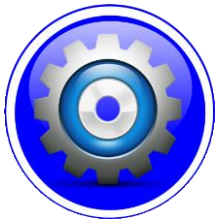
Modeling to Support 5G RAN

- ONAP Modeling

Benjamin Cheung, PhD

Nov 15 2018 version 3

Onboarding and Design Time

	Onboarding Package	Onboarding Descriptor	Platform ONAP Model	NF Instance
WHAT		 PNF Descriptor Model	 Platform Information Model Platform Data Model	
WHEN	Package Delivery 	Onboarding Process 	Design Time 	Run Time 
WHO	Vendor 	Technology Specialist Asset Manager 	Service Designer Operations Specialist 	Operations Specialist 
	SOL 001 PNFD	SOL 004 Package	-	-

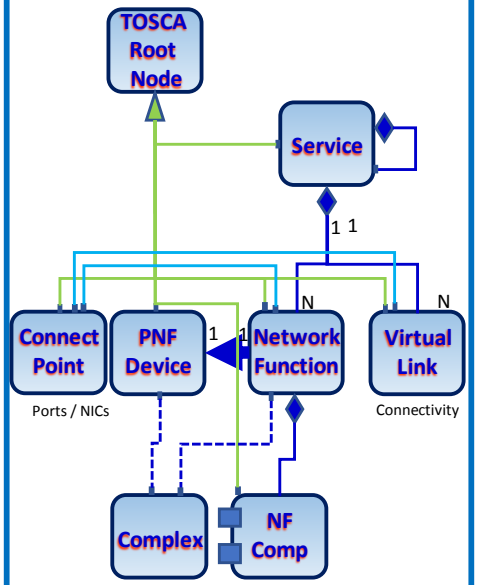
Onboarding and Design Time

Onboarding Package	NF Descriptor	Platform Model	NF Instance
Onboarding	Onboarding	Design Time	Run Time
Vendor	Asset Manager	Service Designer	Operations

- NF Descriptor
- NF Registration
- PM Schema
- Informational Artifacts
- Configuration Files
- Ansible Playbooks

PNF Onboarding Package

SDC Catalog



A&AI

PNF Instance

PNF ONBOARDING DUBLIN ACTIVITIES

1 Create PNF artifacts (PNF descriptor, NF Registration)

Dublin Priority
PNF Descriptor

Dublin Priority
NF Registration

PM Schema

Informational Artifacts

Configuration Files

Ansible Playbook

2 Develop PNF SDK to create PNF Onboarding Package

3 PNF Onboarding package created

xNF SDK

SDC

Package creation

PNF Onboarding Package

Onboarding

+VENDOR META DATA

SDC Catalog

CSAR Package

Distribute

SO, AAI, DCAE etc.

4 SDC: NF OB Package > SDC catalog

5 ONAP RT Components Ingest and use CSAR package

Package Delivery | Onboarding | Design Time | Run Time

Onboarding Package | NF Descriptor | Platform Model | NF Instance

PNF PACKAGE CREATION

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Onboarding Package

Onboarding

Vendor

PNF ONBOARDING PACKAGE

Dublin Priority

PNF-D

NF Descriptor

Dublin Priority

VES Event Registration Specification

NF Registration

PM Schema

PM Schema

Manuals, Help files CuDo Products

Informational Artifacts

Configuration Info

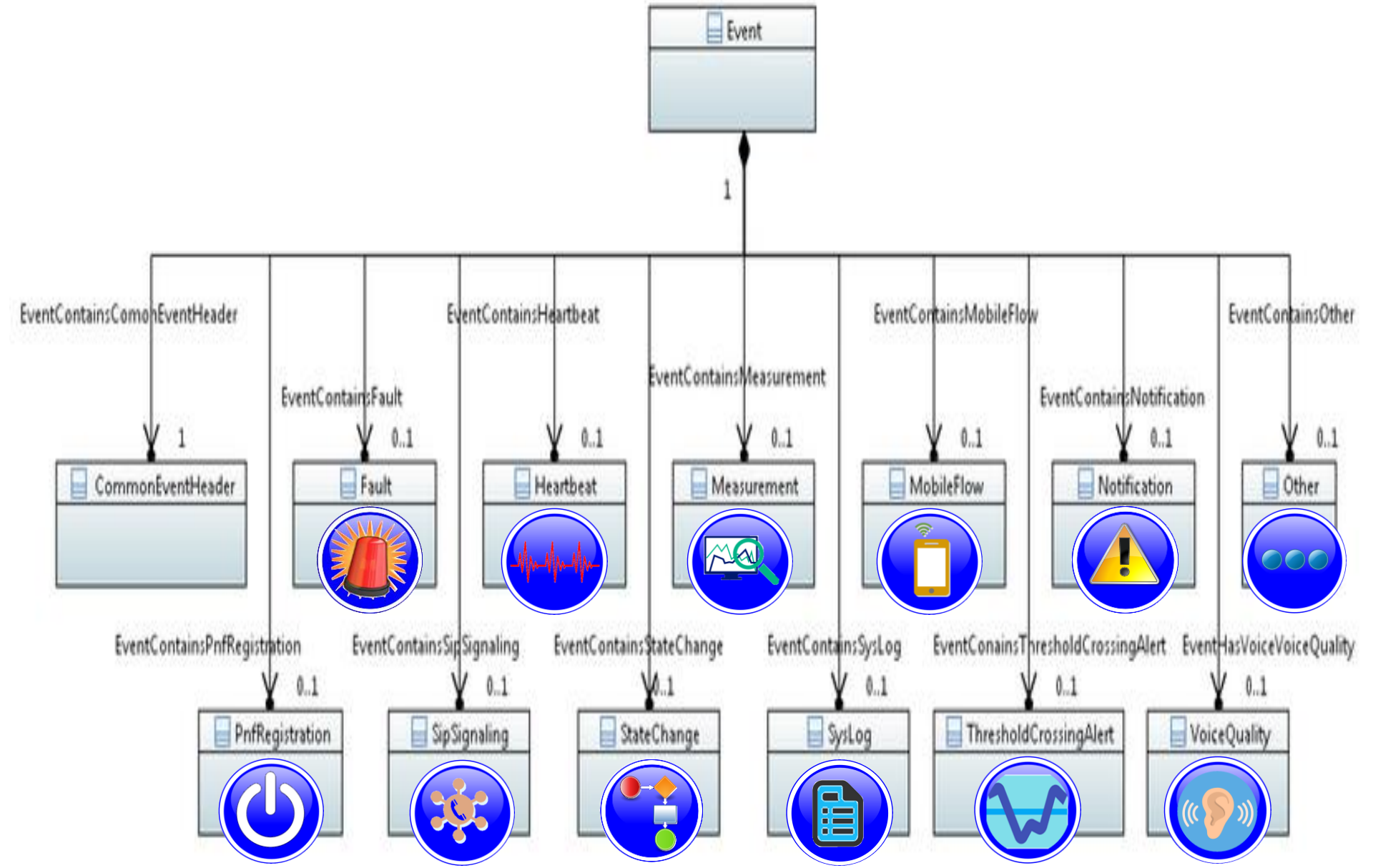
Configuration Files

Ansible Playbooks

Ansible Playbooks

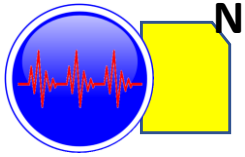
Onboarding Package

R4: Modelling VES Events



NF Registration (YAML) Onboarding

Fault records



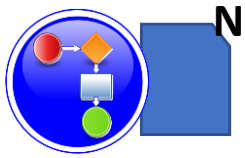
Heartbeat records

Measurement records

Mobile Flow Records

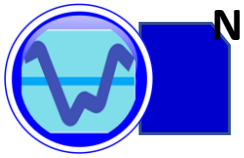
PnfRegistration record

SipSignaling records



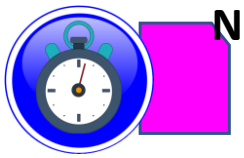
State Change Records

SysLog records



TCA records

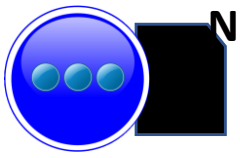
Voice Quality records



PM Dictionary & PM Schema

Notification record

Perf3gpp record



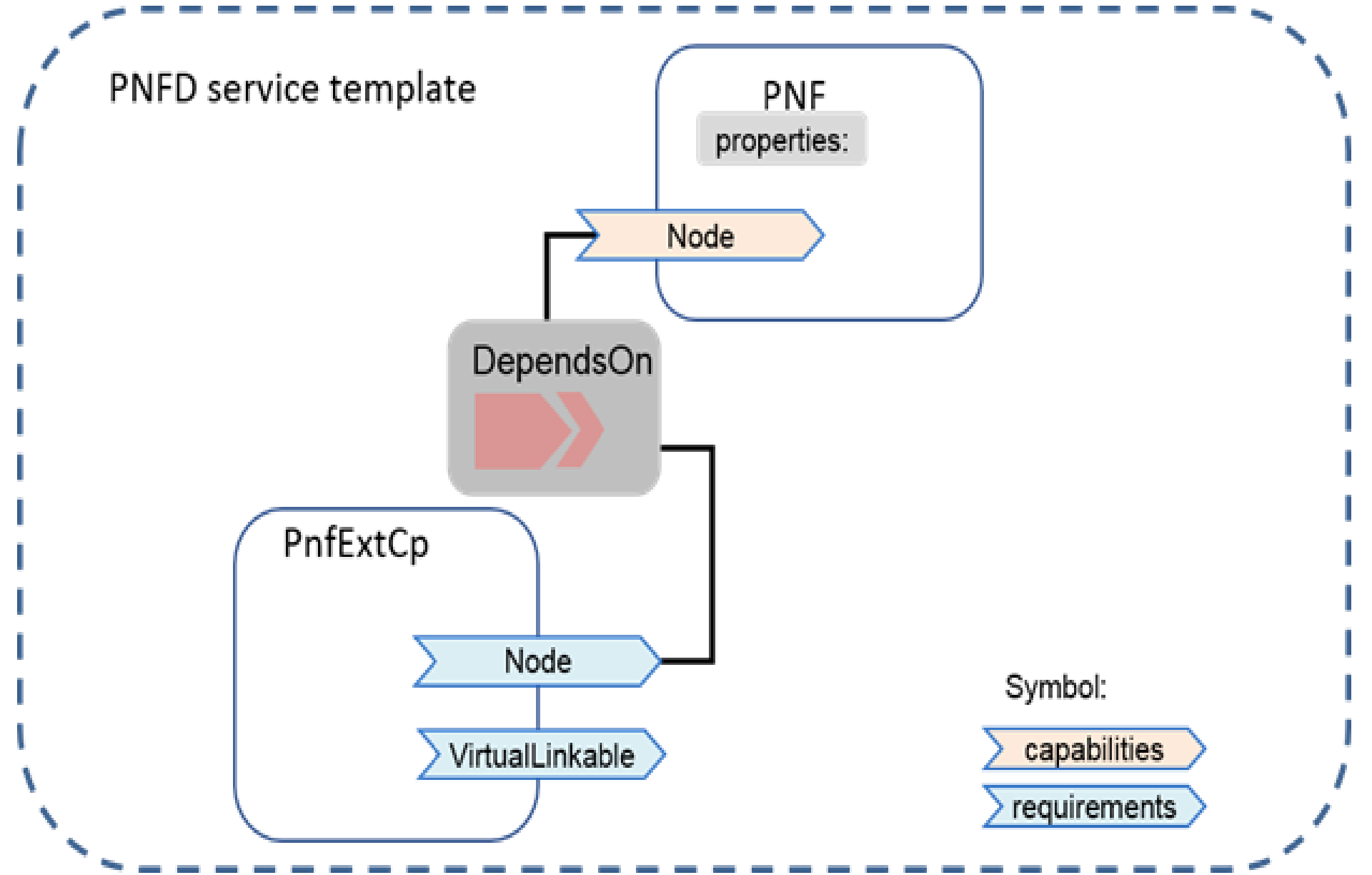
Other records

1

NF REGISTRATION FILE (YAML Format)

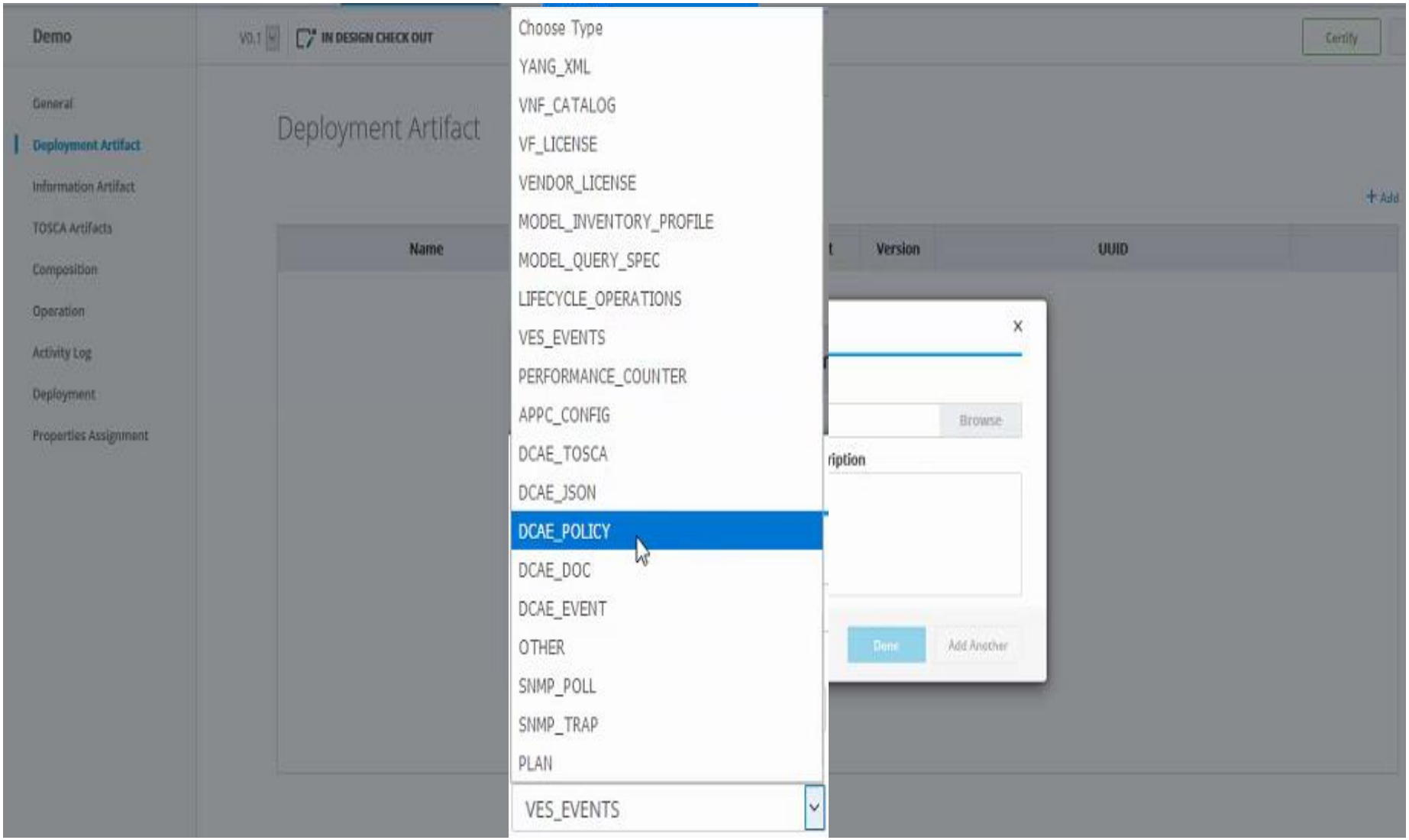
Separate Registration event PER “NF type”

PNF Descriptor (ETSI SOL 001)



NF ONBOARDING ARTIFACTS

DEPLOYMENT ARTIFACT



INFORMATIONAL ARTIFACTS

INFORMATION ARTIFACT

Cloud Questionnaire
Features
Vendor Test Scripts
Resource Security Template
HEAT Template (Vendor)
Capacity Descriptive
Other Informational Artifacts

ONBOARDING PROCESS



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NF Descriptor 

Onboarding 

Asset Manager 

PNF SDK DEVELOPMENT

PNF-D

Dublin Priority

NF Descriptor

VES Event Registration Specification

Dublin Priority

NF Registration

PM Schema

PM Schema

Manuals, Help files
CuDo Products

Informational Artifacts

Configuration Info

Configuration Files

Ansible Playbooks

Ansible Playbooks

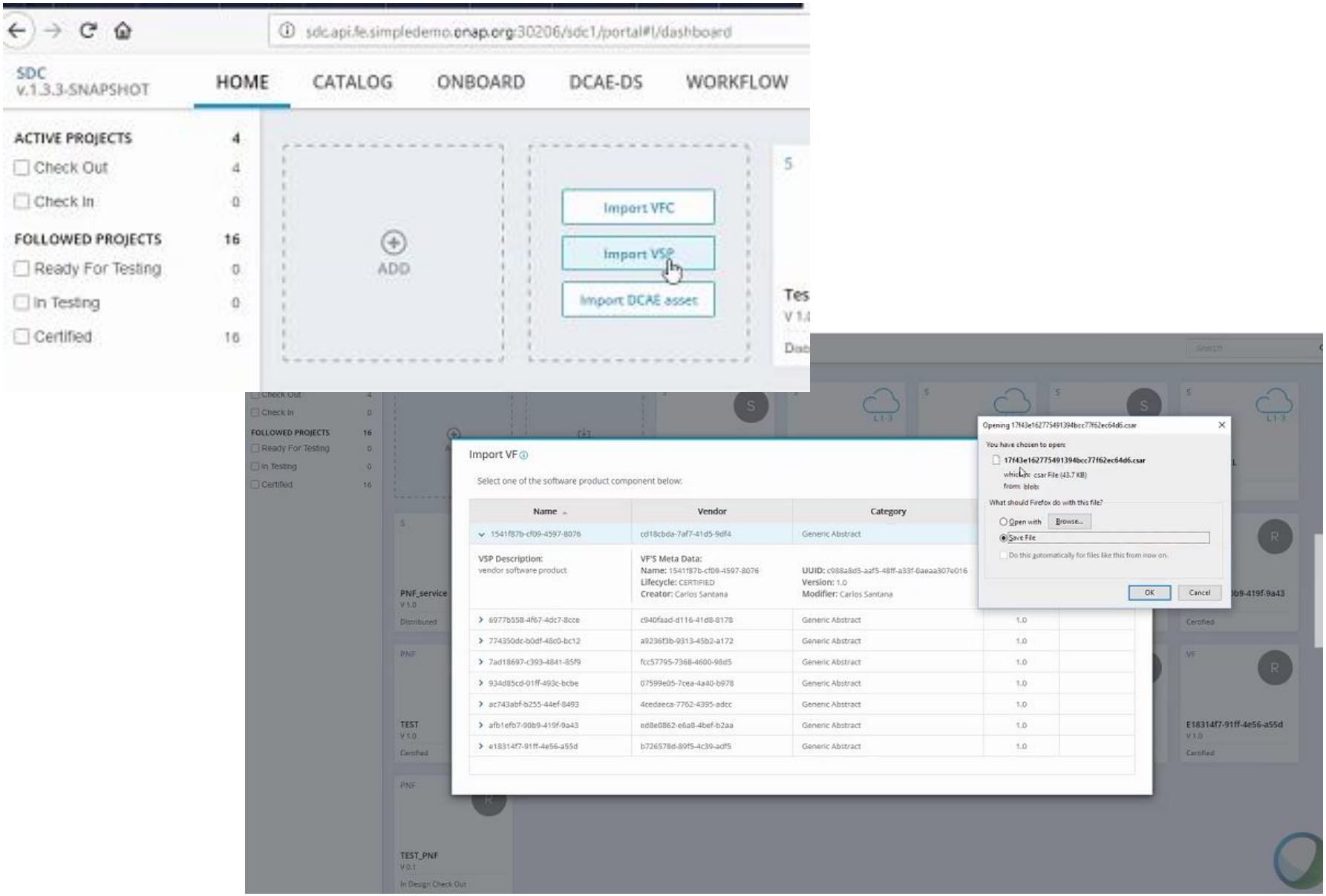
xNF SDK

Package creation

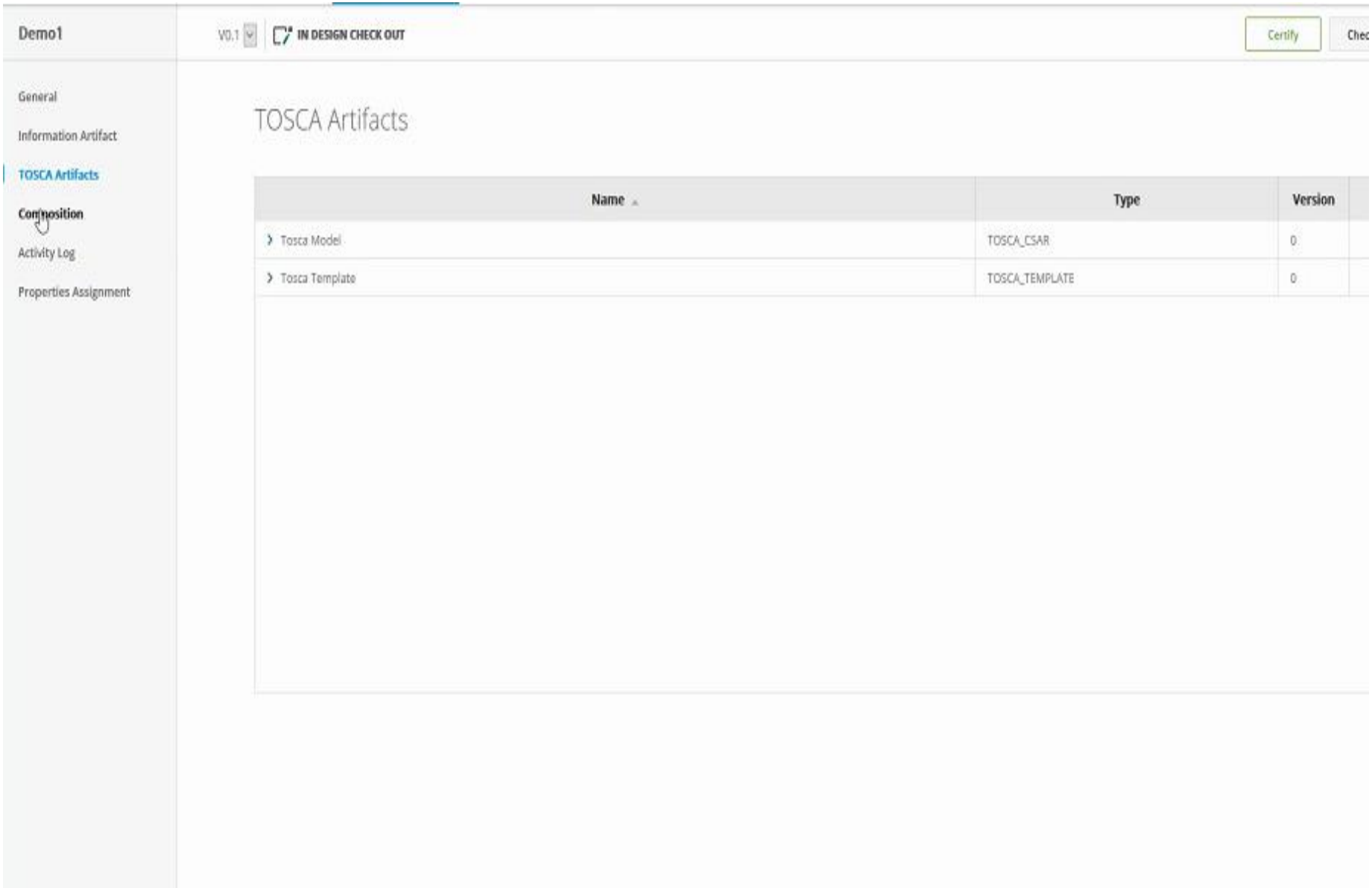
WinZIP
Validating Content

PNF Onboarding Package

SDK ENHANCEMENTS



SDK ENHANCEMENTS



PNF ONBOARDING

PNF-D

Dublin Priority

NF Descriptor

VES Event Registration Specification

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NF Registration

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Onboarding

SDC Catalog

PNF Onboarding Package

+VENDOR META DATA

WinZIP
Validating Content

PLATFORM MODEL / MODELING A SERVICE

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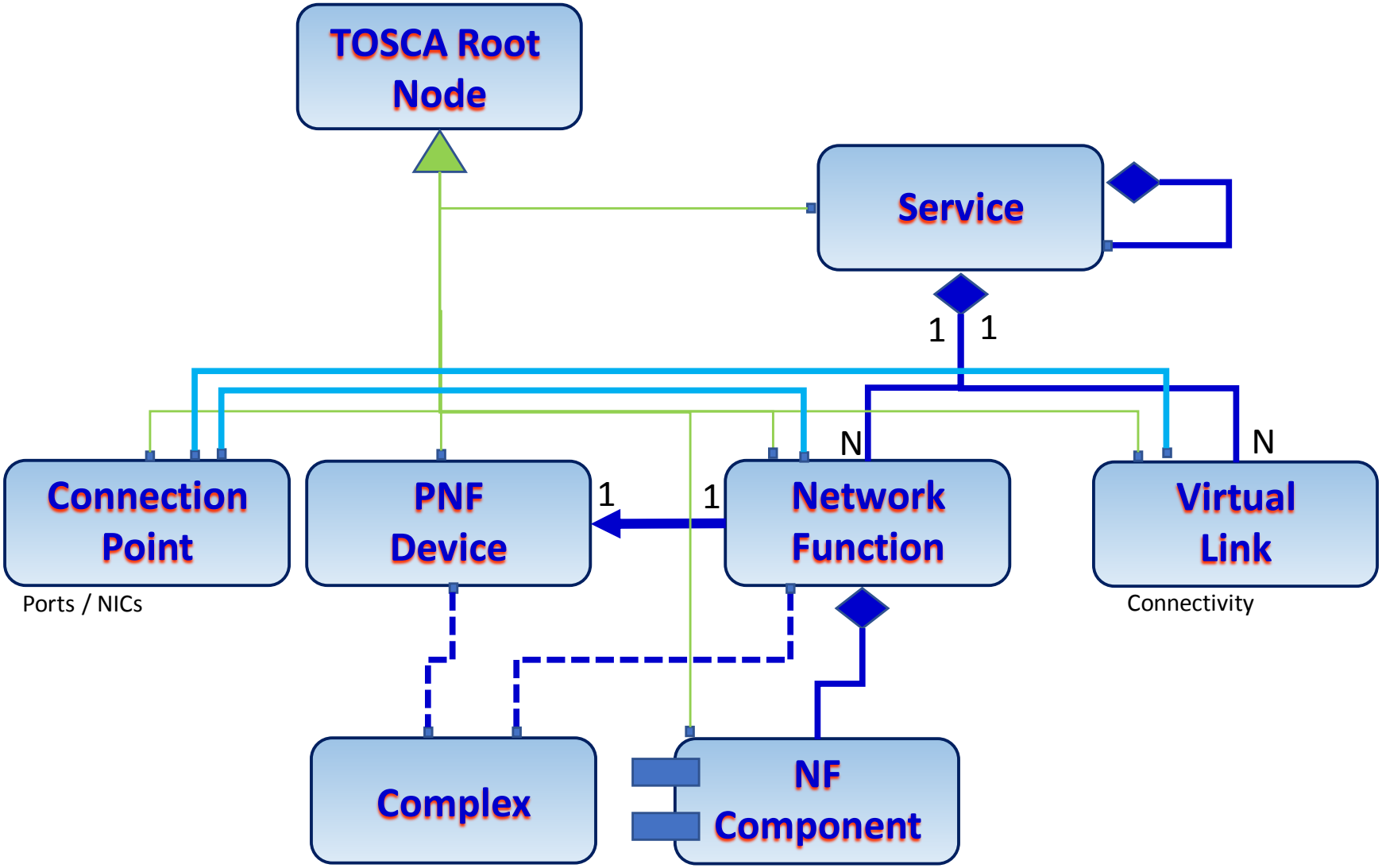
Platform Model

Design Time

Service Designer

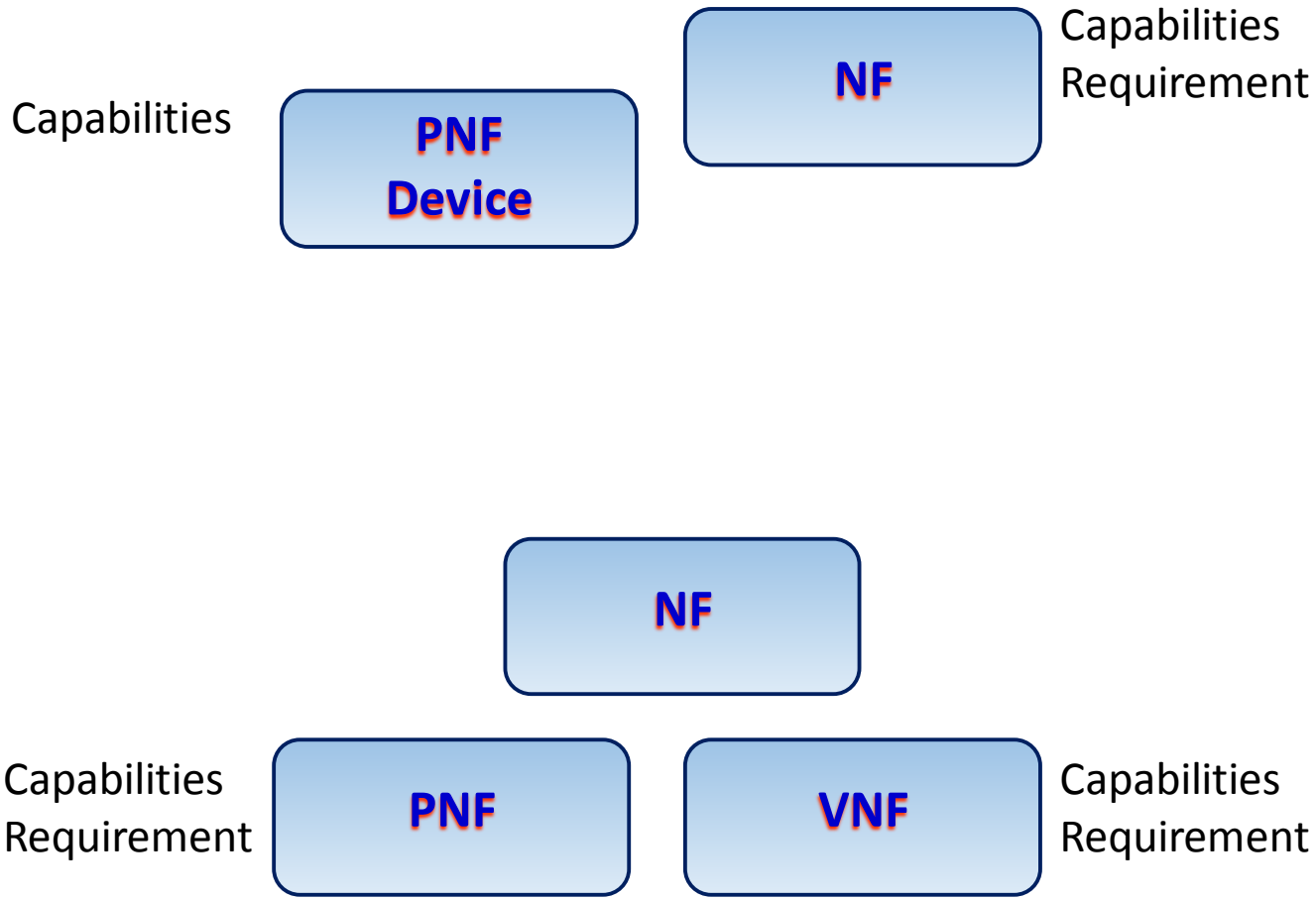
Platform Data Model

Difference PNF vs
VDU compute?
(VDU compute refactoring?)

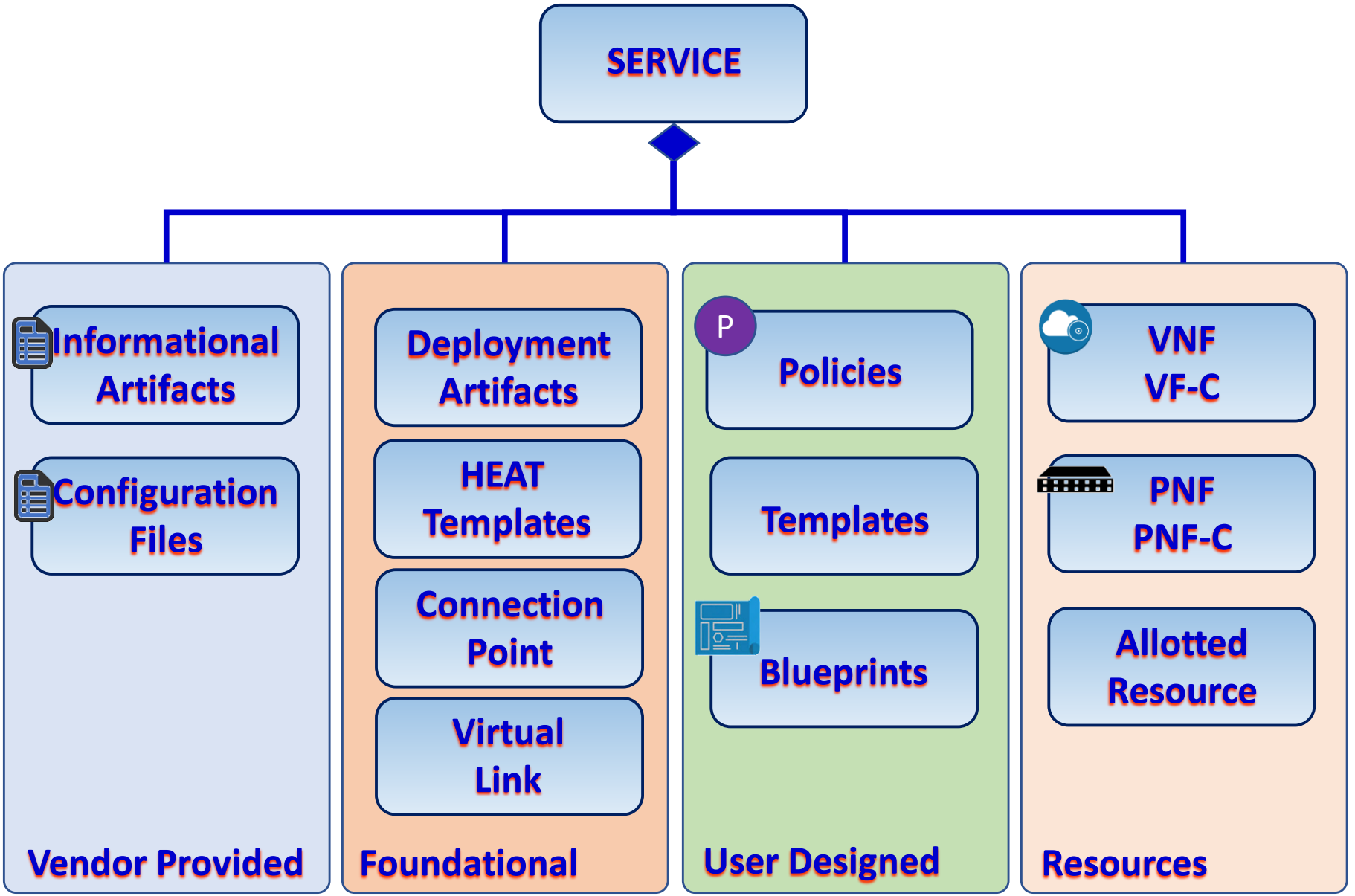


Design time view of a service
Internal representation of a model
Onboarding Model > SDC produces

Platform Information Model



Defining a Service



Design-Time Process

DESIGN-TIME (SDC)

- Descriptor
- NF Registration
- NF Onboarding Package
- Onboarding (Vendor MetaData)
- SDC Catalog
- Policy Database
- Policy Designer
- Add Policies
- Workflow Studio
- Add Workflows
- CLAMP Designer
- Add Control Loops
- Service Designer
- Define Services
- DCAE Design Studio
- Define Templates
- CSAR Package

Certification Studio

Deployment Studio

SDC

- Distribute CSAR

ONAP RUN-TIME

- DCAE Inventory
- DCAE
  - Analytics
- SO
  - Service Orchestration
- Controller
  - APP-C, SDN-C
- A&AI
  - Inventory, Listener

Policy Example

DESIGN-TIME (SDC)

Descriptor

NF Registration

PNF Onboarding Package

Onboarding

SDC Catalog

Policy Database

Policy Designer

P

Add Policies

P

CLAMP Designer

Add Control Loops

DCAE Design Studio

Define Templates

CSAR Package

SDC

Distribute CSAR

DCAE (Run Time)

DCAE Service Change Handler

DCAE Inventory

P

DCAE Controller

P

PNF VNF

VES Event

Fault Domain

DCAE Collector

DMaaP

P

Micro Service

DMaaP

Ticketing

P

Controller

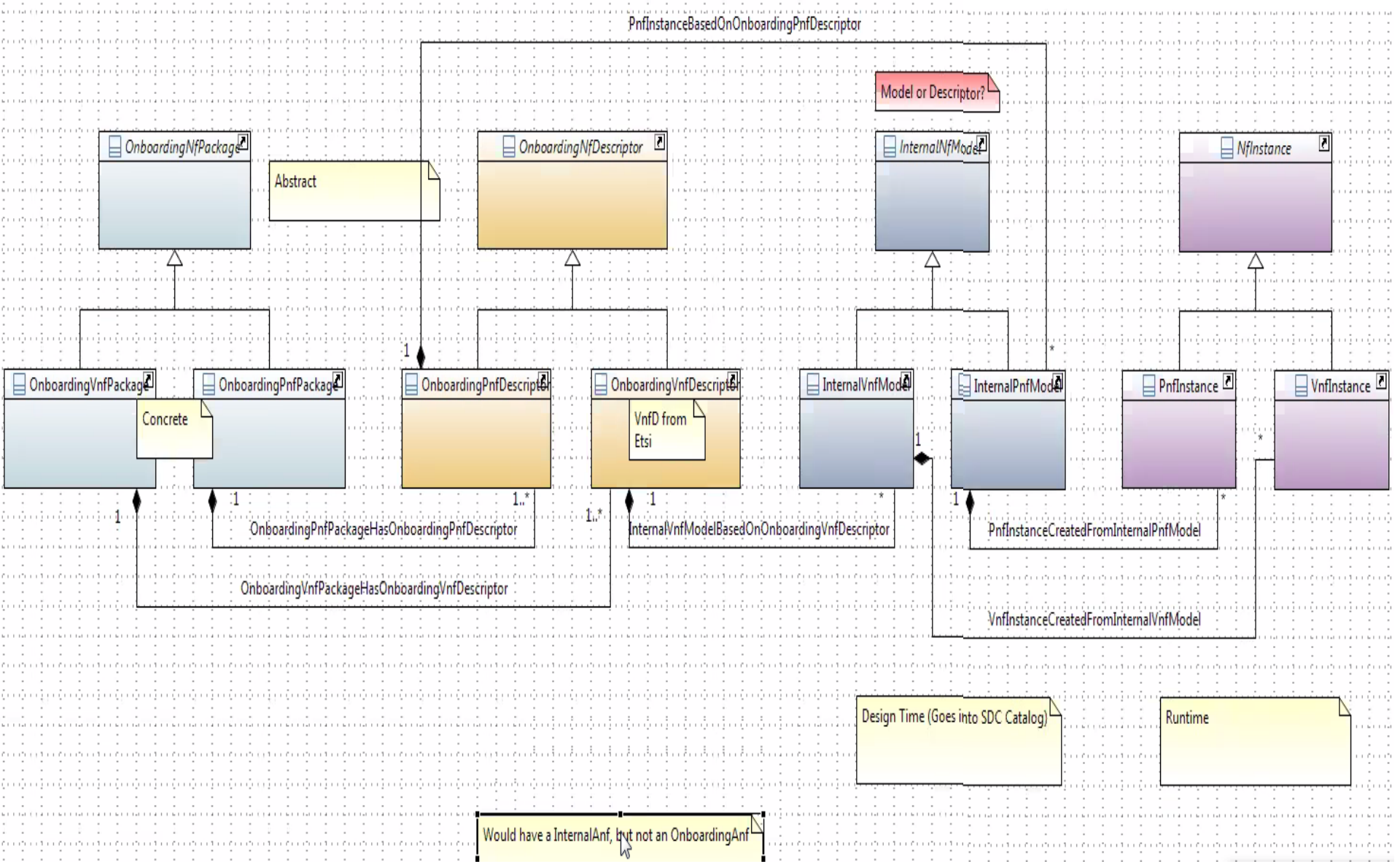
P

Policy Engine

P

A&AI

Onboarding and Design Time



ONAP
OPEN NETWORK AUTOMATION PLATFORM

5G RAN Wireless Systems

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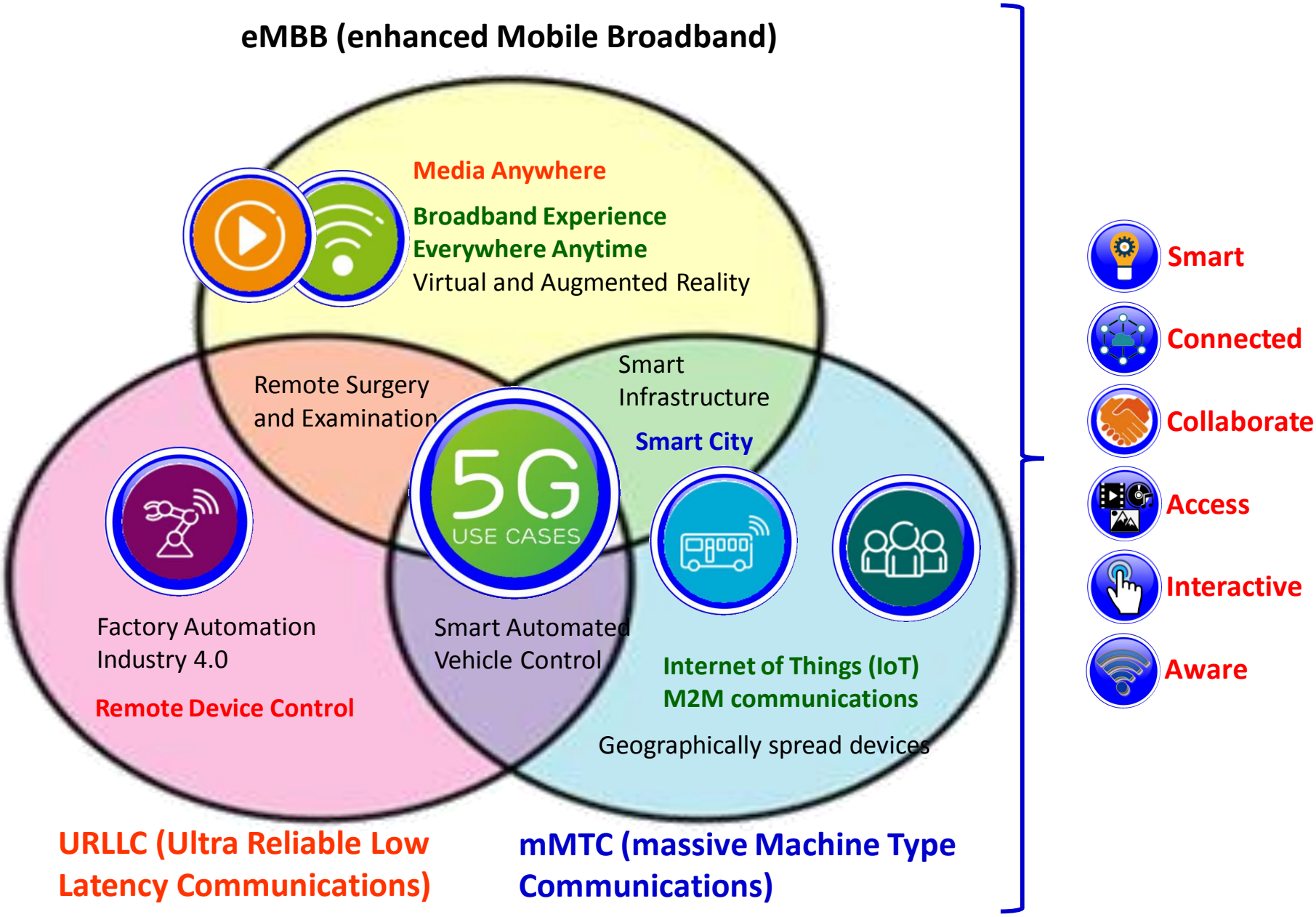
3GPP Release 15, IMT-2020 = 5G



5G Key Technology Components

New Spectrum (Rel 15, 52.6 GHz/39 GHz, Rel 16 > 52.6 GHz)

Advanced Beamforming

Multi-Connectivity (NSA, SA, Option 3, 4, 7)

Network Slicing

Edge Computing

Software Defined Networking (SDN)

Network Functions Virtualization (NFV)

Fog Computing (FC)
Mobile Edge Computing (MEC)

5G RAN Wireless Systems & ONAP

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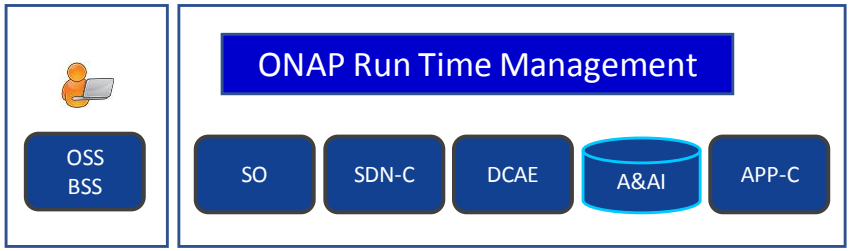
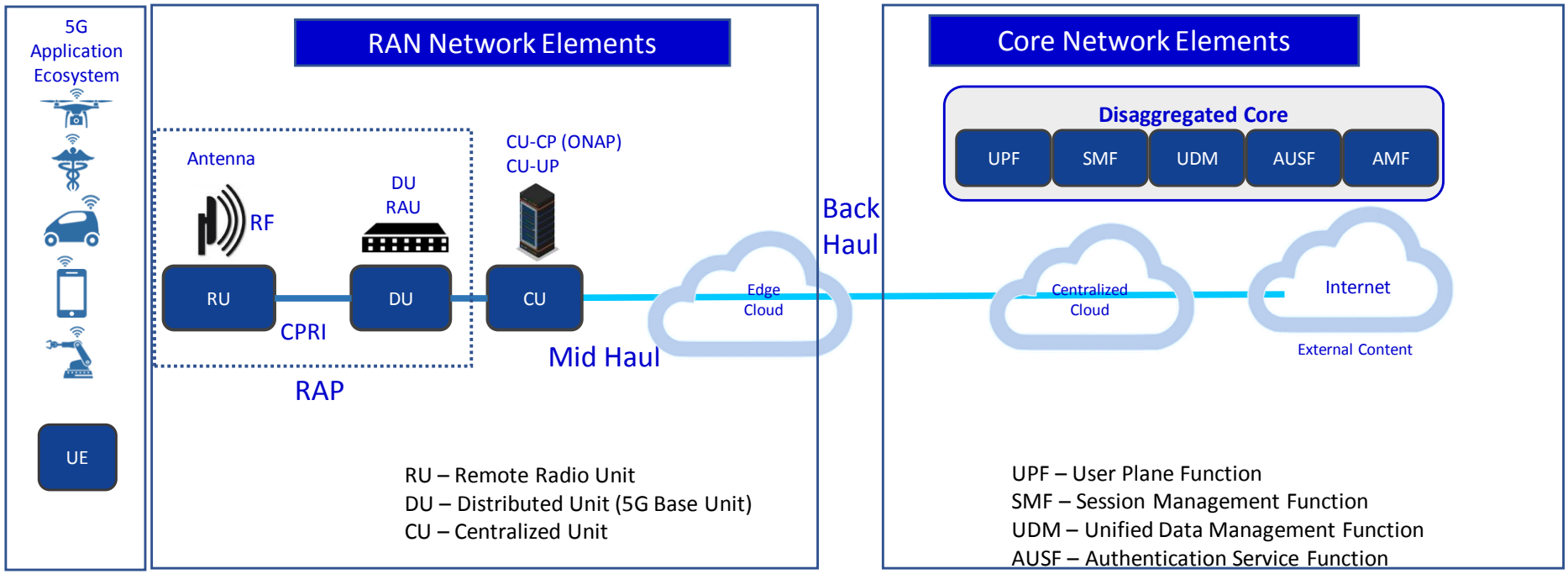
5G RAN Wireless Network



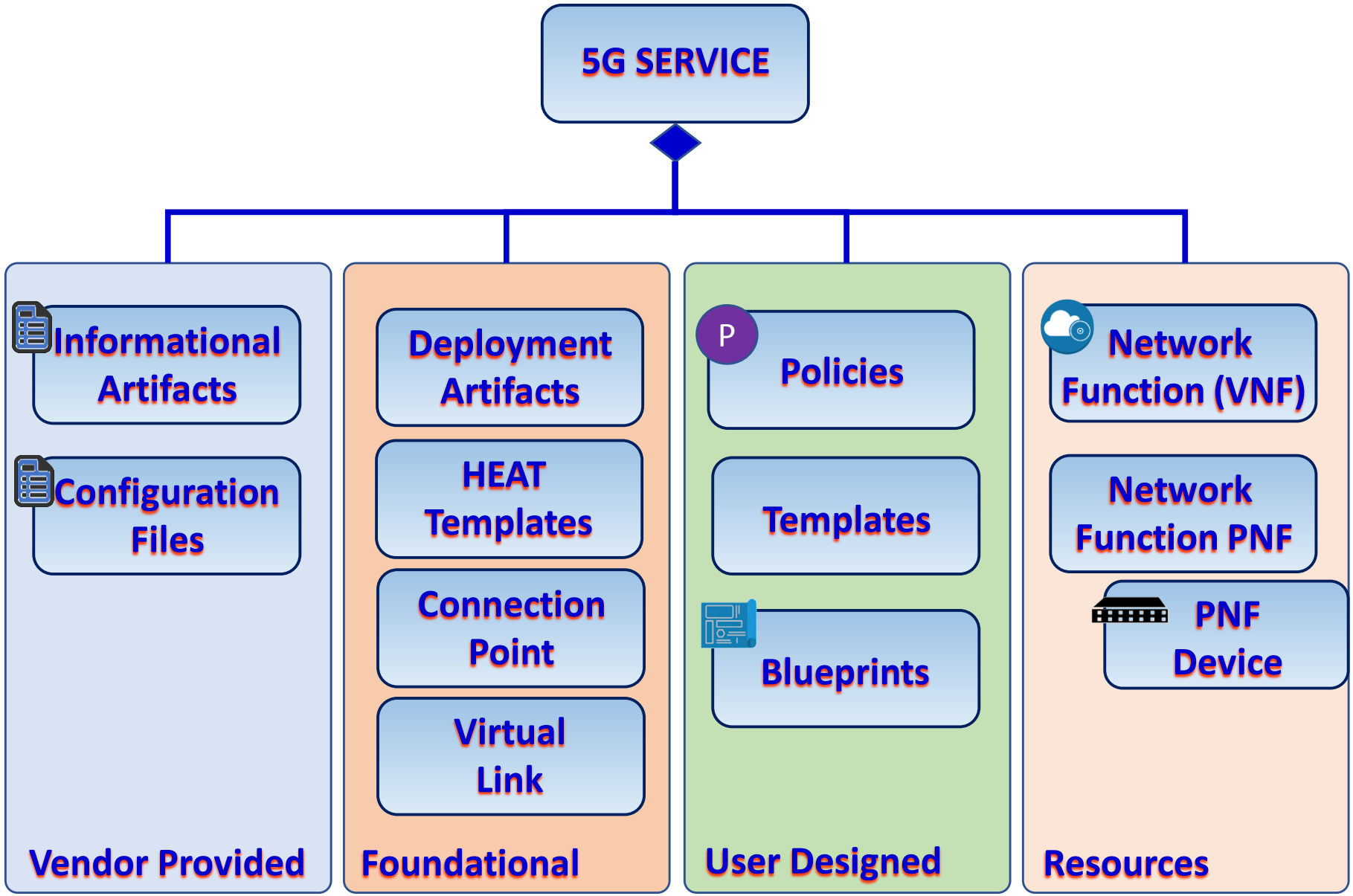
SO – Service Orchestrator
SDN-C – Service Design Network Controller
DCA&E – Data Collection Analytics & Events
A&AI – Available & Active Inventory
APP-C – Application Control



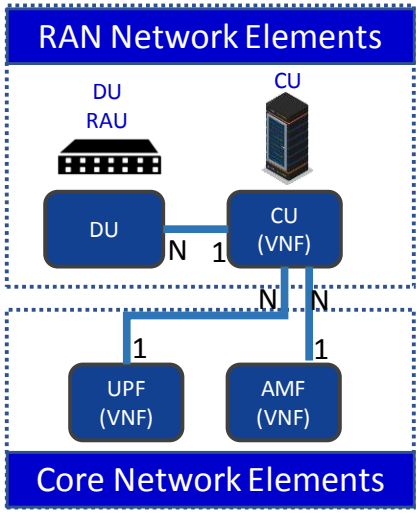
RU – Remote Radio Unit
DU – Distributed Unit (5G Base Unit)
CU – Centralized Unit

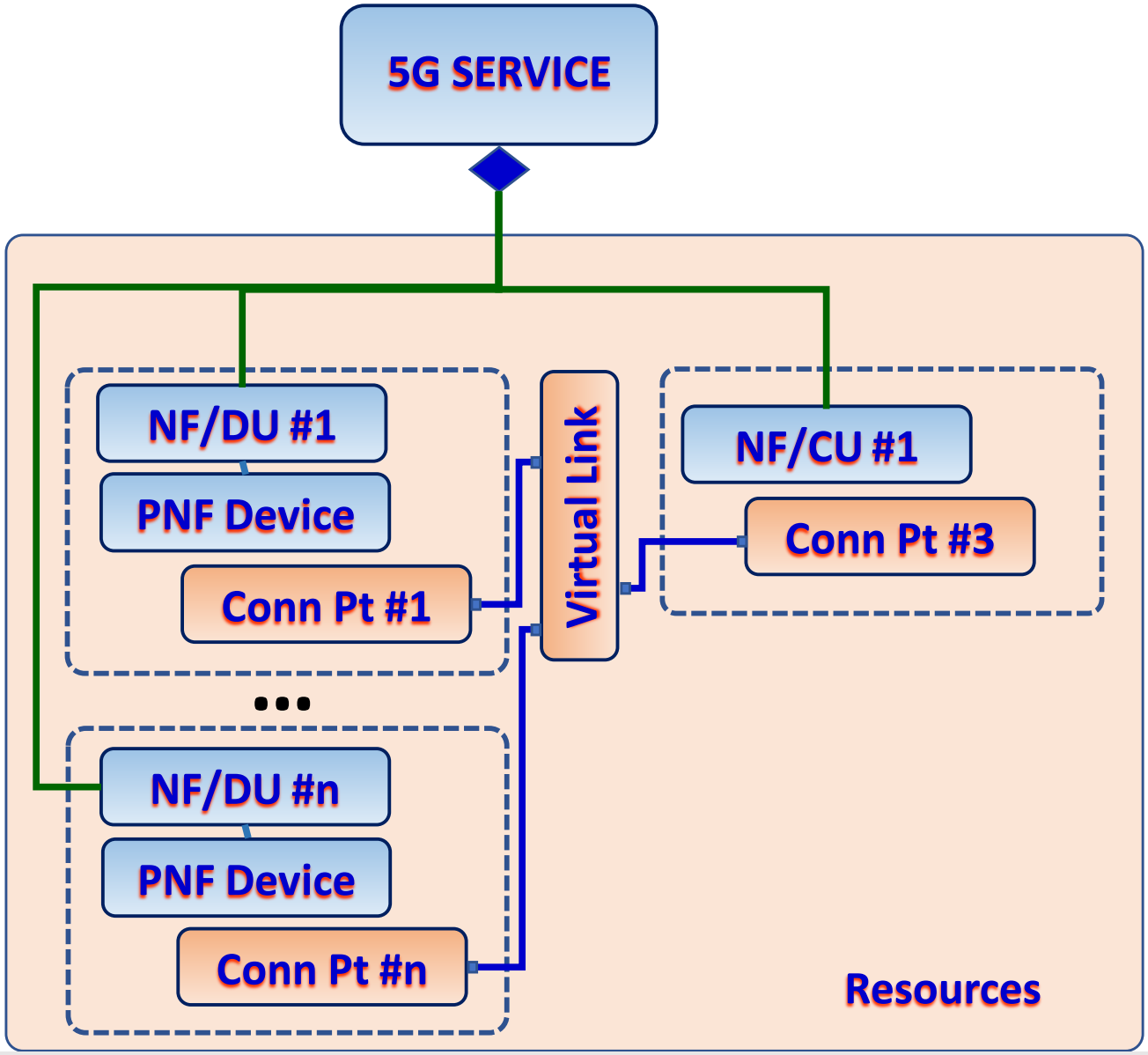
UPF – User Plane Function
SMF – Session Management Function
UDM – Unified Data Management Function
AUSF – Authentication Service Function

R4: Modeling a 5G Service



R4: 5G Base Station (gNodeB)





ONAP
OPEN NETWORK AUTOMATION PLATFORM

Configurations

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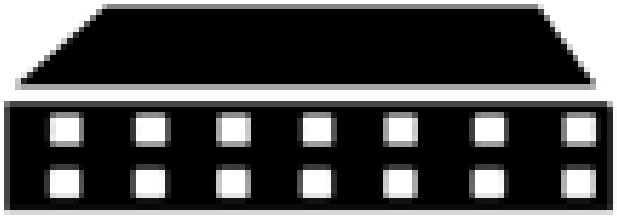
MODELING WITHIN A PNF (DU)

5G DU (PNF)



Sub-Component #1

Sub-Component #2

Sub-Component #n

SFP #1 = Port #1

SFP #n = Port #n

Software Function of a DU

Network Function

"Hardware Aspects of a PNF"

Connection Point

Ports / NICs

The hardware Ports (e.g. SFP/Backhaul Ports)

PNF Device

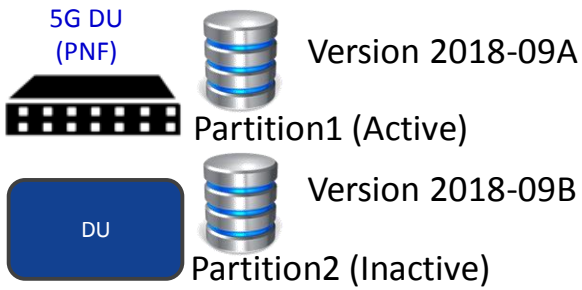
FUTURE

NF Component

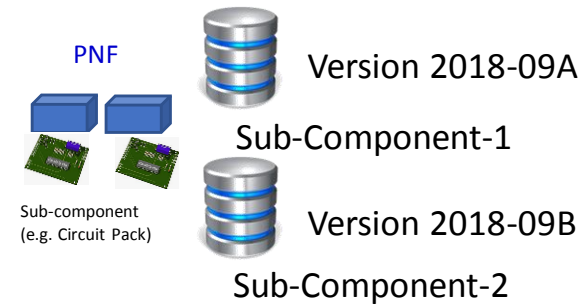
Sub-components within PNF

DU Configurations

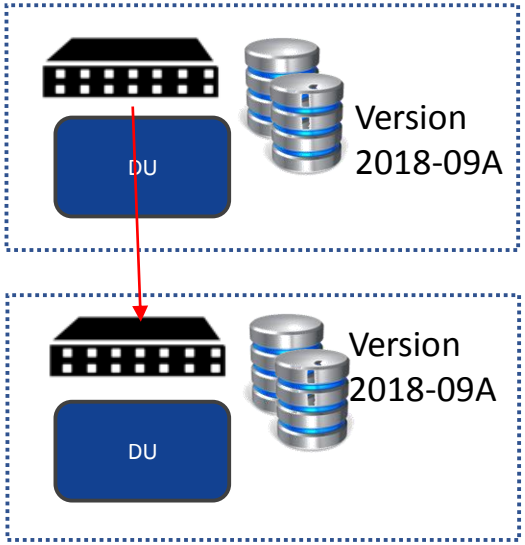
DRIVE PARTITIONS



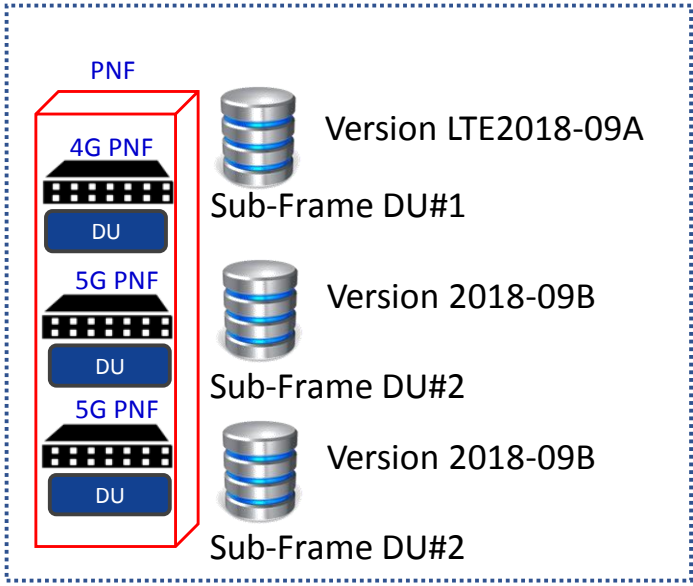
SUBCOMPONENTS (R4+)



MULTI-PNF DAISY CHAIN CONFIG



TANDEM CHASSIS CONFIGURATIONS



ETSI (SOL 001, SOL 004, SOL005, SOL 007)

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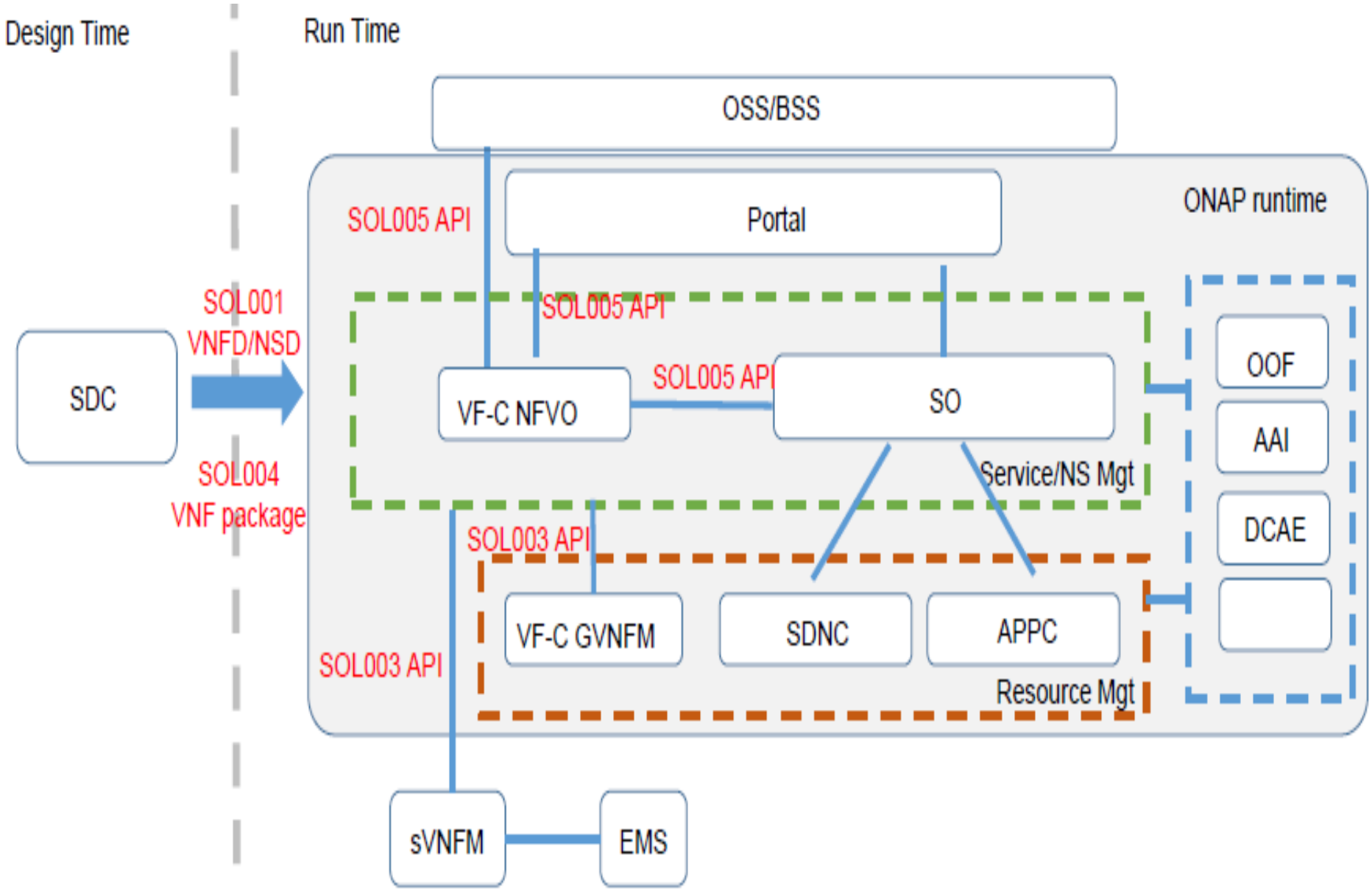
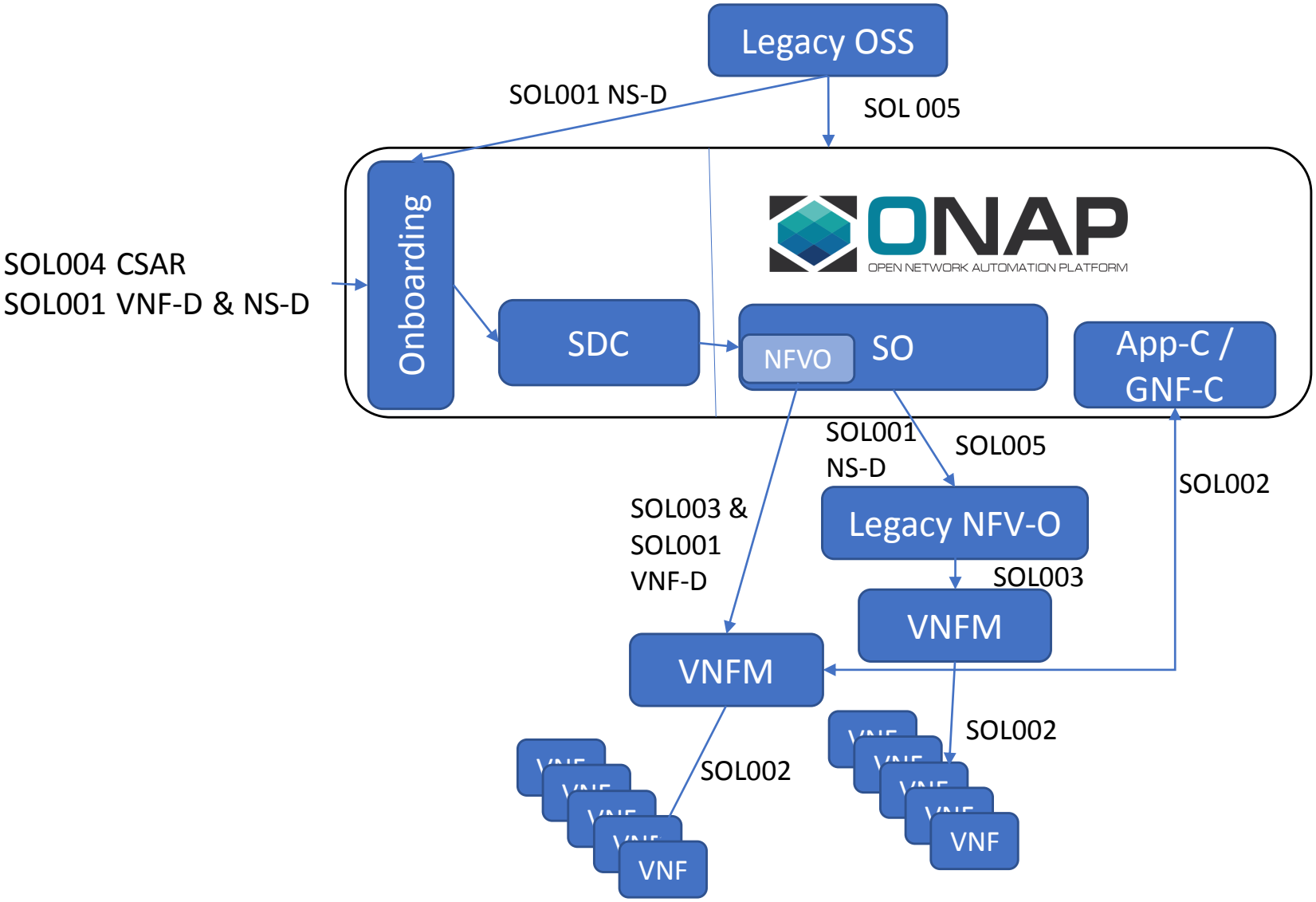
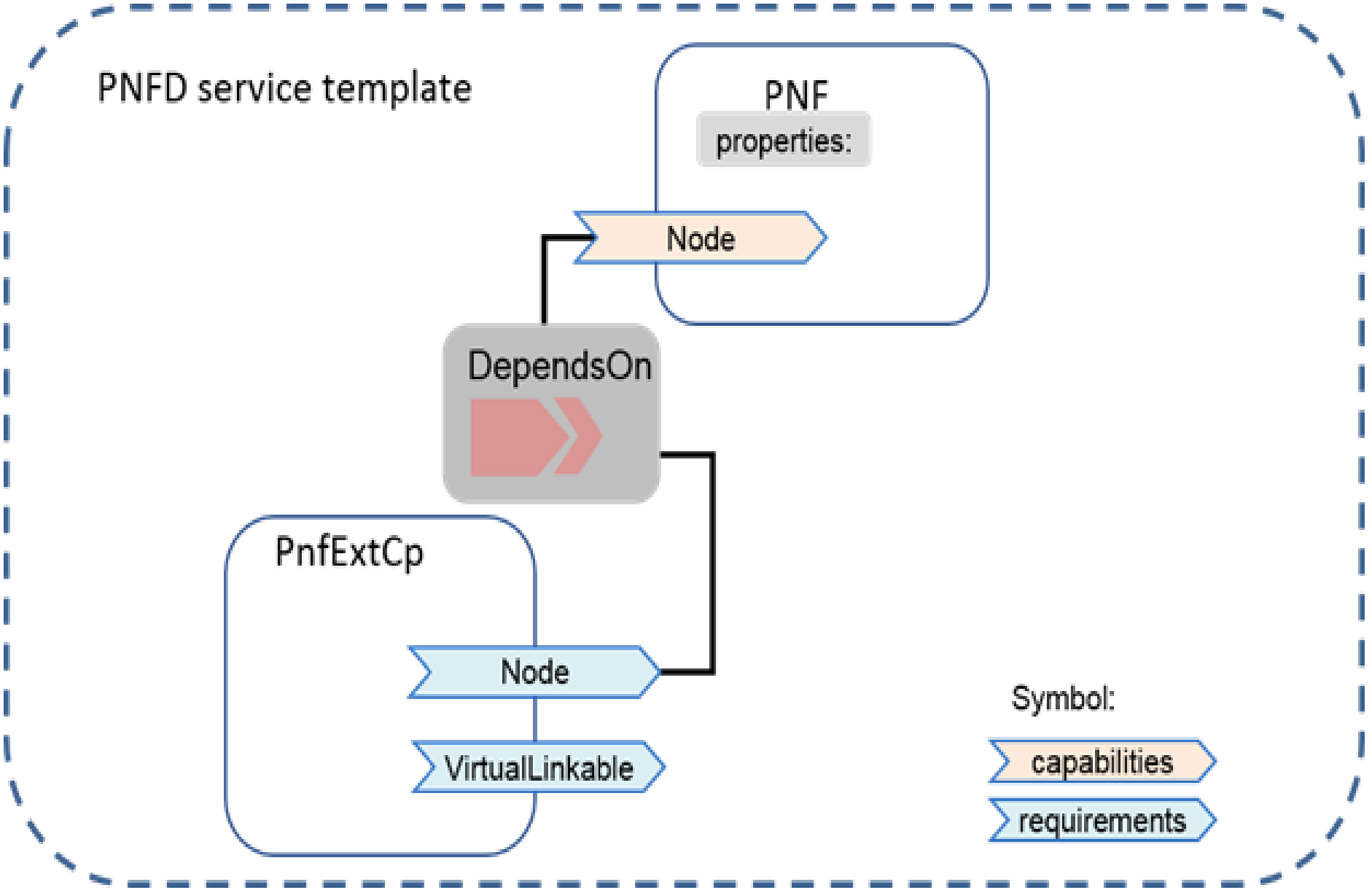
ETSI SOL Standards



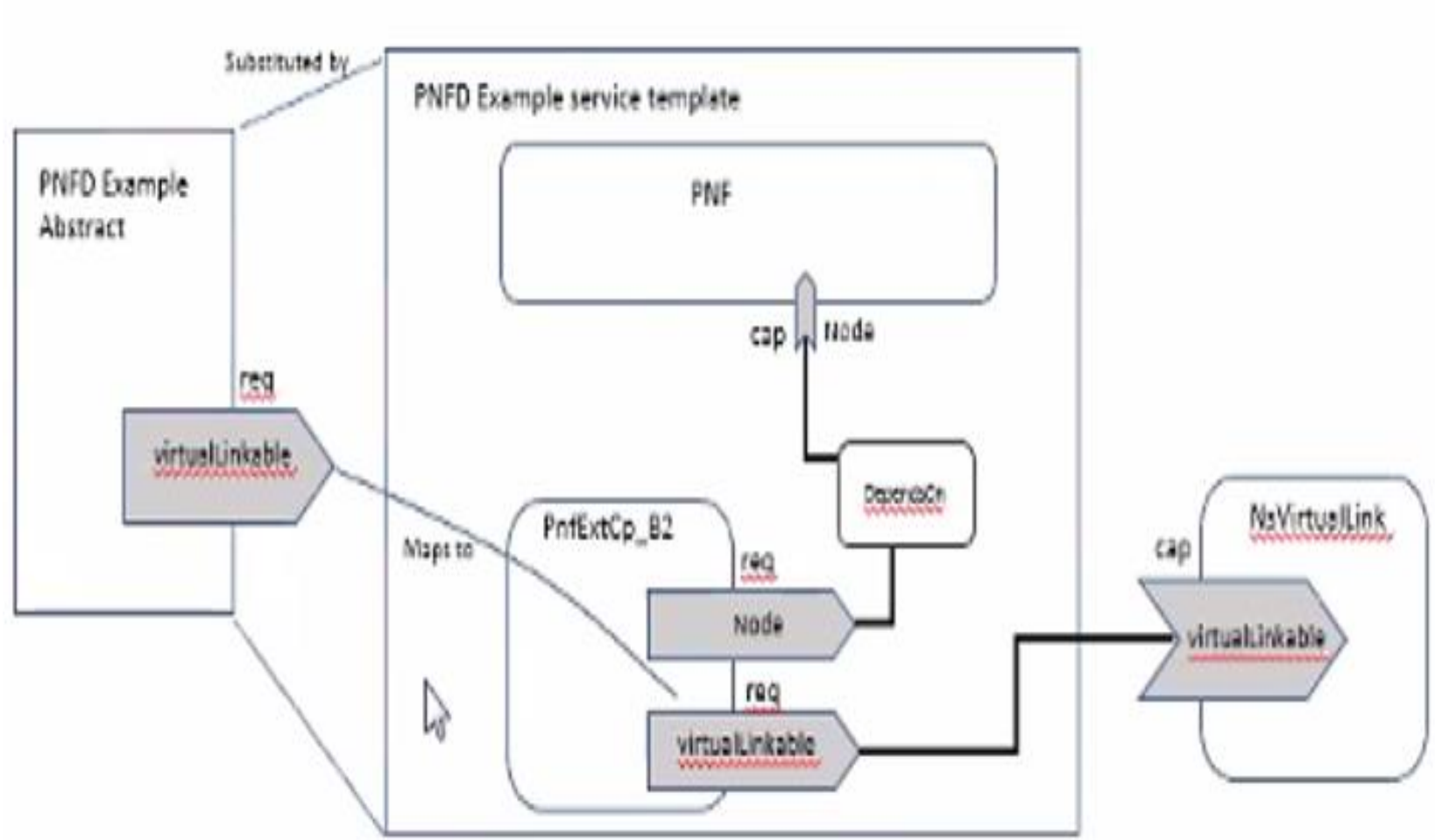
ETSI SOL Standards Alignment



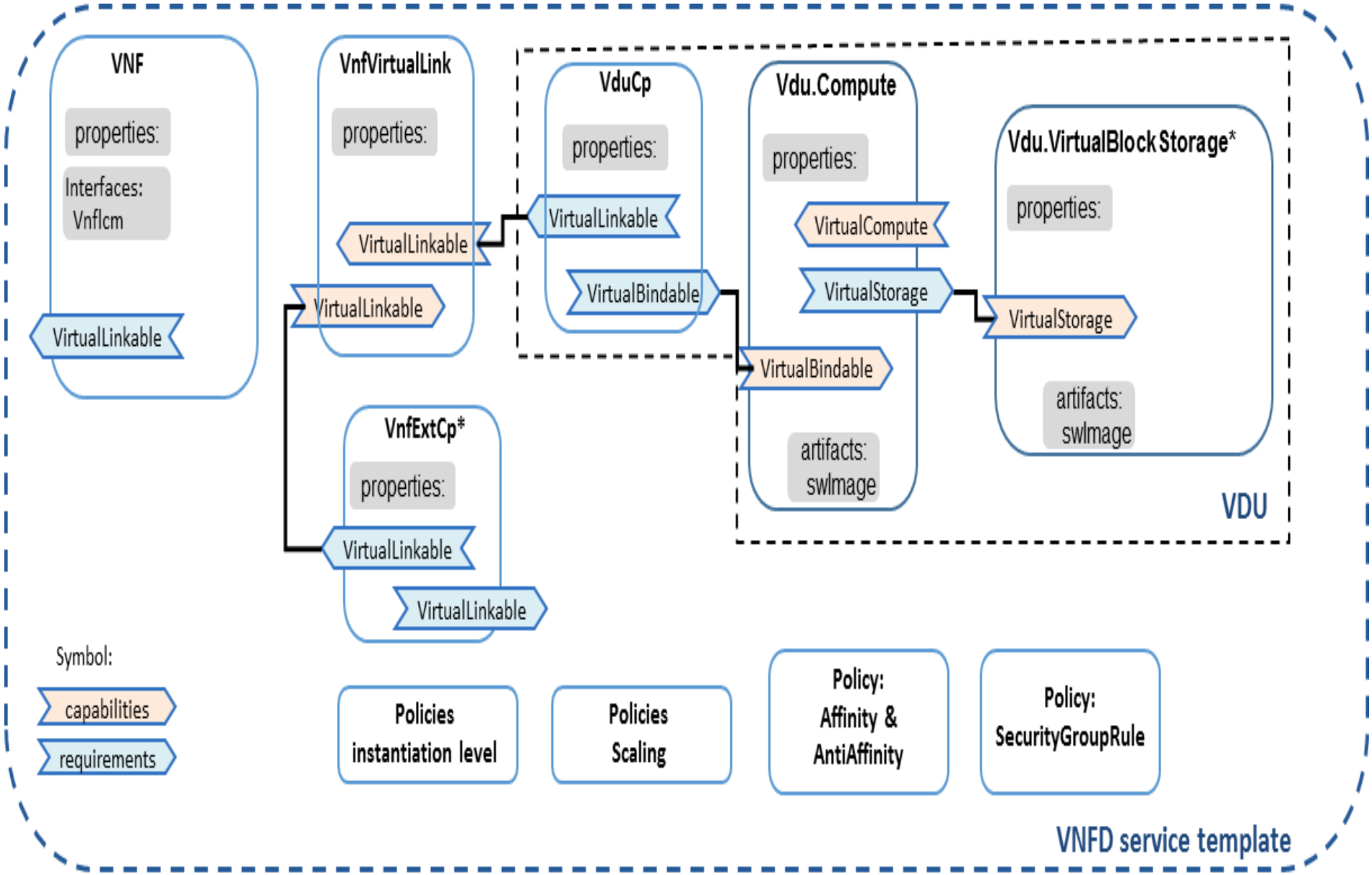
ETSI (SOL 1) PNF Descriptor Model



ETSI (SOL 1) PNF Descriptor Model



ETSI (SOL 1) VNF Descriptor Model



From SOL001 Standard

REFERENCES / APPENDIX / BACKUP SLIDES

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