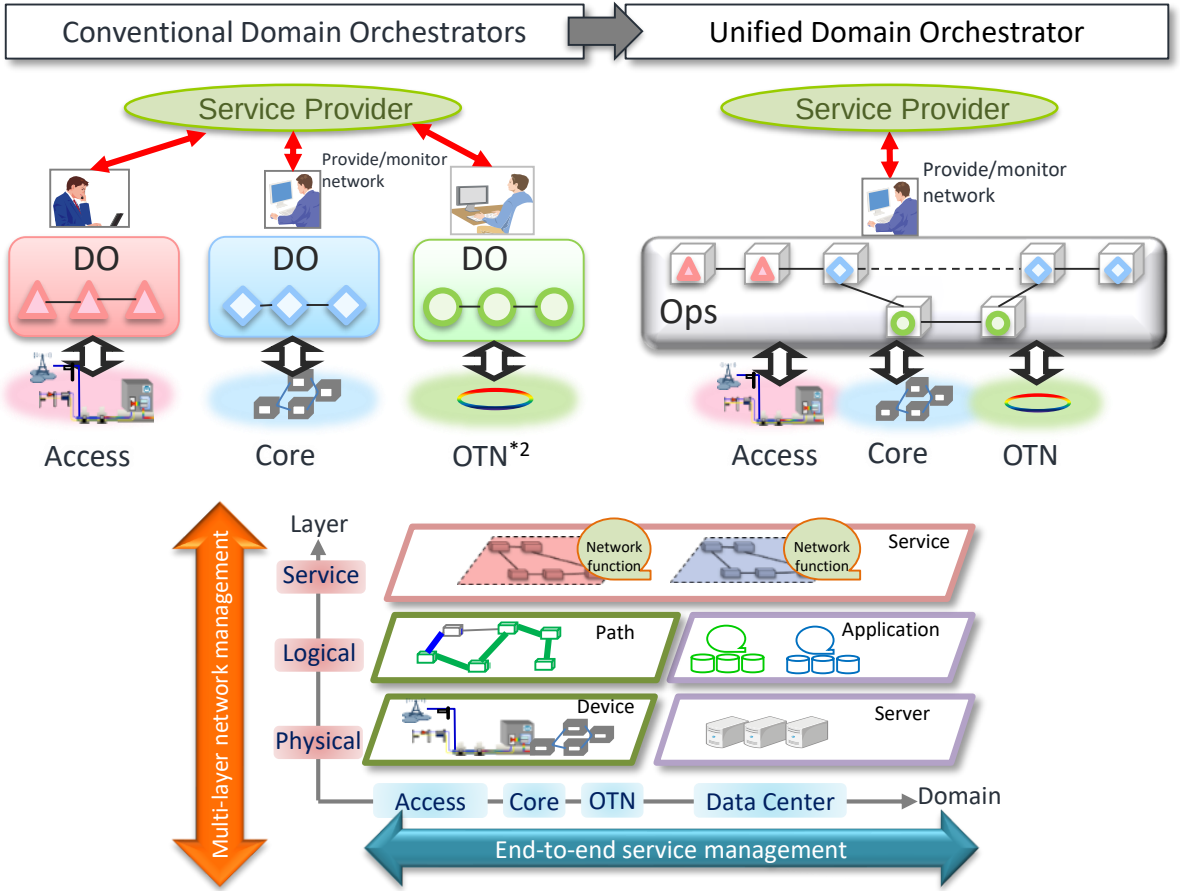

Features

- Integrated management of various kinds of networks based on both a unified data model (TMF standards aligned) and pre-defined general operation management function
- Flexibly respond to the operation management requirements of various networks by externally defining the characteristics of each network
- End-to-end network automatic configurations
- End-to-end fault monitoring

NTT Slice Activation

Demo home

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JP CRM

TMF 641

Service Order(CFS)
UK-JP remote diagnosis service order

JP SO

TOSCA modeling for slice

Resource Order(RFS)
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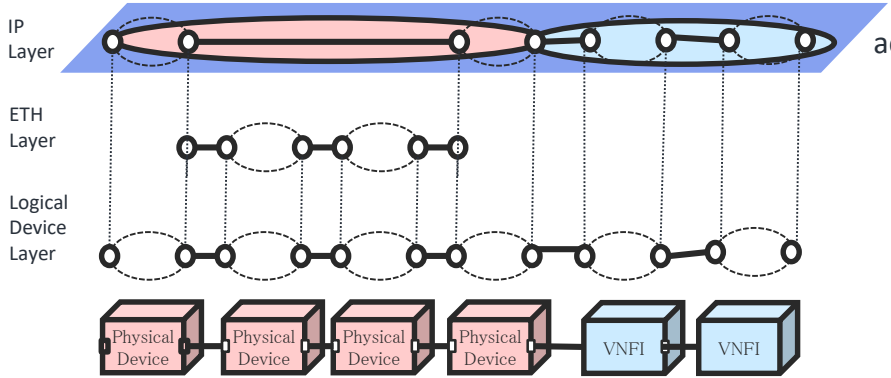

activate the slice

Modeling on the basis of TR255 and TR275

Appendix NTT Domain Orchestrator

Demo home

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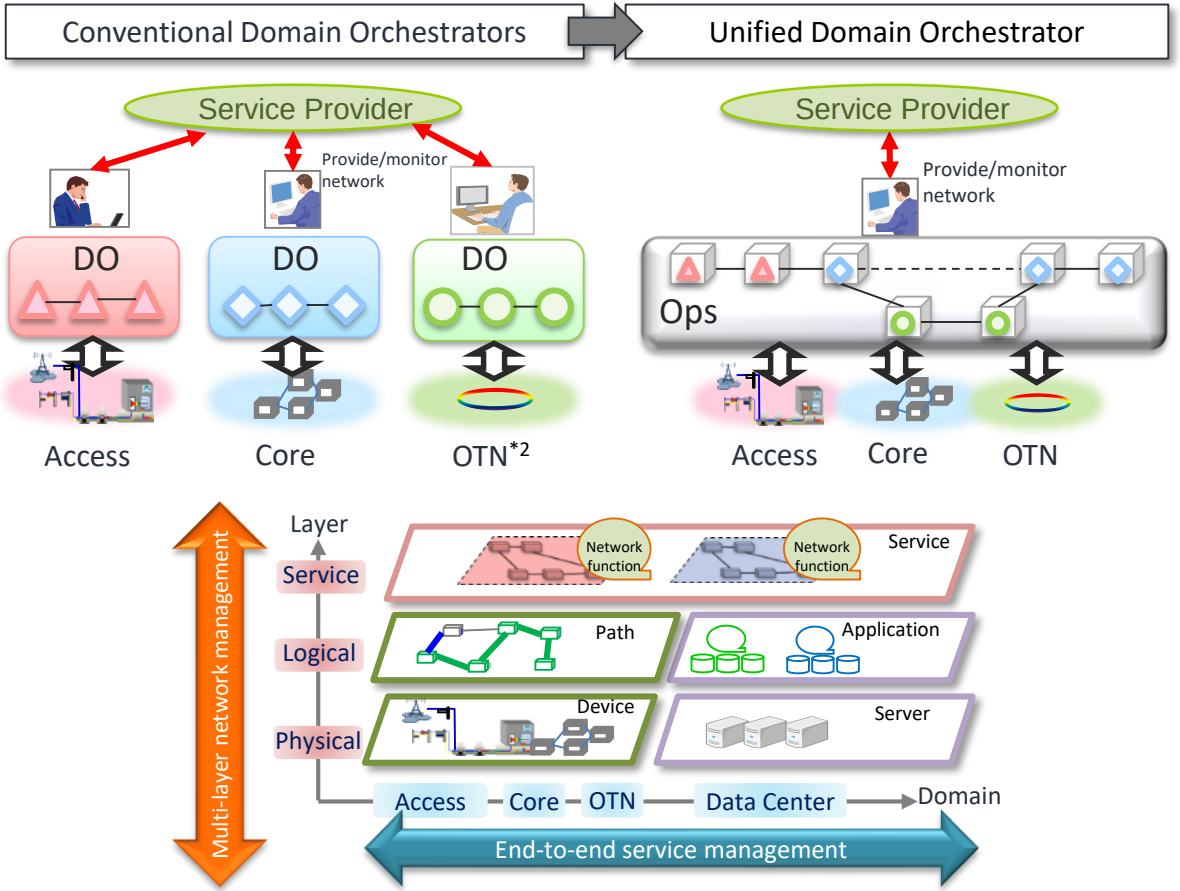

Features

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