ONAP Frankfurt release - OOF impacts

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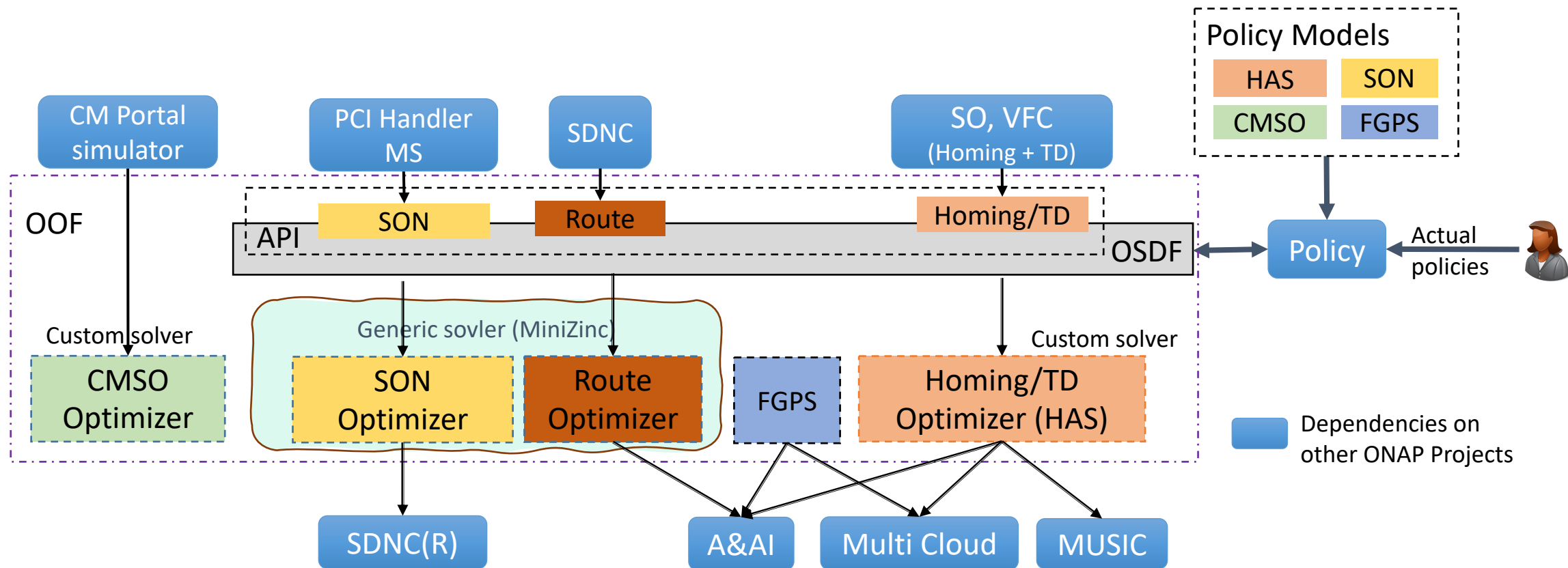
Use case realization subcommittee meeting
10/30/2019

Frankfurt impacts - Summary

- CCVPN:E-LINE Service over OTN NNI
  - OTN path between two domains
- Component Upgrades to new Policy Lifecycle API
  - Moving to new Policy APIs
- E2E Network Slicing
  - *More details in subsequent slides*
- 5G / OOF SON Enhancement
  - Runtime DB impacts, AI/ML based SON algorithm (stretch)
- ETSI Alignment Support (requirements not known yet)
- MDONS (requirements not known yet)

OOF architecture – El Alto

Policy Models
- HAS
- SON
- CMSO
- FGPS

CM Portal simulator

PCI Handler MS

SDNC

SO, VFC (Homing + TD)

OOF

API — SON — Route — Homing/TD — OSDF

Policy ← Actual policies

Custom solver

CMSO Optimizer

Generic sovler (MiniZinc)

SON Optimizer — Route Optimizer

FGPS

Custom solver

Homing/TD Optimizer (HAS)

Dependencies on other ONAP Projects

SDNC(R)

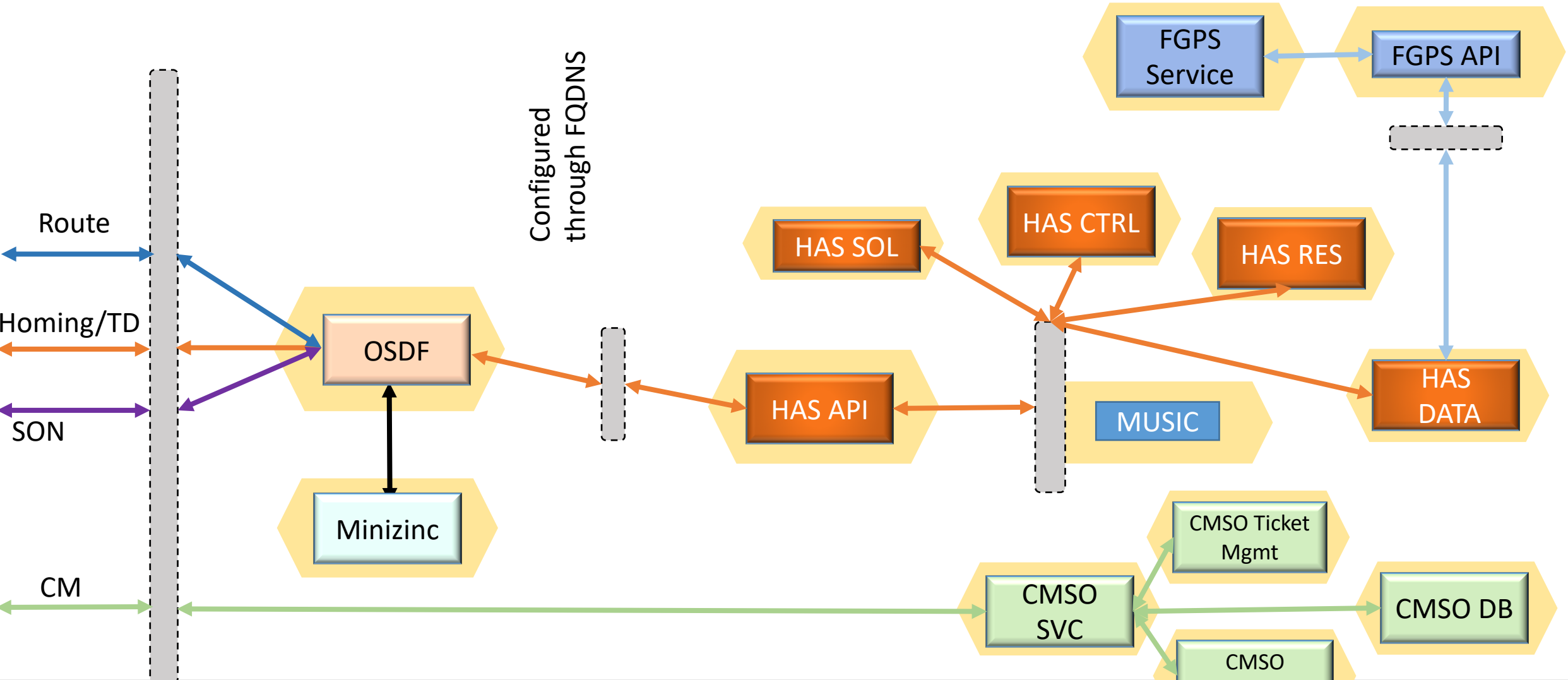A&AI

Multi Cloud

MUSIC

What is the underlying optimization ?

Change Mgmt – Constraint-based schedule optimization
Homing/TD – Constraint-based placement (with an objective function)
SON - PCI allocation without collisions/confusions (graph-coloring)
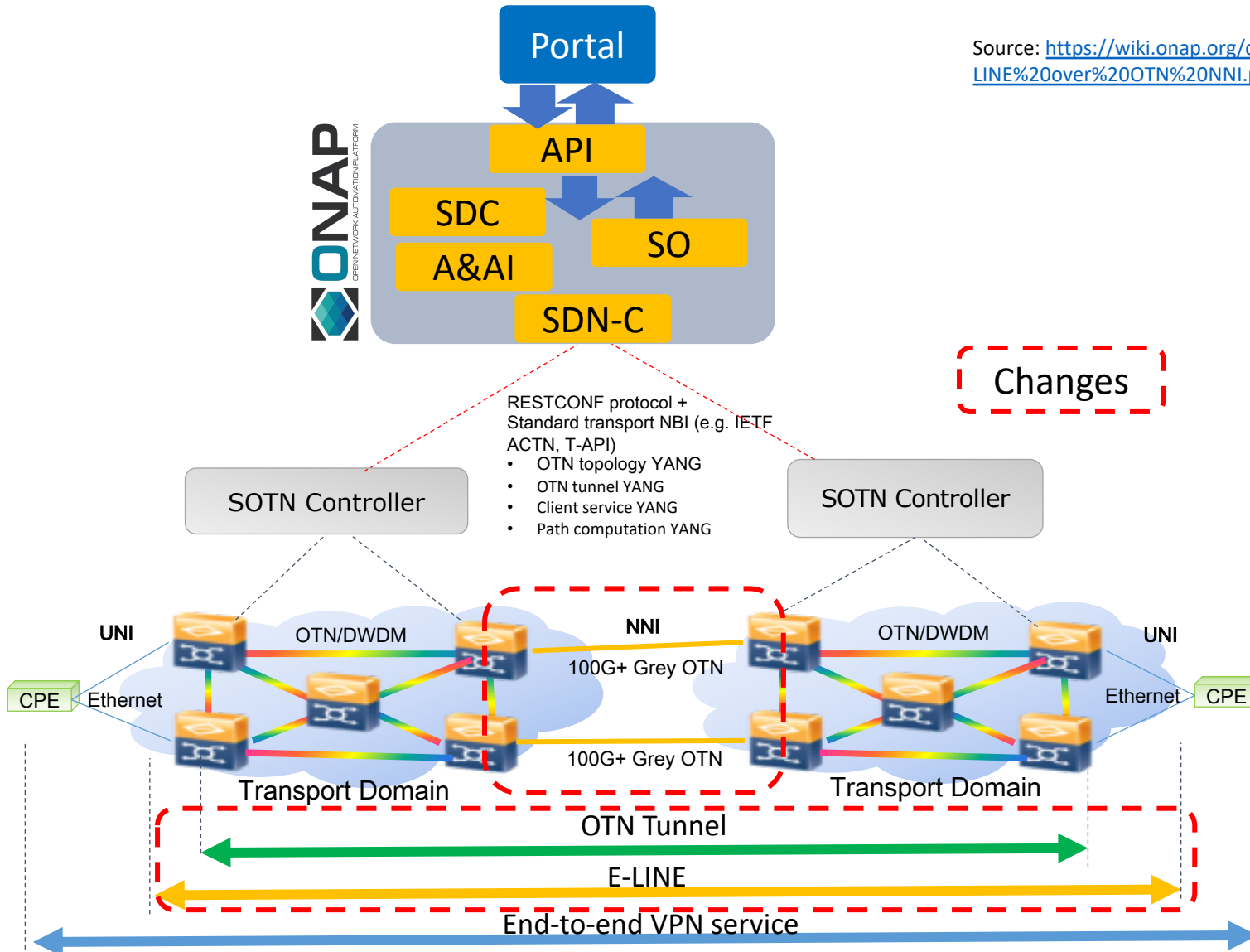Route – shortest path computation

OOF - Deployment Graph

POD

K8S Load Balancer

Container

FGPS Service

FGPS API

Route

Homing/TD

SON

Configured through FQDNS

OSDF

Minizinc

HAS API

HAS SOL

HAS CTRL

HAS RES

MUSIC

HAS DATA

CM

CMSO SVC

CMSO Ticket Mgmt

CMSO DB

CMSO Topology Svc

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CCVPN - Use Case Description

Portal

API

SDC

SO

A&AI

SDN-C

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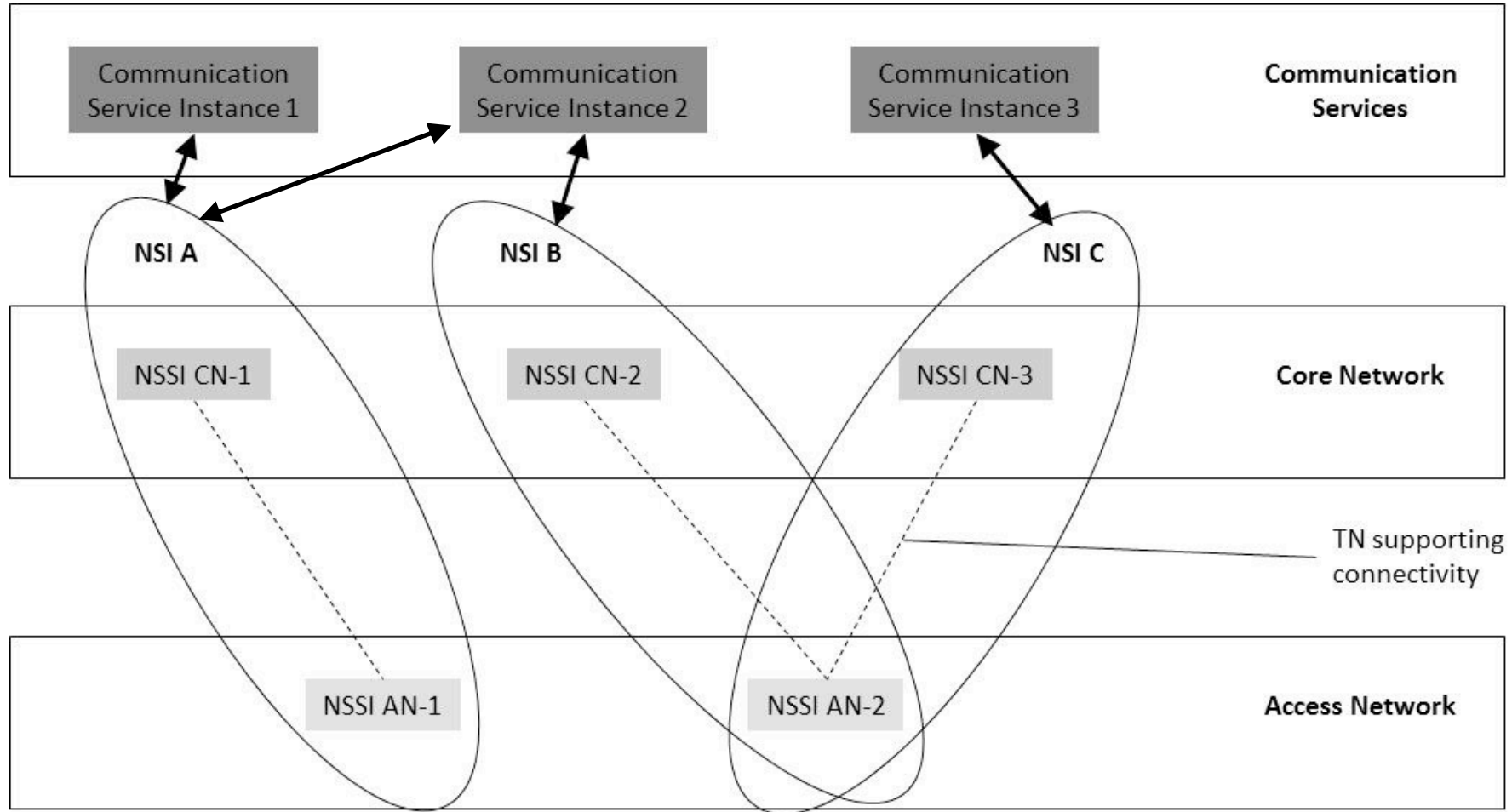## Changes Description:
- NNI handover between 2 OTN domain.
- E2E OTN tunnel across multiple domains
- E2E E-LINE service

RESTCONF protocol +
Standard transport NBI (e.g. IETF ACTN, T-API)
- OTN topology YANG
- OTN tunnel YANG
- Client service YANG
- Path computation YANG

Changes

SOTN Controller

SOTN Controller

UNI

OTN/DWDM

NNI

OTN/DWDM

UNI

CPE

Ethernet

100G+ Grey OTN

Ethernet

CPE

100G+ Grey OTN

Transport Domain

Transport Domain

OTN Tunnel

E-LINE

End-to-end VPN service

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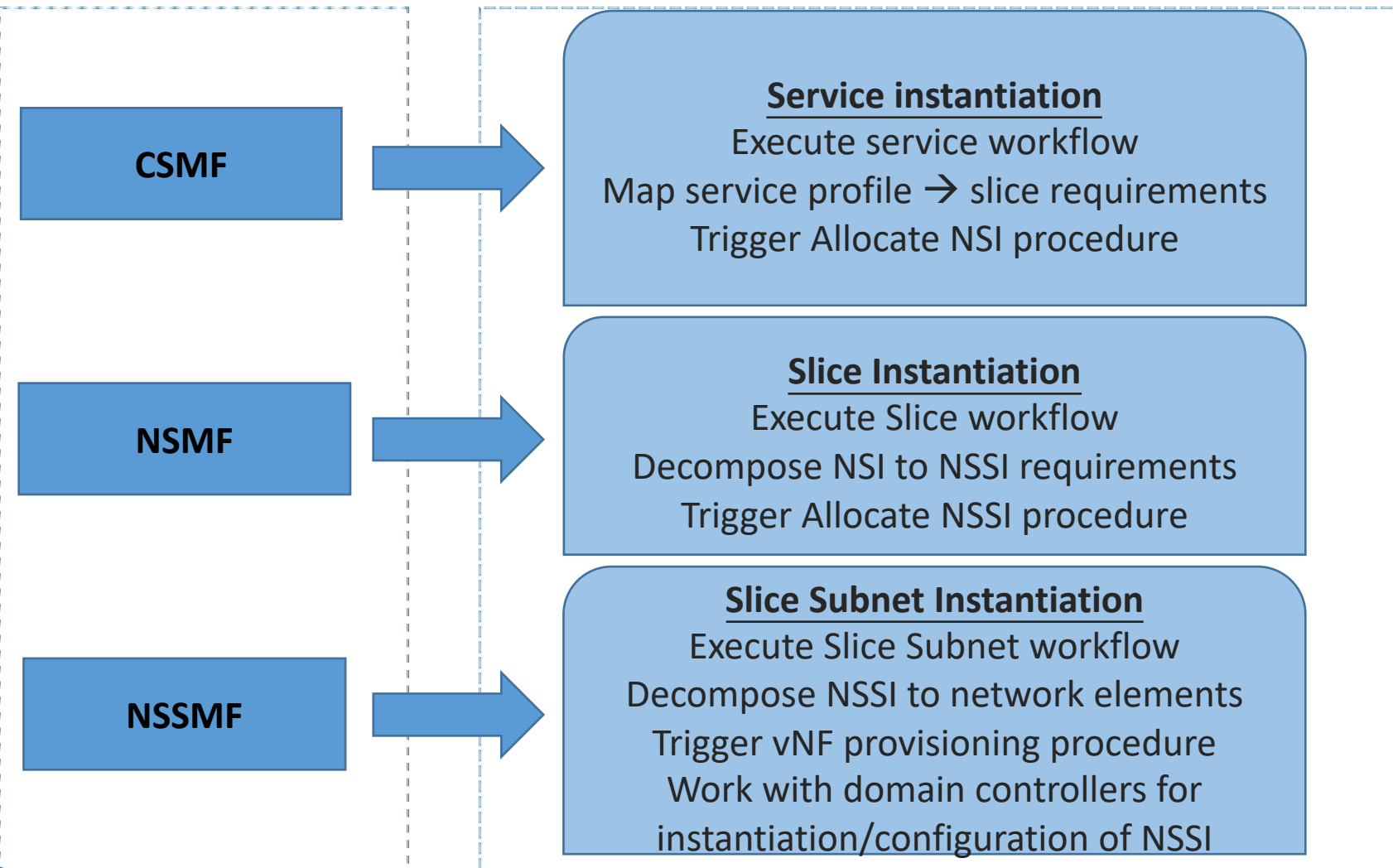
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CCVPN impacts – route optimization

- Replace the CCVPN route optimizer stub
- Discover topology from AAI
- Identify model for route calculation
  - Selection of an inter-domain link (if the route is a simple link)
  - Shortest path between two points (if the route comprises of both inter/intra domain)
- Tasks
  - Develop optimization model, constraints,
  - Convert topology data into input format
  - Format output and return to sender

Network Slicing Impacts

Ref.: 3GPP TS 28.530

Role of OOF in Network Slicing Lifecycle

CSMF

→

Service instantiation
Execute service workflow
Map service profile → slice requirements
Trigger Allocate NSI procedure

NSMF

→

Slice Instantiation
Execute Slice workflow
Decompose NSI to NSSI requirements
Trigger Allocate NSSI procedure

NSSMF

→

Slice Subnet Instantiation
Execute Slice Subnet workflow
Decompose NSSI to network elements
Trigger vNF provisioning procedure
Work with domain controllers for
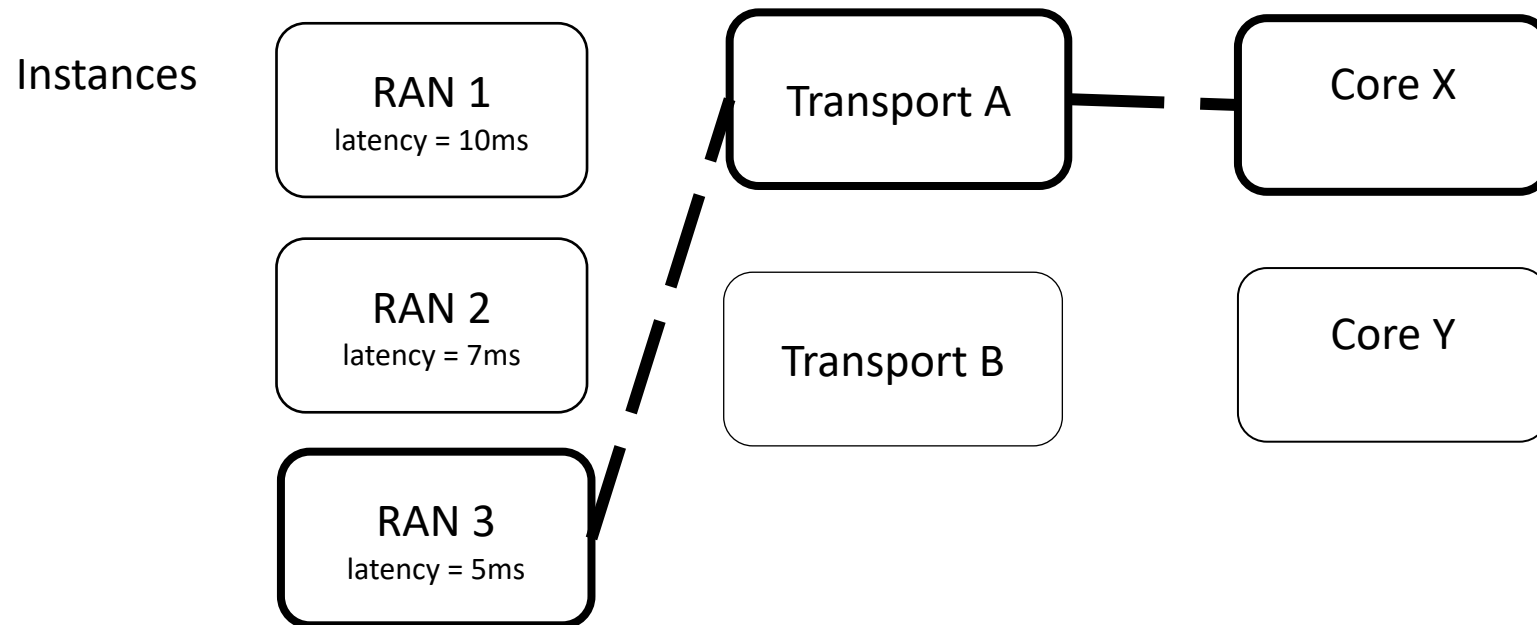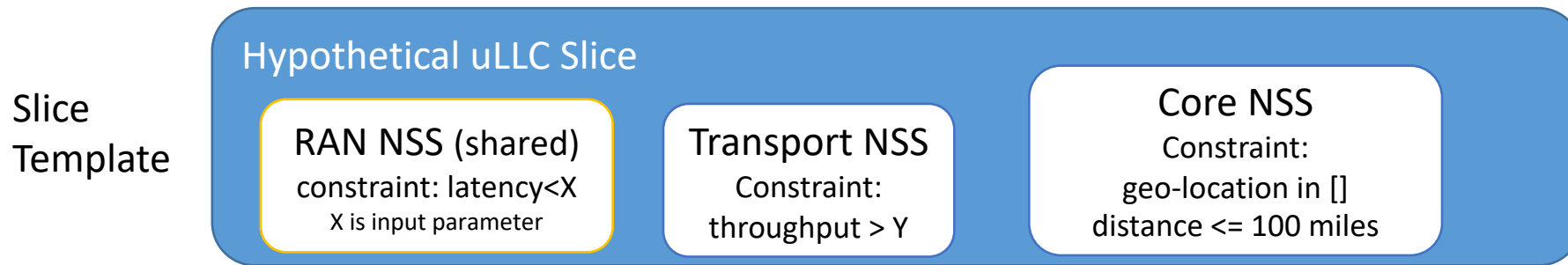instantiation/configuration of NSSI

Anticipated role of OOF

Select optimal Slice profile that meets service profile

Selecting optimal NSI (or) recommend modify existing NSI (or) recommend creating new NSI along with NSSI requirements
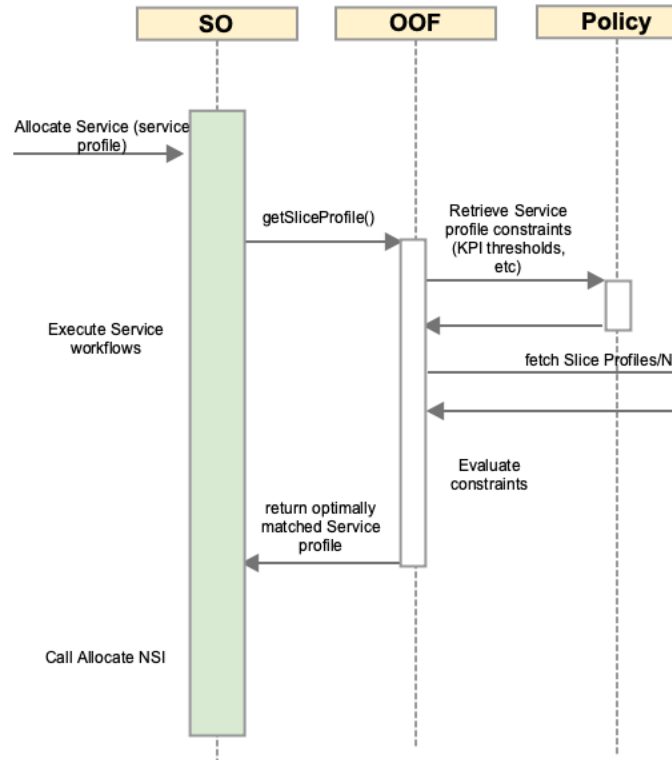
Select optimal NSSIs that meets KPIs (or) recommend modifying NSSI (or) create new NSSIs with NF requirements/configuration

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Selection problem - an illustration

Slice Template

Hypothetical uLLC Slice

RAN NSS (shared)
constraint: latency<X
X is input parameter

Transport NSS
Constraint:
throughput > Y

Core NSS
Constraint:
geo-location in []
distance <= 100 miles

Instances

RAN 1
latency = 10ms

RAN 2
latency = 7ms

RAN 3
latency = 5ms

Transport A

Transport B

Core X

Core Y

Constraint-based Selection

Service Creation Sequence

SO | OOF | Policy

Slice Creation Sequence

SO | OOF | Policy | AAI | DCAE
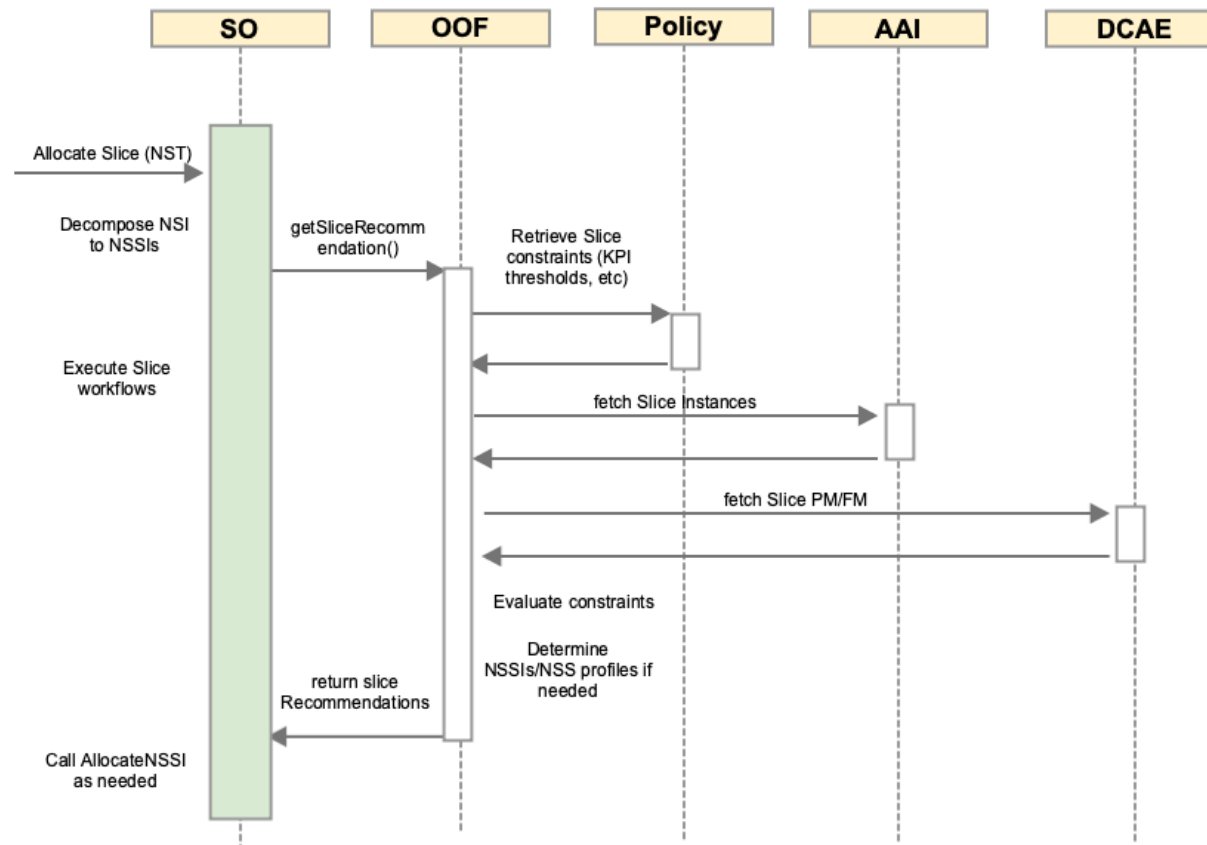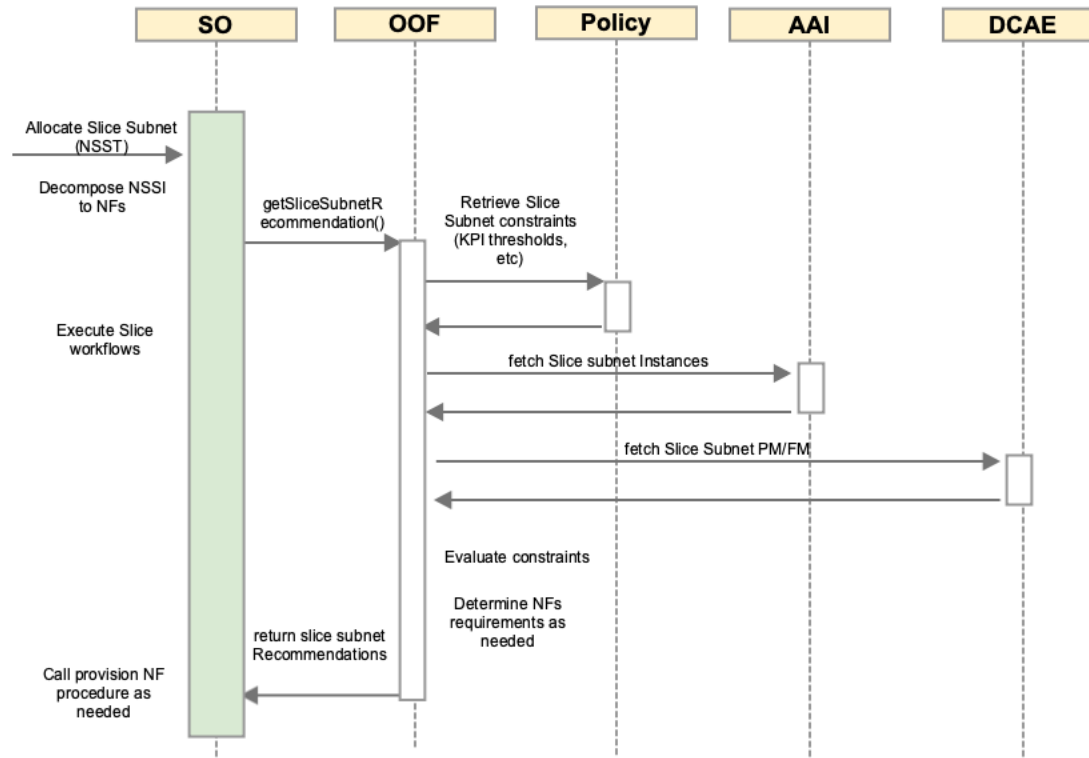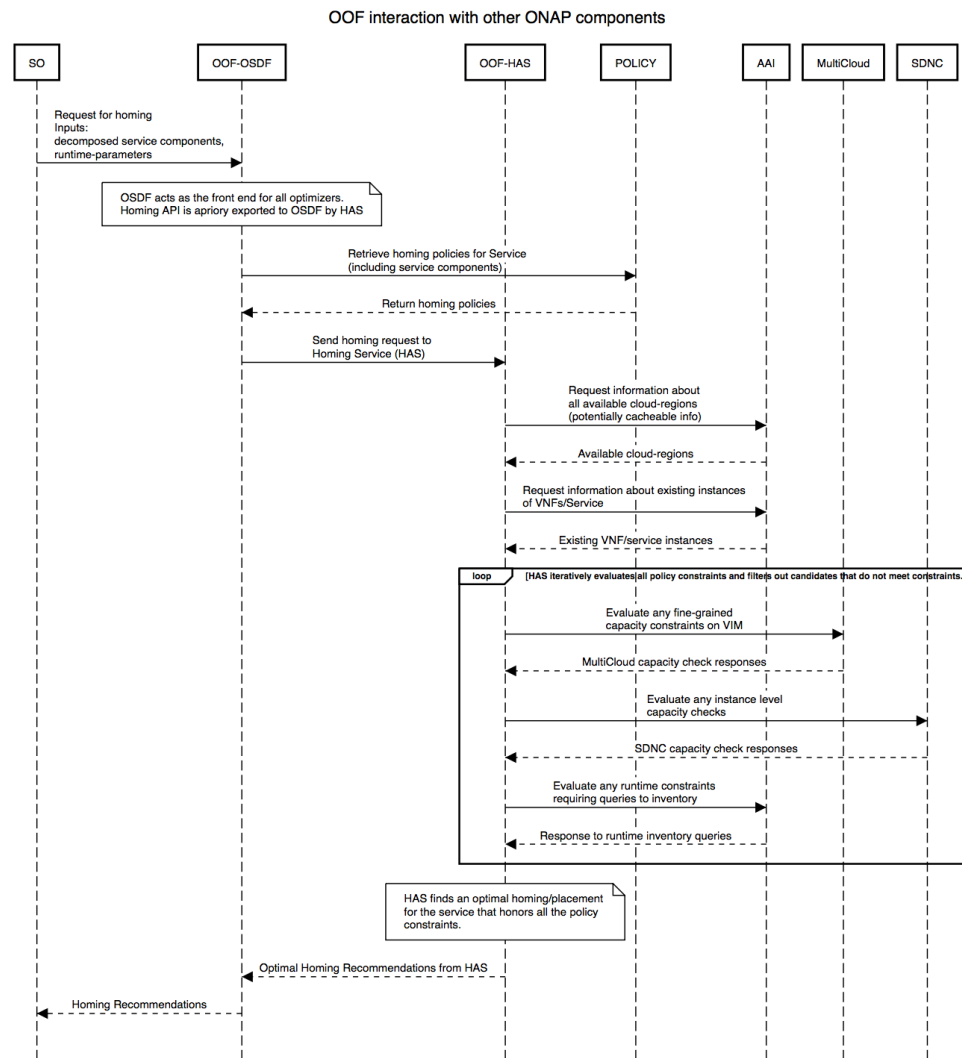
Constraint-based Selection
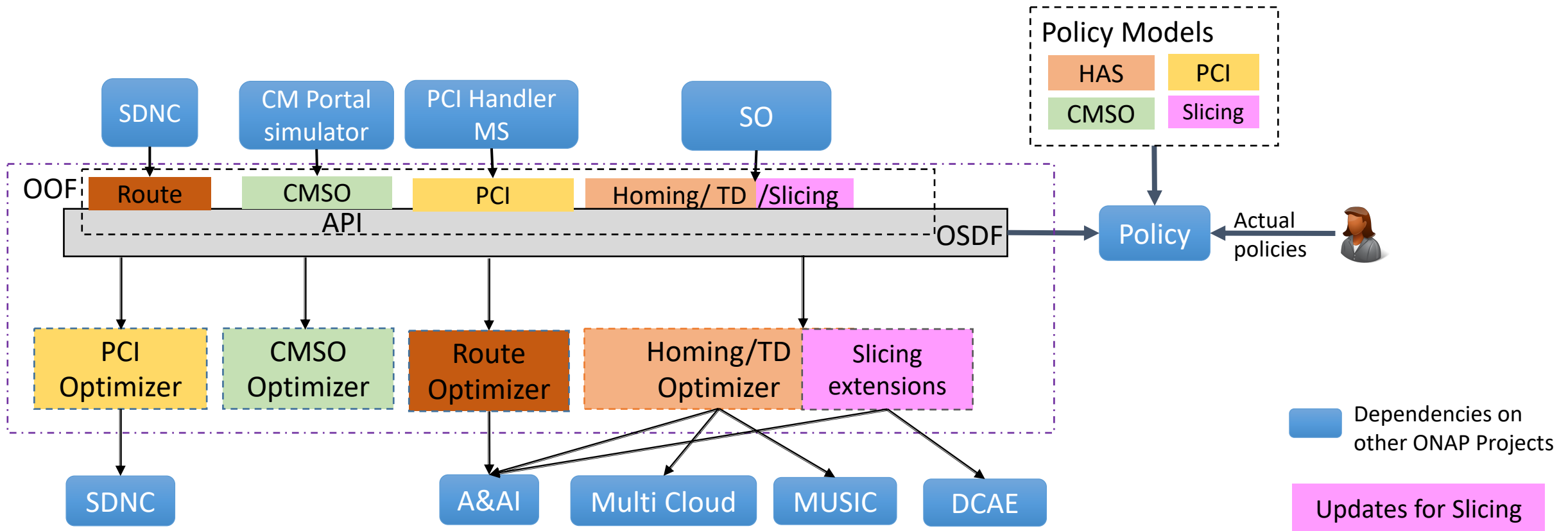

Slice Subnet Creation Sequence

Selection procedure similar to network service provisioning

1. Decomposition into constituent components
2. Discover potential candidates for components
3. Fetch constraints for the component selection
4. Identify optimal candidate for component
5. Return recommendation

OOF in Service provisioning workflow

OOF interaction with other ONAP components

Columns: SO | OOF-OSDF | OOF-HAS | POLICY | AAI | MultiCloud | SDNC

Request for homing
Inputs:
decomposed service components,
runtime-parameters

OSDF acts as the front end for all optimizers.
Homing API is apriory exported to OSDF by HAS

Retrieve homing policies for Service
(including service components)

Return homing policies

Send homing request to
Homing Service (HAS)

Request information about
all available cloud-regions
(potentially cacheable info)

Available cloud-regions

Request information about existing instances
of VNFs/Service

Existing VNF/service instances

loop   [HAS iteratively evaluates all policy constraints and filters out candidates that do not meet constraints.]

Evaluate any fine-grained
capacity constraints on VIM

MultiCloud capacity check responses

Evaluate any instance level
capacity checks

SDNC capacity check responses

Evaluate any runtime constraints
requiring queries to inventory

Response to runtime inventory queries

HAS finds an optimal homing/placement
for the service that honors all the policy
constraints.

Optimal Homing Recommendations from HAS

Homing Recommendations

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5G Slicing impact

- OOF shall fetch details of active slices, slice sub-nets and services from A&AI (optionally, PM/FM data from DCAE).
- Given the similarities between Slicing and Service instantiation workflows, this could be integrated with HAS.

Adopting new policy lifecycle API

Policy is critical to making OOF model-driven

- Uses policy to store and retrieve constraints for optimization

- Decision on which policies apply to current context currently in OOF

- In Frankfurt, this decision making is delegated to Policy framework

  - OOF would only provide a set of "context" (or scope) tags, using which Policy XACML can identify the precise set of policies that apply to current optimization instance

- https://wiki.onap.org/display/DW/Estimated+changes+in+policy+retrieving

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Backup

5G Slice composition

	Requirement	Resource
Comm Service	Service	Service instance
E2E Network Slice (e.g, URLLC)	NST	NSI
NG-Core NSS	Transport NSS	NG-(R)AN NSS	NSST	NSSI
VNFs VL (dedicated/shared)	VNFs PNFs VL (dedicated/shared)	VNFD, PNFD, AR	VNFI, PNFI, AR