

# PNF Pre-Onboarding / Onboarding & Modeling to Support 5G RAN



- ONAP Modeling
- PNF Onboarding

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# Onboarding and Design Time



	Onboarding Package	Onboarding Descriptor	Platform ONAP Model	SDC CSAR Artifacts	NF Instance
WHAT	 <p>PNF Package Artifacts (CSAR)</p>	 <p>PNF Descriptor Model</p>	 <p>Platform Information Model Platform Data Model</p>	 <p>CSAR (VSP, VF, Service)</p>	 <p>NF Discovery, Instantiation Run time Catalog</p>
WHEN	<p>Package Delivery</p> 	<p>Pre-Onboarding</p> 	<p>Onboarding</p> 	<p>Design Time</p> 	<p>Run Time</p> 
WHO	<p>Vendor</p>  <p>SOL 001 PNFD</p>	<p>Technology Specialist Asset Manager</p>  <p>SOL 004 Package</p>	<p>Technology Specialist Asset Manager</p>  <p>SOL 004 Package</p>	<p>Service Designer Operations Specialist</p>  <p>SOL 007 NFV NSD</p>	<p>Operations Specialist</p>  <p>-</p>

# Onboarding and Design Time



Onboarding Package	
Onboarding	
Vendor	


NF Descriptor	
Onboarding	
Asset Manager	

Platform Model	
Design Time	
Service Designer	


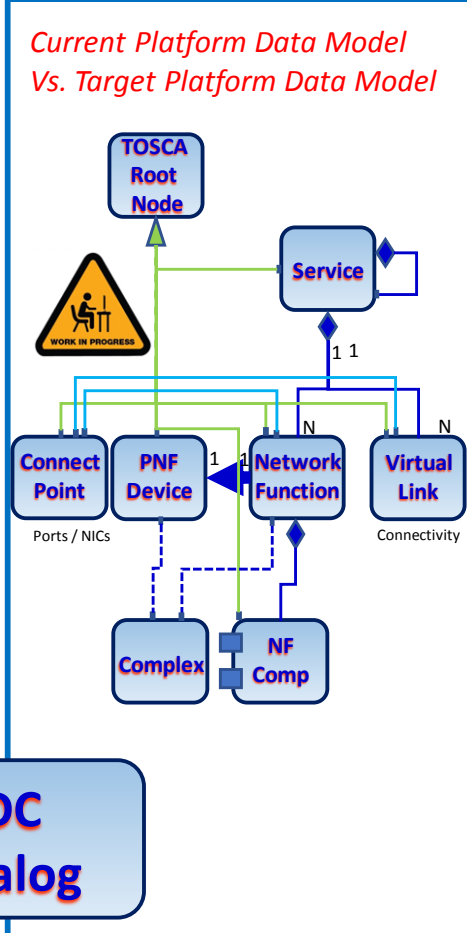
NF Instance	
Run Time	
Operations	

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

**PNF Onboarding Package**



**SDC Catalog**

**A&AI**



**PNF Instance**



# PNF PRE-ONBOARDING/ONBOARDING U/C OVERVIEW

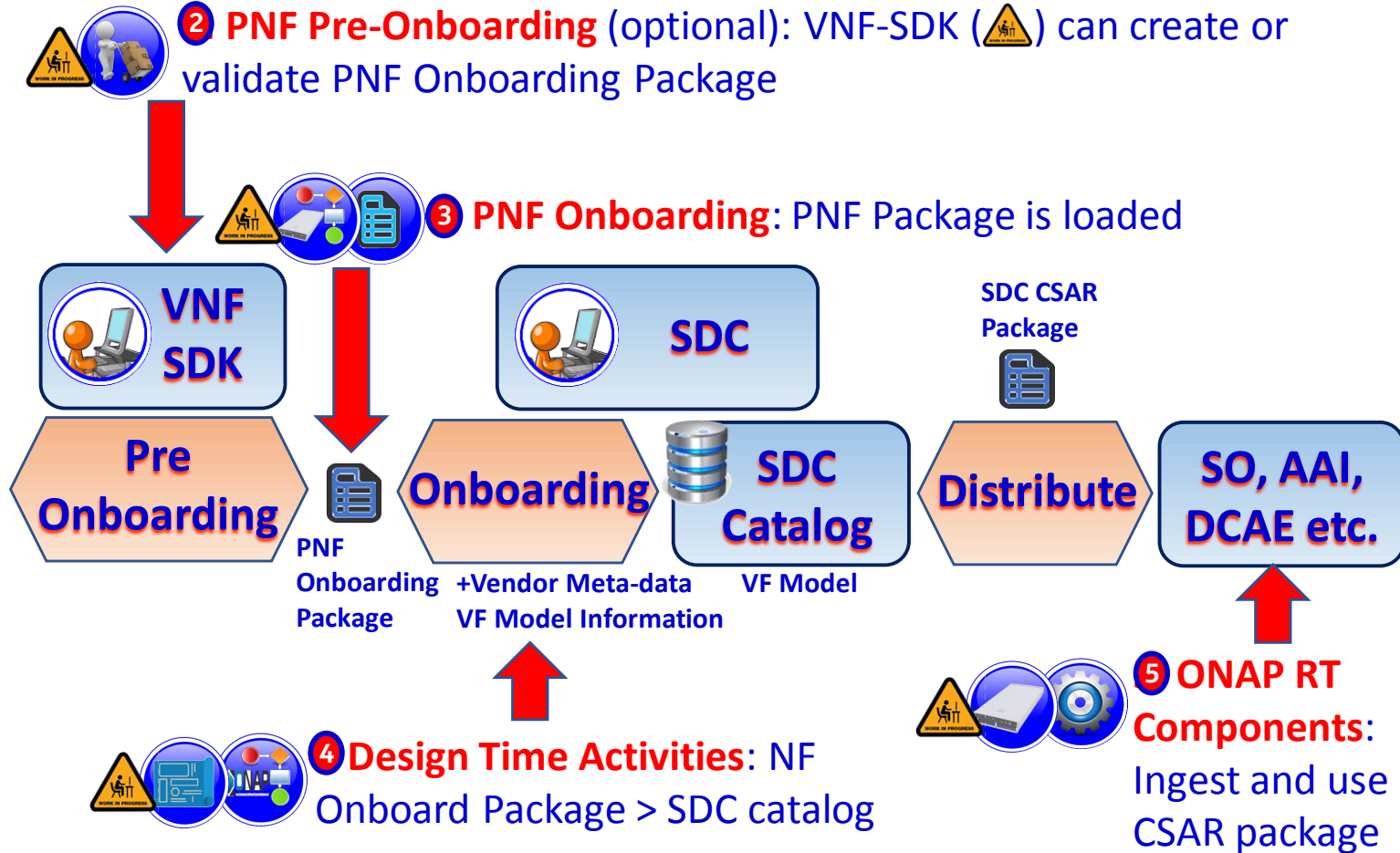
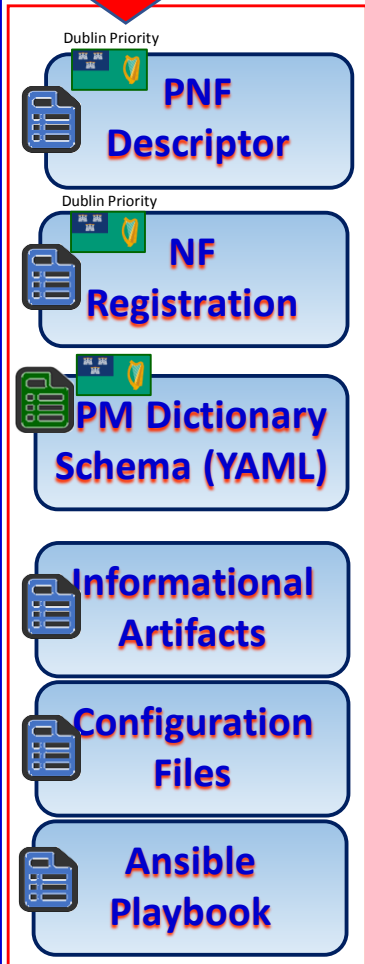
**1 PNF Package Delivery:** Vendor creates & delivers PNF Package with PNF artifacts

**2 PNF Pre-Onboarding (optional):** VNF-SDK (⚠️) can create or validate PNF Onboarding Package

**3 PNF Onboarding:** PNF Package is loaded

**4 Design Time Activities:** NF Onboard Package > SDC catalog




**5 ONAP RT Components:** Ingest and use CSAR package



# PNF PACKAGE CREATION







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- Onboarding Package 
- Onboarding 
- Vendor 

# PNF ONBOARDING PACKAGE




**PNF-D**  **NF Descriptor** 

**VES Event Registration**  **NF Registration** 

**PM Dictionary**  **PM Schema** 

Manuals, Help files  
CuDo Products  
Test files  
Licensing agreement

 **Informational Artifacts**

Resource  
Configuration Info

 **Configuration Files**

Ansible Playbooks  
Netconf Yang model  
Chef Cookbooks

 **Communication Files**



**Onboarding Package**

 **TOSCA Metadata (SDC)**

 **Manifest File**

 **TOSCA Descriptor (SDC)**

 **X\_License Model files**

# NF Registration (YAML) Onboarding



# NF ONBOARDING ARTIFACTS



## DEPLOYMENT ARTIFACT

The screenshot shows the ONAP interface for managing Deployment Artifacts. On the left, a sidebar lists various artifact types: General, Deployment Artifact (selected), Information Artifact, TOSCA Artifacts, Composition, Operation, Activity Log, Deployment, and Properties Assignment. The main area displays a table with columns for Name, Version, and UUID. A context menu is open over the table, listing various artifact types. The 'DCAE\_POLICY' option is highlighted in blue. A modal dialog box is also visible, containing a 'Browse' button and a 'Description' text area.

Choose Type

- YANG\_XML
- VNF\_CATALOG
- VF\_LICENSE
- VENDOR\_LICENSE
- MODEL\_INVENTORY\_PROFILE
- MODEL\_QUERY\_SPEC
- LIFECYCLE\_OPERATIONS
- VES\_EVENTS
- PERFORMANCE\_COUNTER
- APPC\_CONFIG
- DCAE\_TOSCA
- DCAE\_JSON
- DCAE\_POLICY**
- DCAE\_DOC
- DCAE\_EVENT
- OTHER
- SNMP\_POLL
- SNMP\_TRAP
- PLAN

VES\_EVENTS

Done Add Another





## INFORMATION

## ARTIFACT

### (SDC Design Studio)

Cloud Questionnaire

Features

Vendor Test Scripts

Resource Security Template

HEAT Template (Vendor)

Capacity Descriptive

Other Informational Artifacts

# PNF Onboarded Package (CSAR)

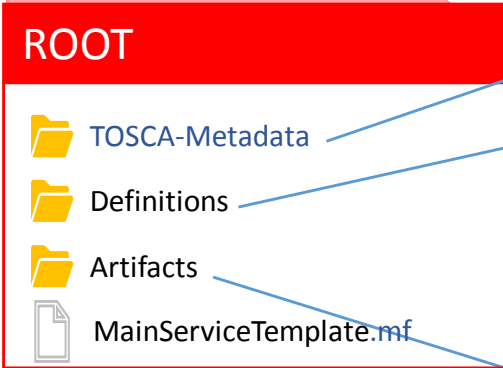


## PNF Onboarded CSAR file

### Note:

- This is an example of the package.
- The files listed in the folder is example only. And not all files are listed here.
- Folder / file name in blue is requested by SOL004.
- Folder / file name in black is example only.

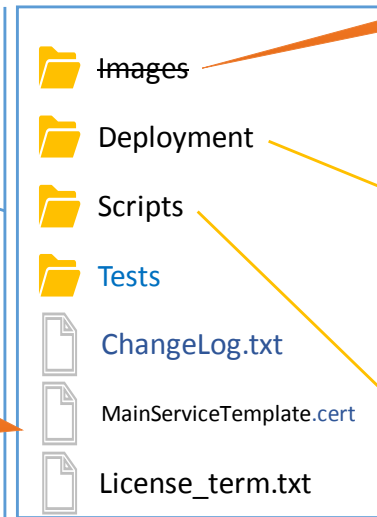
TOSCA-Meta-Version: 1.0  
 CSAR-Version: 1.1  
 Created-By: Ericsson (Zu Qiang 2018-12-03)  
 Entry-Definitions:  
 Definitions/MainServiceTemplate.yaml  
 Entry-Manifest: MainServiceTemplate.mf  
 Entry-Change-Log: Artifacts/ChangLog.txt  
 Entry-Tests: Artifacts/Tests  
 Entry-Certificate: Artifacts/License\_term.txt



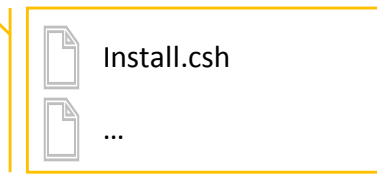
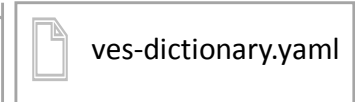
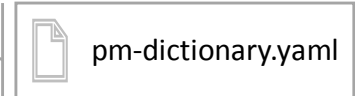
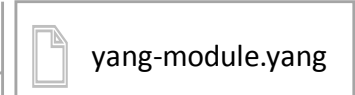
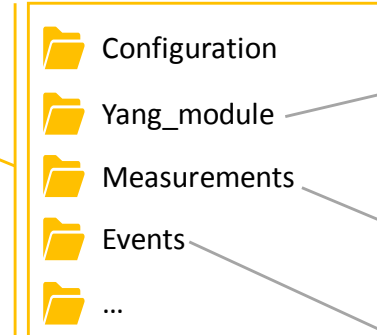
NF descriptor



Not supported by ONAP Casablanca



No ONAP requireme nt yet



```

metadata:
pnf_product_name: gNB
pnf_provider_id: Ericsson
pnf_package_version: 1.0
pnf_release_date_time: 2018-12-03T08:44:00-05:00
non_mano_artifact_sets:
Events:
source:
Artifacts/Deployment/Events/VES_registration.yaml
    
```

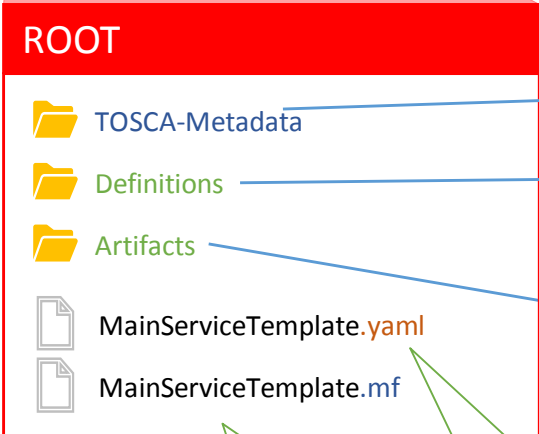
# PNF Onboarded Package (CSAR)



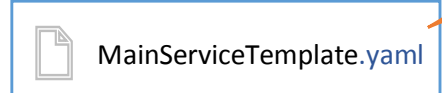
CSAR file

**Note:**

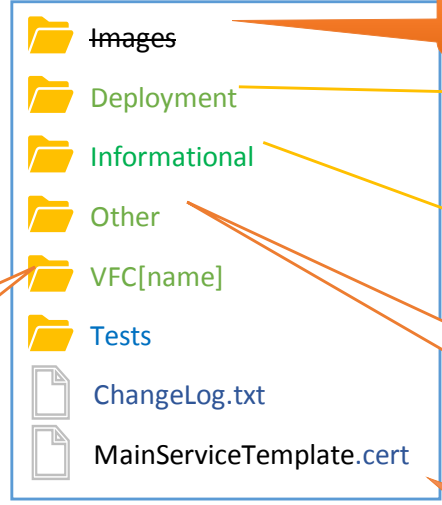
- This is an example of the current vendor provided VNF package to SDC for onboarding.
- The files listed in the folder is example only. And not all files are listed here.
- Folder / file name in **blue** is requested by SOL004.
- Folder / file name in **green** is expected by ONAP.
- Folder / file name in **black** is example only.



NF descriptor



Not supported by ONAP Casablanca



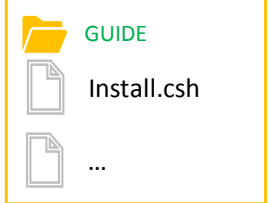
Copy of NF descriptor

VFC[name]/Deployment  
VFC[name]/Information

Any unrecognized artifacts

Not supported by ONAP Casablanca

- HEAT
- HEAT\_VOL
- HEAT\_NET
- HEAT\_ENV
- HEAT\_ARTIFACT
- HEAT\_NESTED
- YANG\_XML
- MODEL\_INVENTORY\_PROFILE
- VNF\_CATALOG
- VNF\_LICENSE
- VENDOR\_LICENSE
- APPC\_CONFIG
- VF\_MODULES\_METADATA
- DCAE\_TOSCA
- DCAE\_JSON
- PLAN



```

metadata:
vnf_product_name: gNB
vnf_provider_id: Ericsson
vnf_package_version:1.0
vnf_release_date_time:2018-11-07T08:44-05:00
source: MainServiceTemplate.yaml
    
```

# ONBOARDING PROCESS (PNF SDK)



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NF Descriptor



Onboarding



Asset Manager



# PRE ONBOARDING: VNF SDK DEVELOPMENT



PNF-D  
 **NF Descriptor**

Dublin Priority

VES Event Registration Specification  
 **NF Registration**


Dublin Priority




PM Dictionary PM Schema  
 **PM Dictionary PM Schema**



Manuals, Help files  
CuDo Products  
 **Informational Artifacts**

Configuration Info  
 **Configuration Files**

Ansible Playbooks  
Netconf Yang model  
Chef Cookbooks  
 **Communication Files**

  **2 PNF Pre-Onboarding** (optional): VNF-SDK  
() can create or validate PNF Onboarding Package

 **xNF SDK**

**Package creation**

WinZIP  
Validating Content



**PNF Onboarding Package**

# PNF ONBOARDING: SDC Catalog



WinZIP  
Validating Content

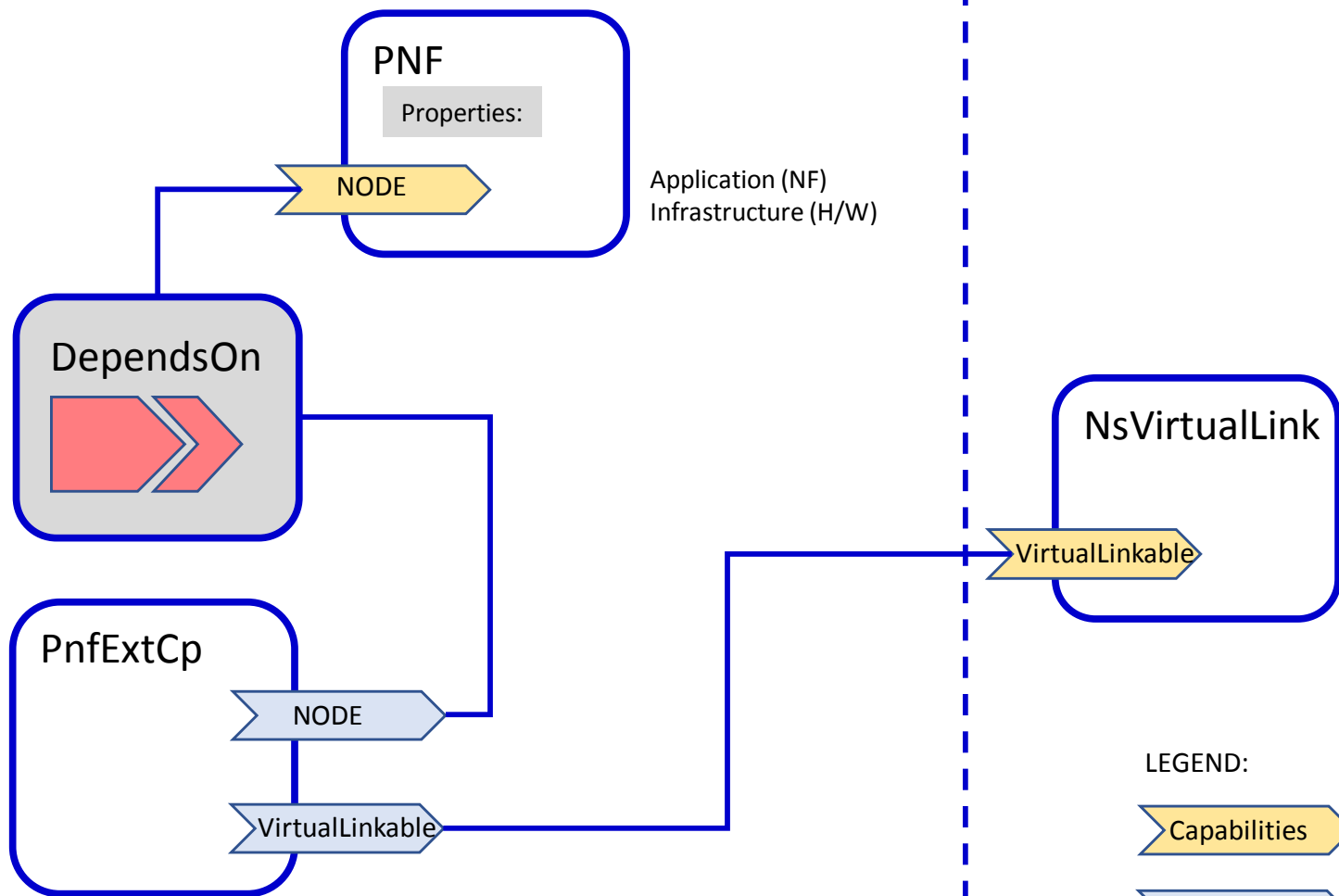
PNF  
Onboarding  
Package

+VENDOR  
META DATA

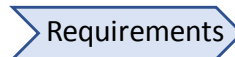
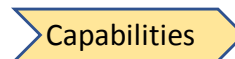
# PNF Descriptor (ETSI SOL 001)



## PNFD Service Template



LEGEND:



## VNF SDK Updates



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NF Descriptor



Onboarding



Asset Manager





# SDK ENHANCEMENTS



sdsc.api.fe.simplifiedemo.onap.org:30206/sdc1/portal#/dashboard

SDC v.1.3.3-SNAPSHOT

HOME CATALOG ONBOARD DCAE-DS WORKFLOW

ACTIVE PROJECTS 4

- Check Out 4
- Check In 0

FOLLOWED PROJECTS 16

- Ready For Testing 0
- In Testing 0
- Certified 16

ADD

Import VFC

Import VSP

Import DCAE asset

Import VF

Select one of the software product component below:

Name	Vendor	Category
1541f87b-cf09-4597-8076	cd18cbda-7af7-41d5-9df4	Generic Abstract
VSP Description: vendor software product		
VSP's Meta Data: Name: 1541f87b-cf09-4597-8076 Lifecycle: CERTIFIED Creator: Carlos Santana		
UUID: c988a8d5-aaf5-481f-a33f-0aaa307e016 Version: 1.0 Modifier: Carlos Santana		
6077b558-4f67-4dc7-8cce	c94dfaad-d116-41db-8178	Generic Abstract
774350dc-b0df-48c0-bc12	a9236f3b-9b13-45b2-a172	Generic Abstract
7ad18697-c393-4841-8599	fcc57795-7368-4600-98d5	Generic Abstract
934d85cd-01ff-493c-bcbe	07599e05-7cea-4a40-b978	Generic Abstract
ac743abf-b235-44ef-8493	4cedaeca-7762-4395-adcc	Generic Abstract
afb1efb7-90b9-419f-9a43	ed8e0862-e5a8-4bef-b2aa	Generic Abstract
e18314f7-91ff-4e56-a55d	b7265786-80f5-4c39-adf5	Generic Abstract

Opening 17443e162775491394bcc77f62ec64d6.csar

You have chosen to open:

- 17443e162775491394bcc77f62ec64d6.csar  
which is: csar File (43.7 KB)  
from: blob

What should Firefox do with this file?

- Open with - Save File
- Do this automatically for files like this from now on.

OK Cancel

# SDK ENHANCEMENTS



Demo1

V0.1

IN DESIGN CHECK OUT

Certify

Check

General

Information Artifact

TOSCA Artifacts

Composition

Activity Log

Properties Assignment

## TOSCA Artifacts

Name	Type	Version
↳ Tosca Model	TOSCA_CSAR	0
↳ Tosca Template	TOSCA_TEMPLATE	0

# VNF SDK Impacts

- [VNFSDK-337](#): Supporting PNF package onboarding
  - [VNFSDK-338](#): Project scope to include PNF
  - [VNFSDK-339](#): PNF CSAR structure based SOL004
  - [VNFSDK-340](#): PNF manifest file
  - [VNFSDK-341](#): PNFD validation based on SOL001
  - [VNFSDK-342](#): Support packaging security
  - [VNFSDK-343](#): Enhancement of the test on PNF package

# PLATFORM MODEL / MODELING A SERVICE



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Platform Model



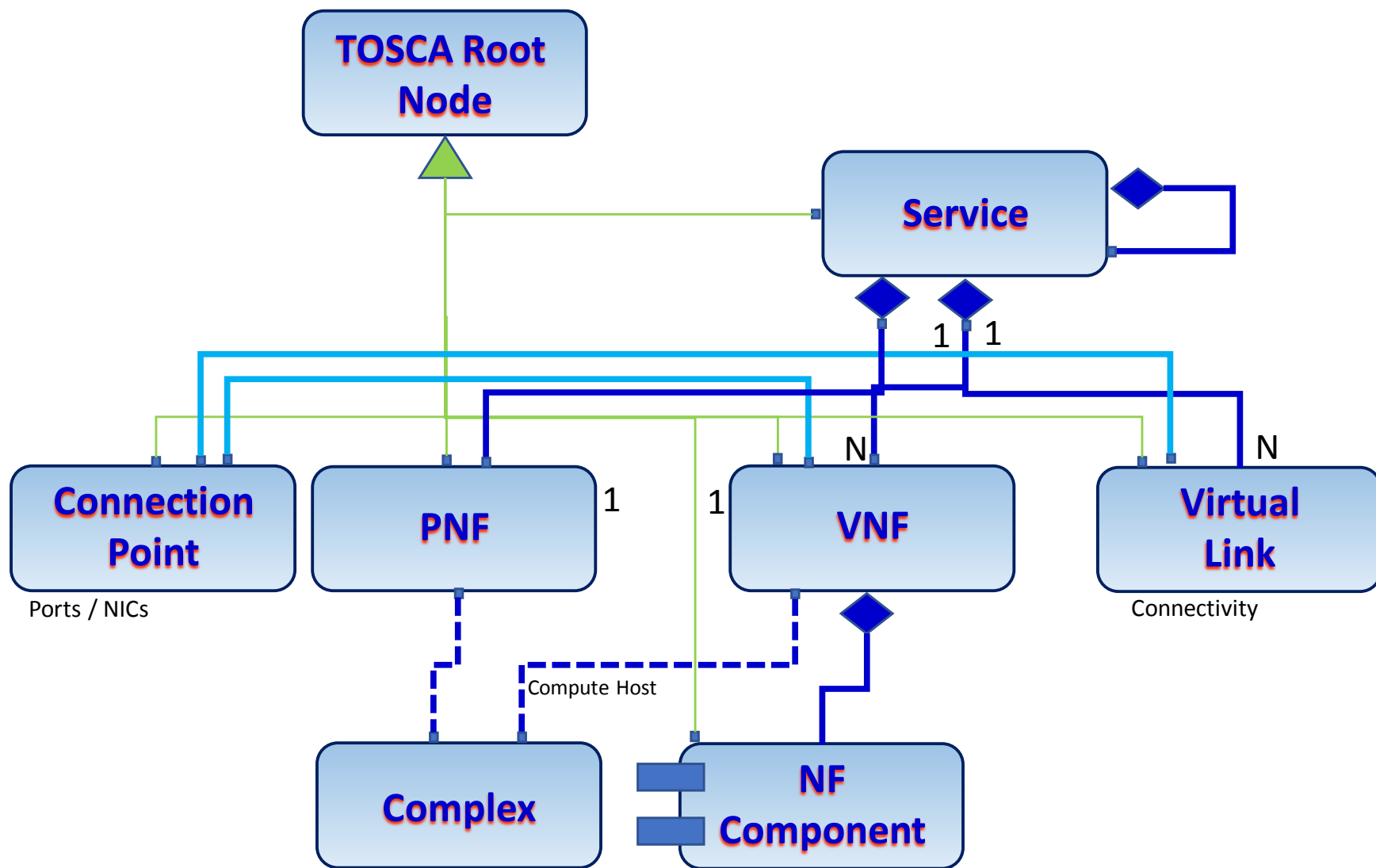
Design Time



Service Designer

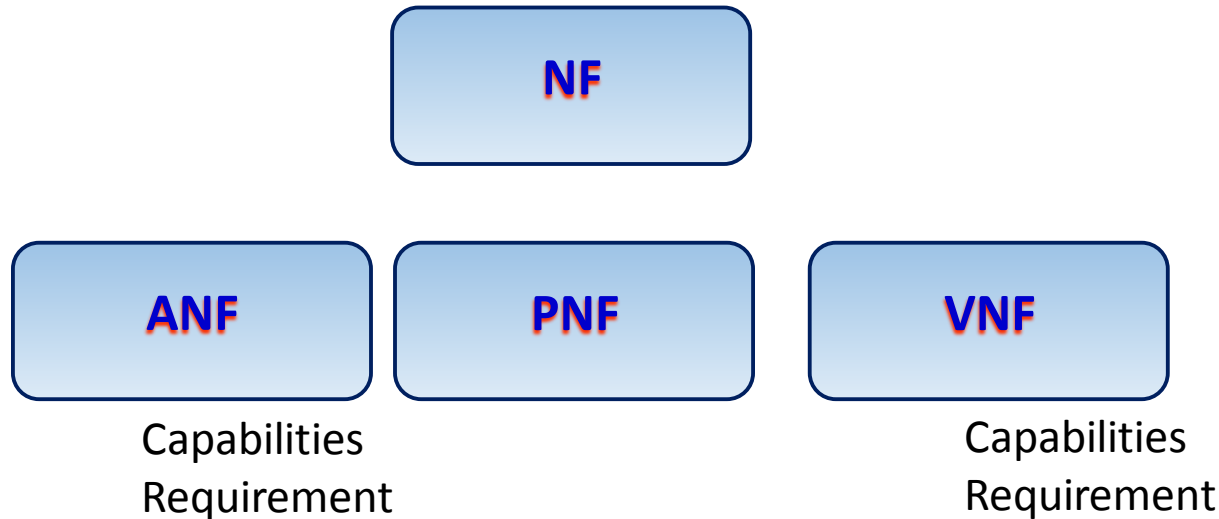


# Platform Data Model



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

# Platform (Internal) Information Model



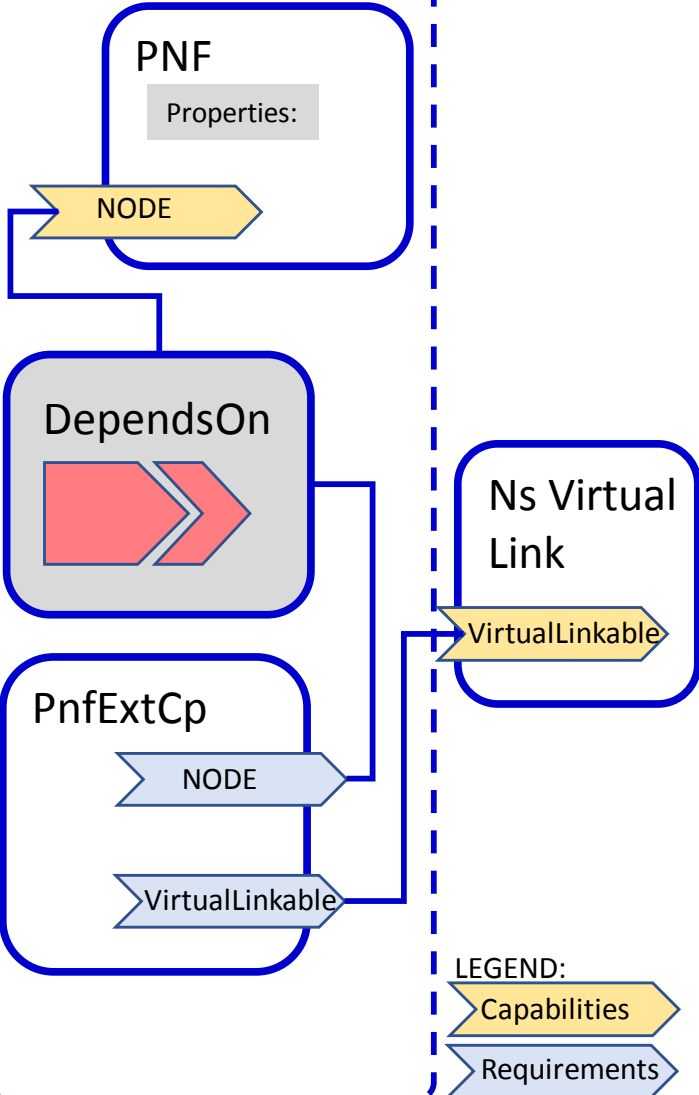
Create "PNF"  
Assign (registers)/connpts  
Configure

Assign [connections pts]  
Create  
Configure

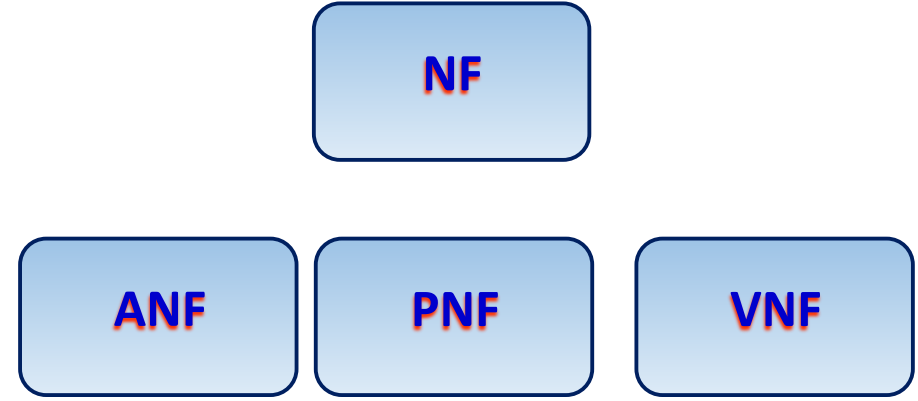
# PNF Descriptor > ONAP Platform Model



## PNFD DESCRIPTOR



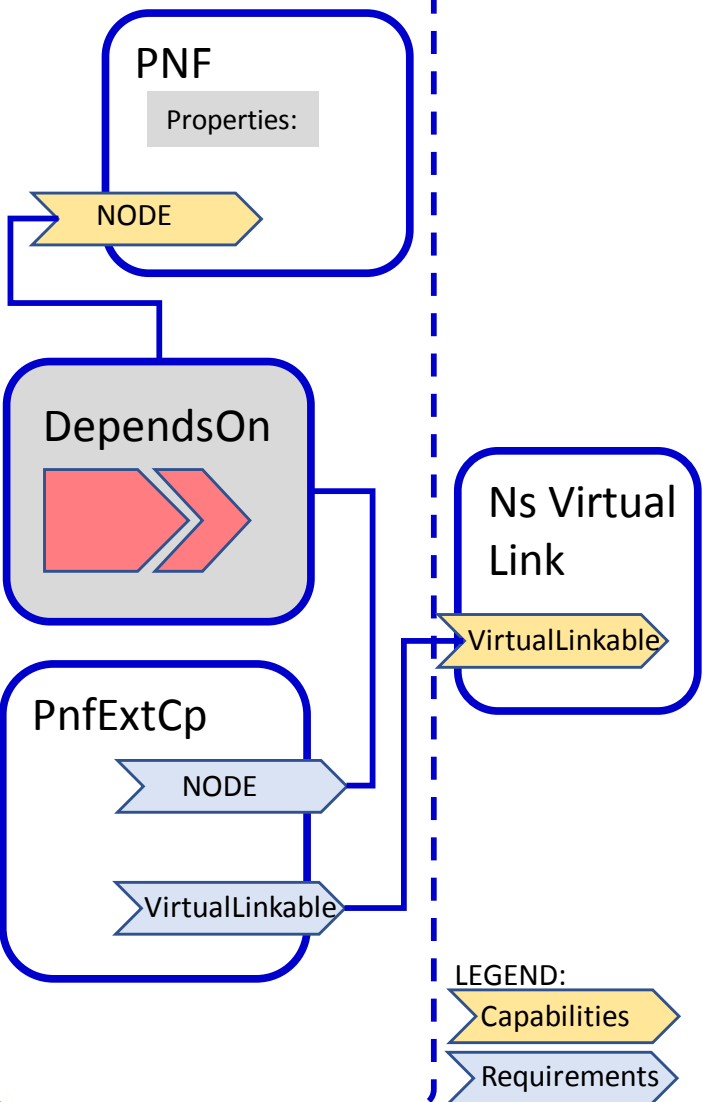
## PLATFORM MODEL (INTERNAL MODEL)



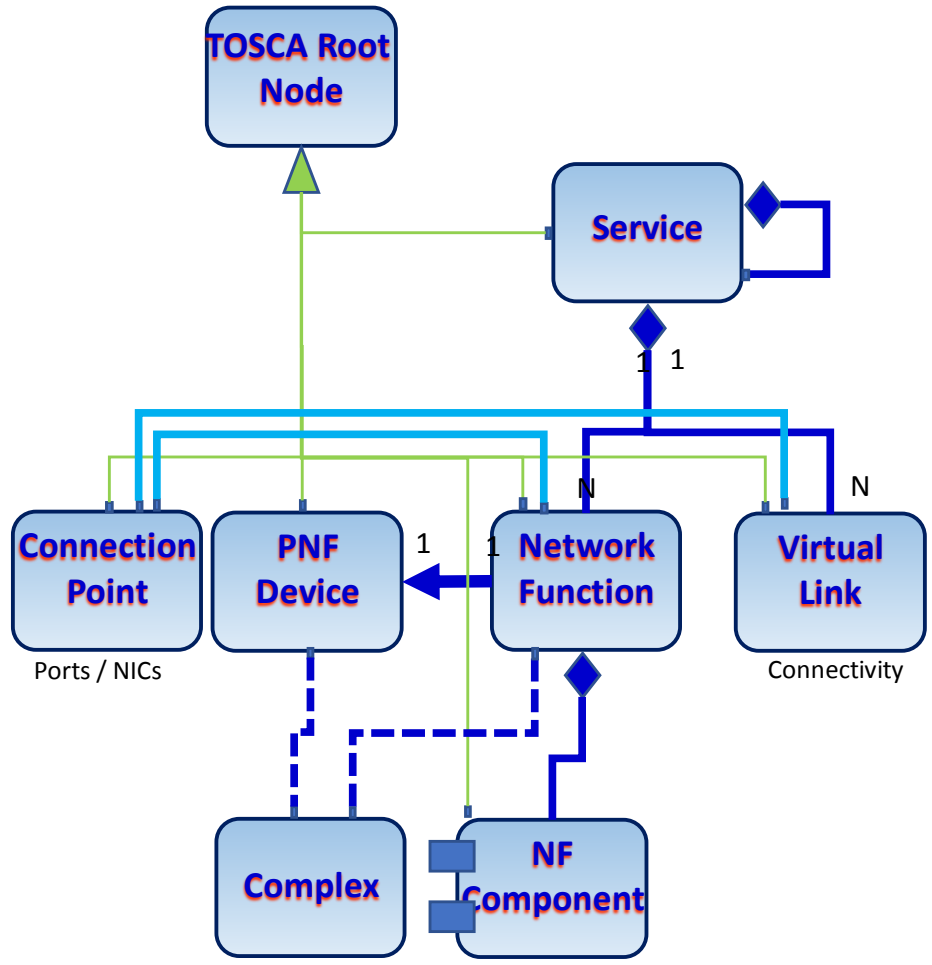
# PNF Descriptor > ONAP Platform Model



## PNFD DESCRIPTOR

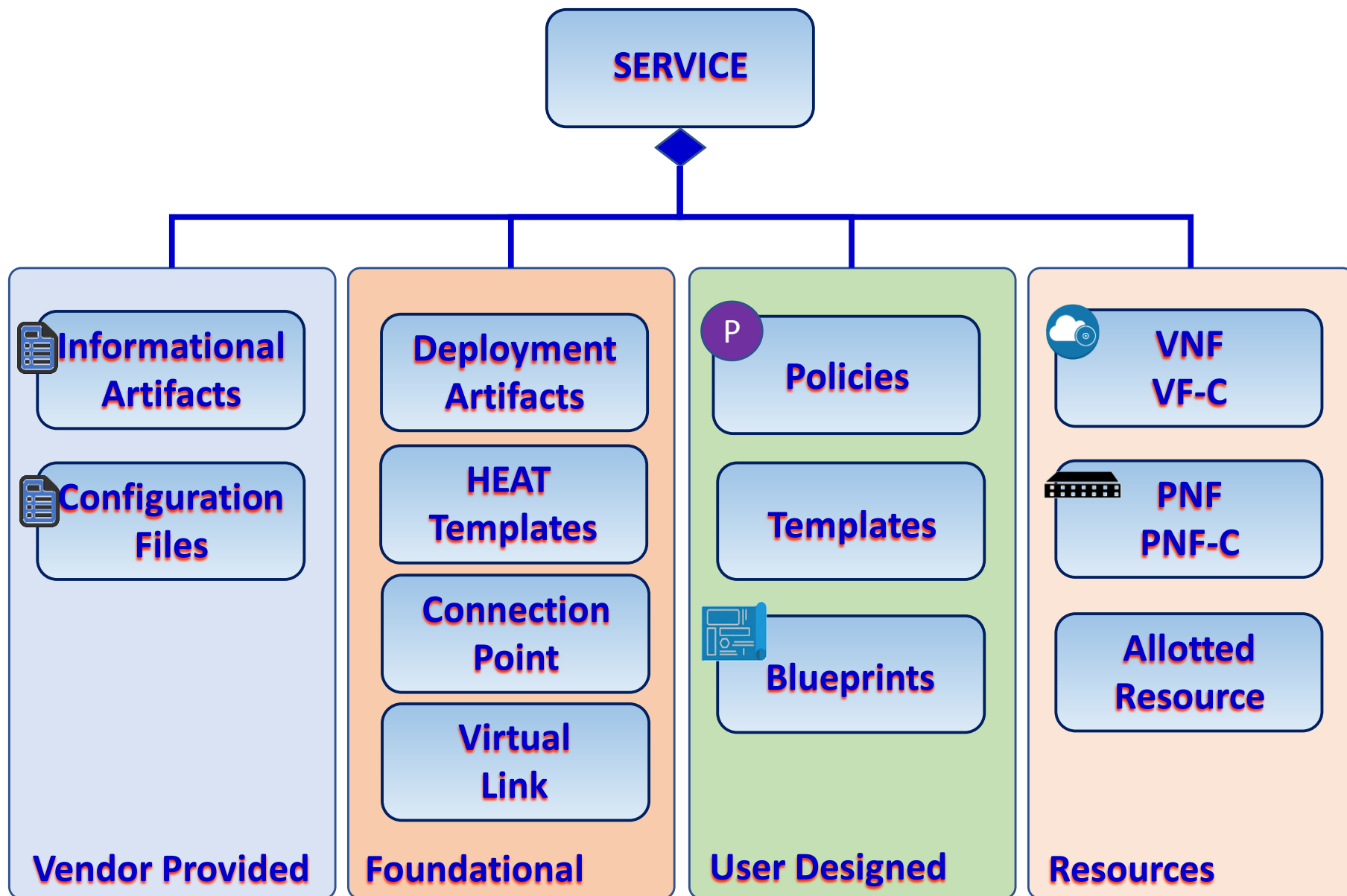


## PLATFORM MODEL (INTERNAL MODEL)





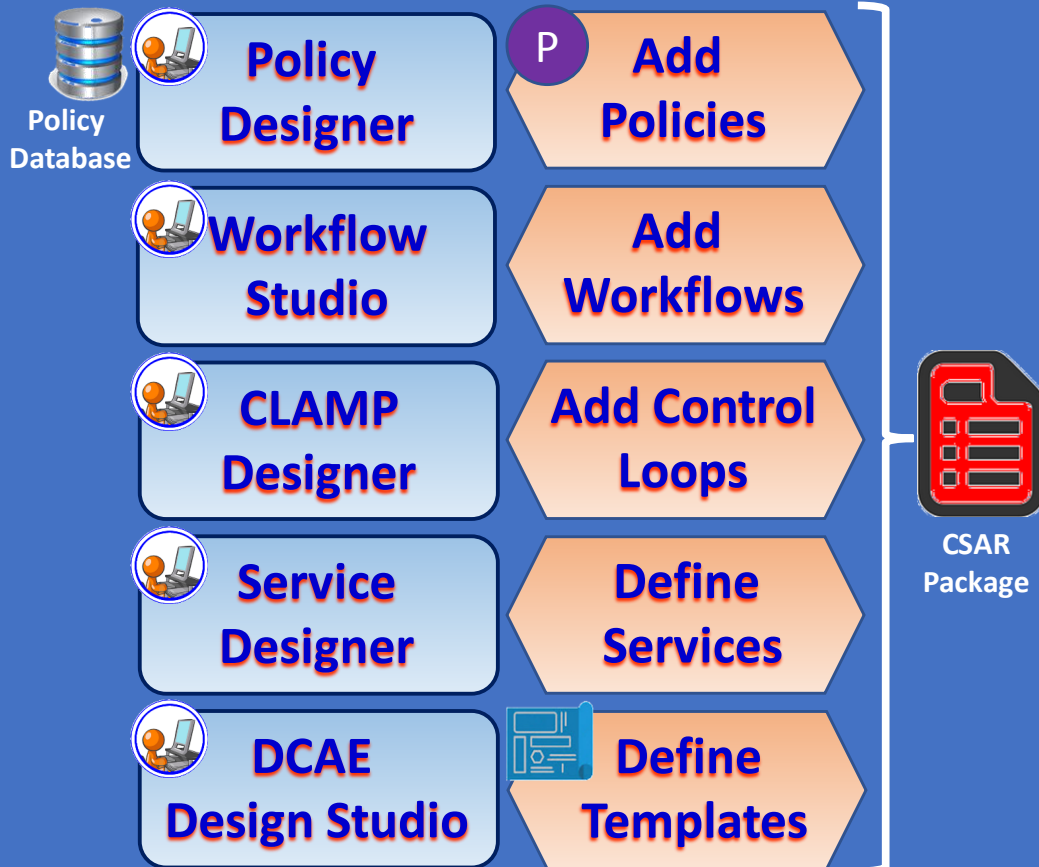
# Defining a Service



# Design-Time Process



## DESIGN-TIME (SDC)



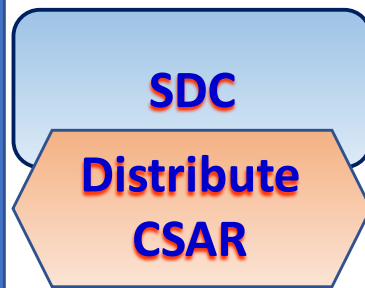
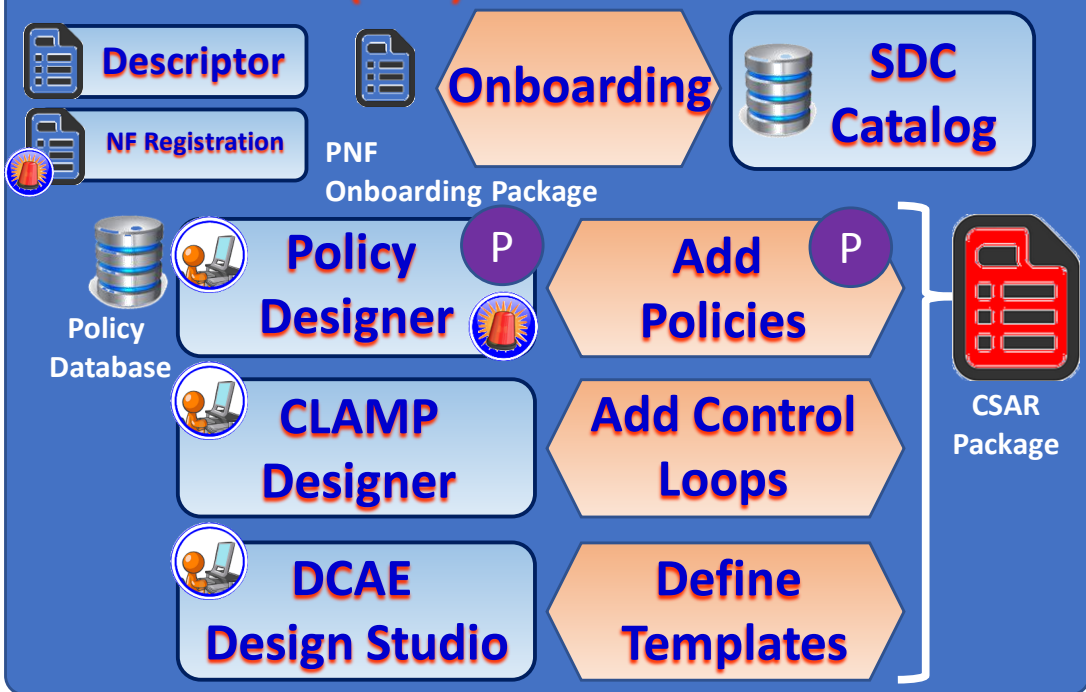
## ONAP RUN-TIME



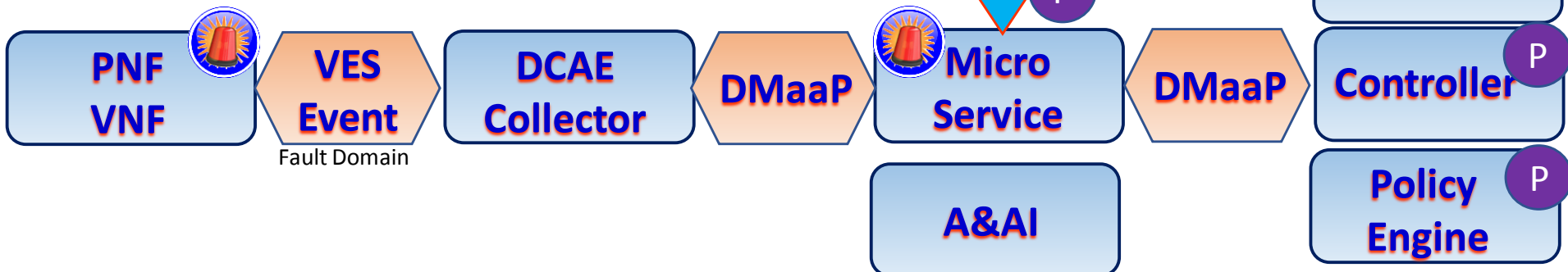
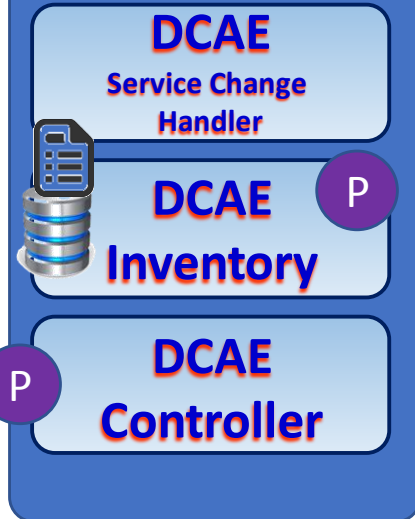
# Policy Example



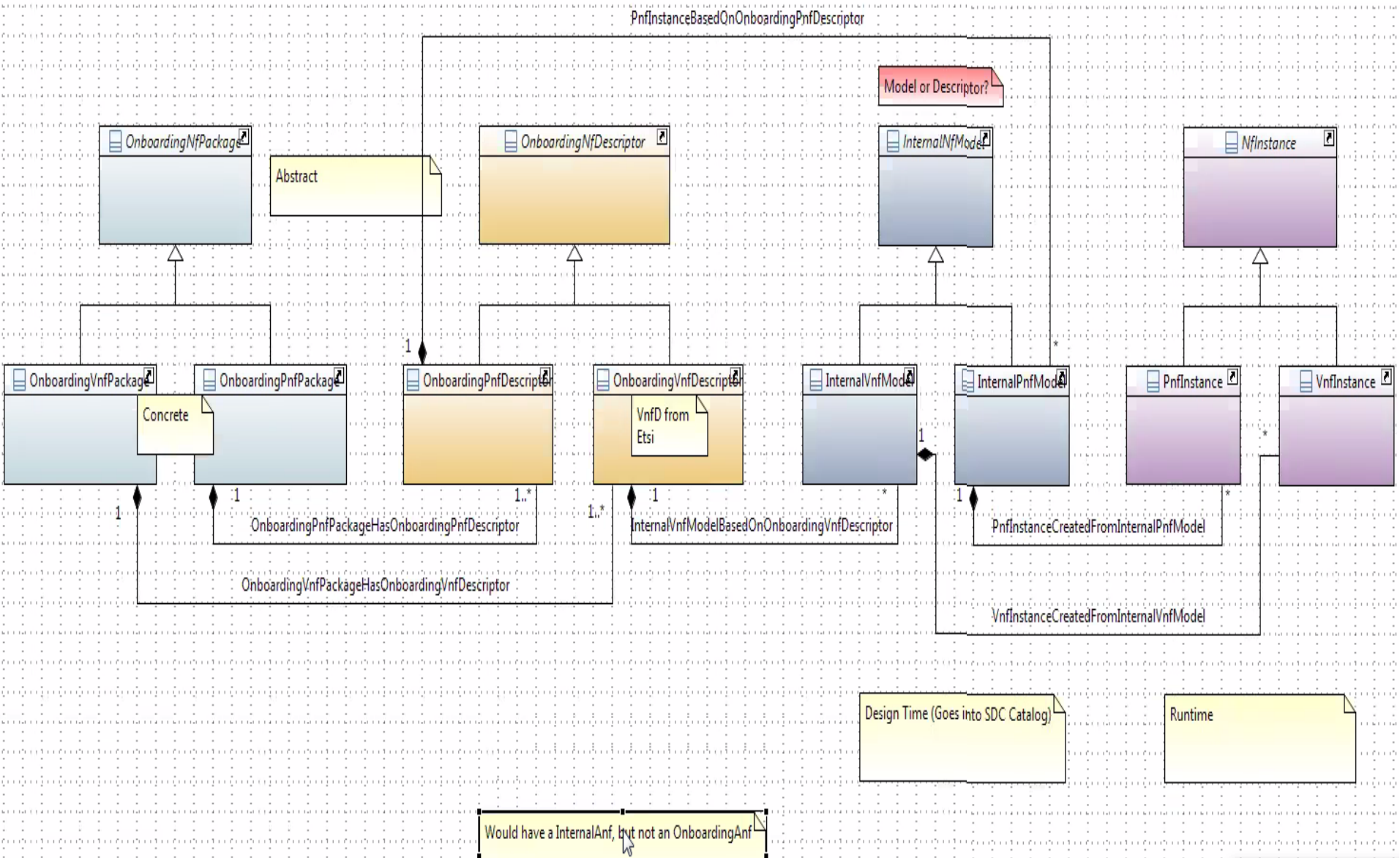
## DESIGN-TIME (SDC)



## DCAE (Run Time)



# Onboarding and Design Time



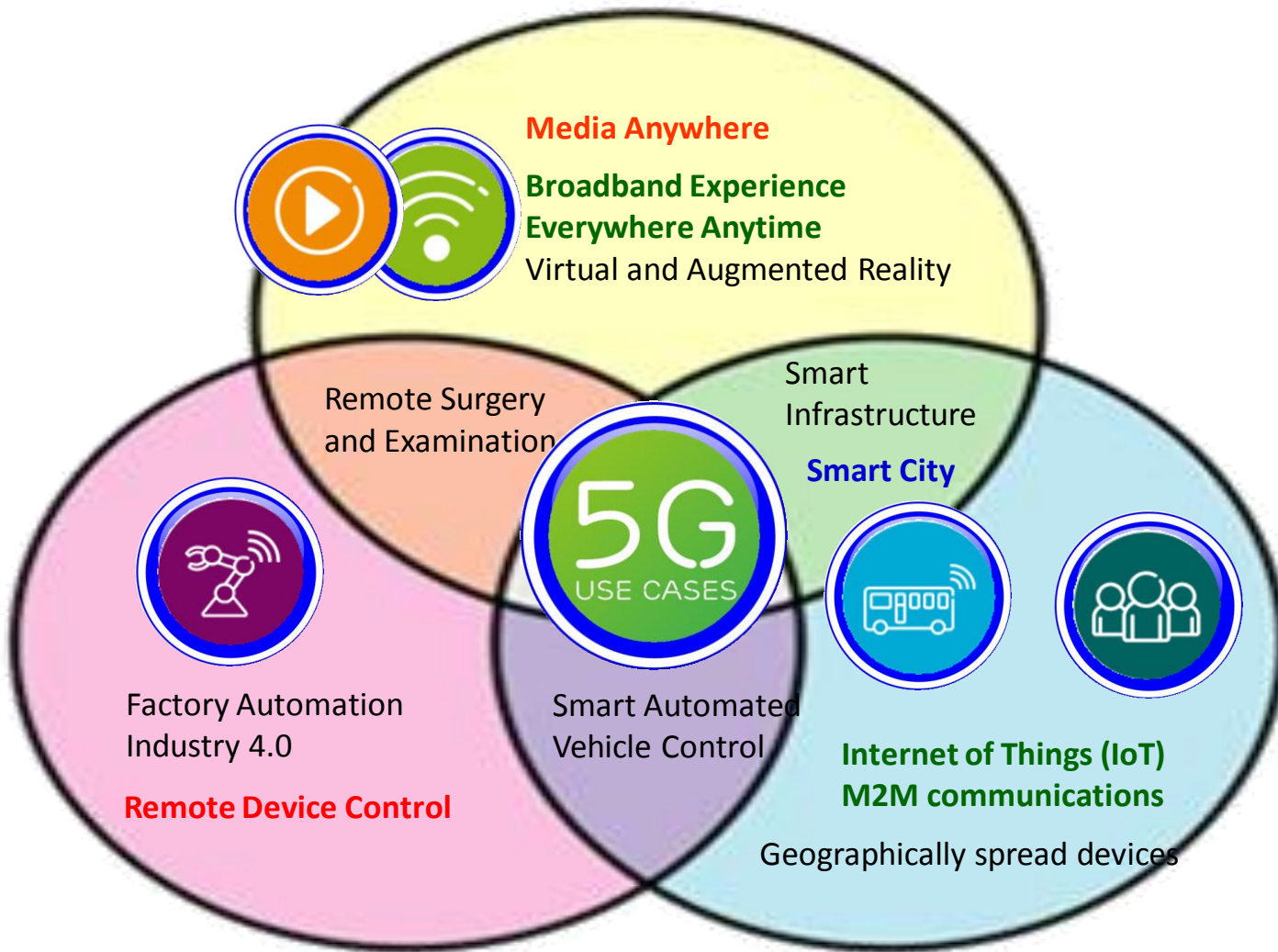
# 5G RAN Wireless Systems



# 3GPP Release 15, IMT-2020 = 5G



## eMBB (enhanced Mobile Broadband)



- Smart
- Connected
- Collaborate
- Access
- Interactive
- Aware

**URLLC (Ultra Reliable Low Latency Communications)**

**mMTC (massive Machine Type Communications)**

# 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)**

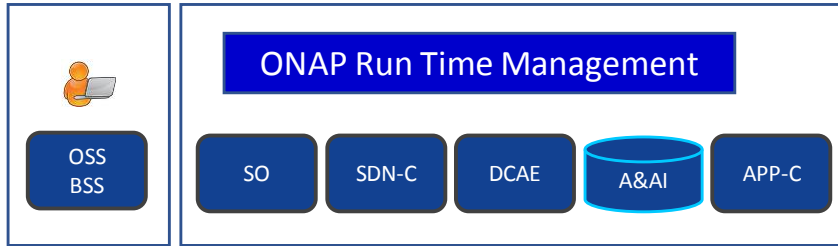


# 5G RAN Wireless Systems & ONAP

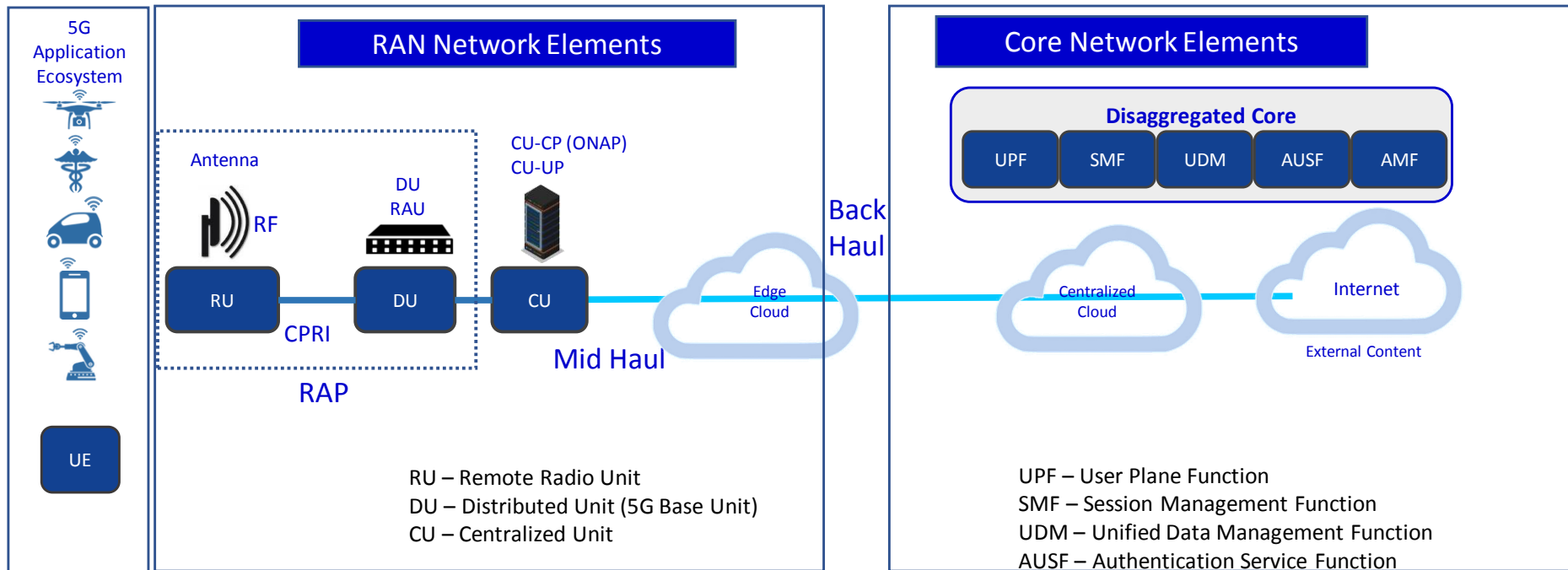




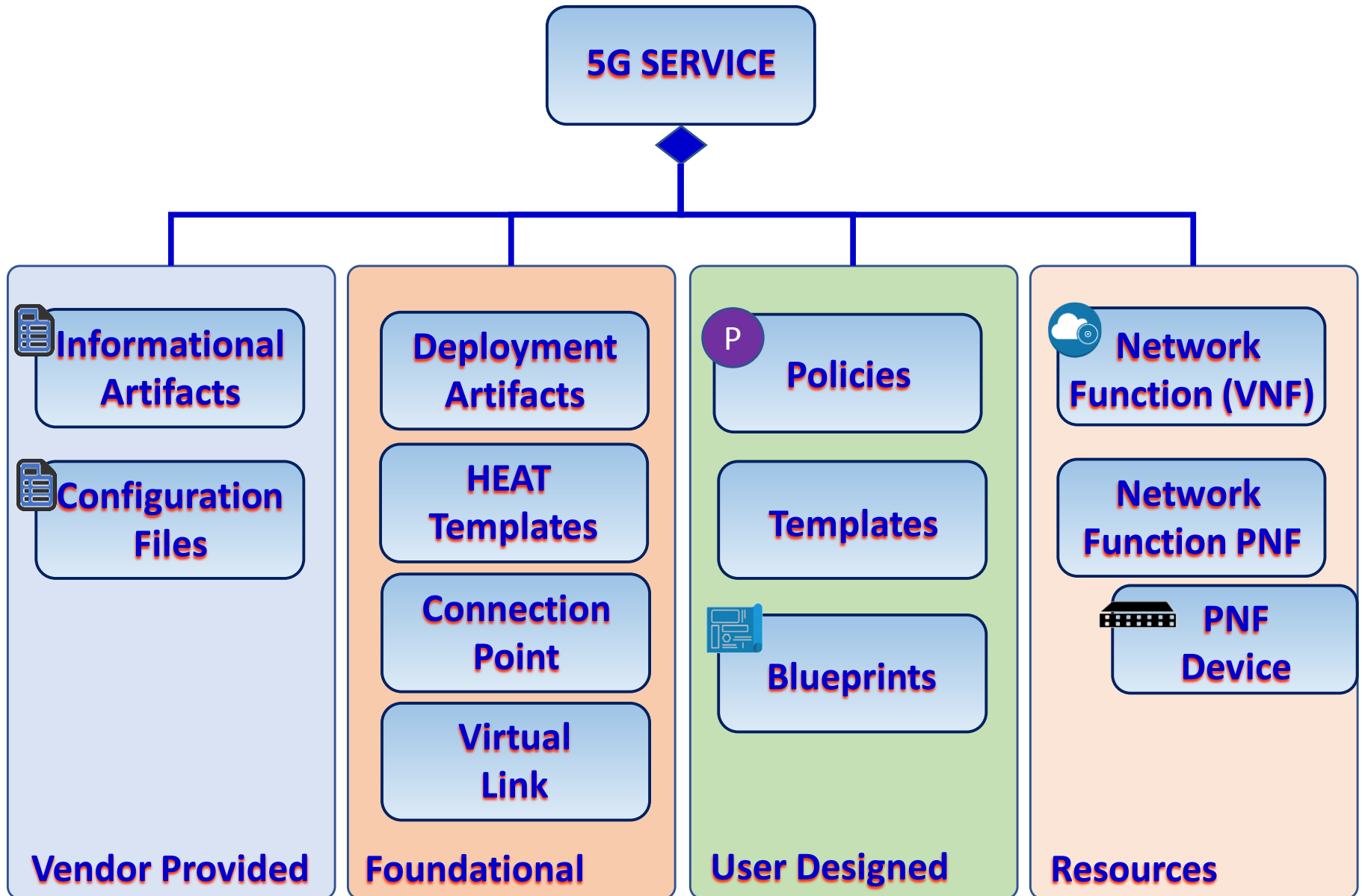
# 5G RAN Wireless Network



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



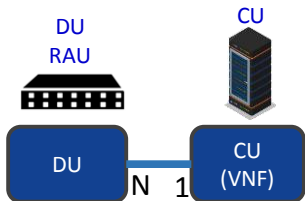
# R4: Modeling a 5G Service



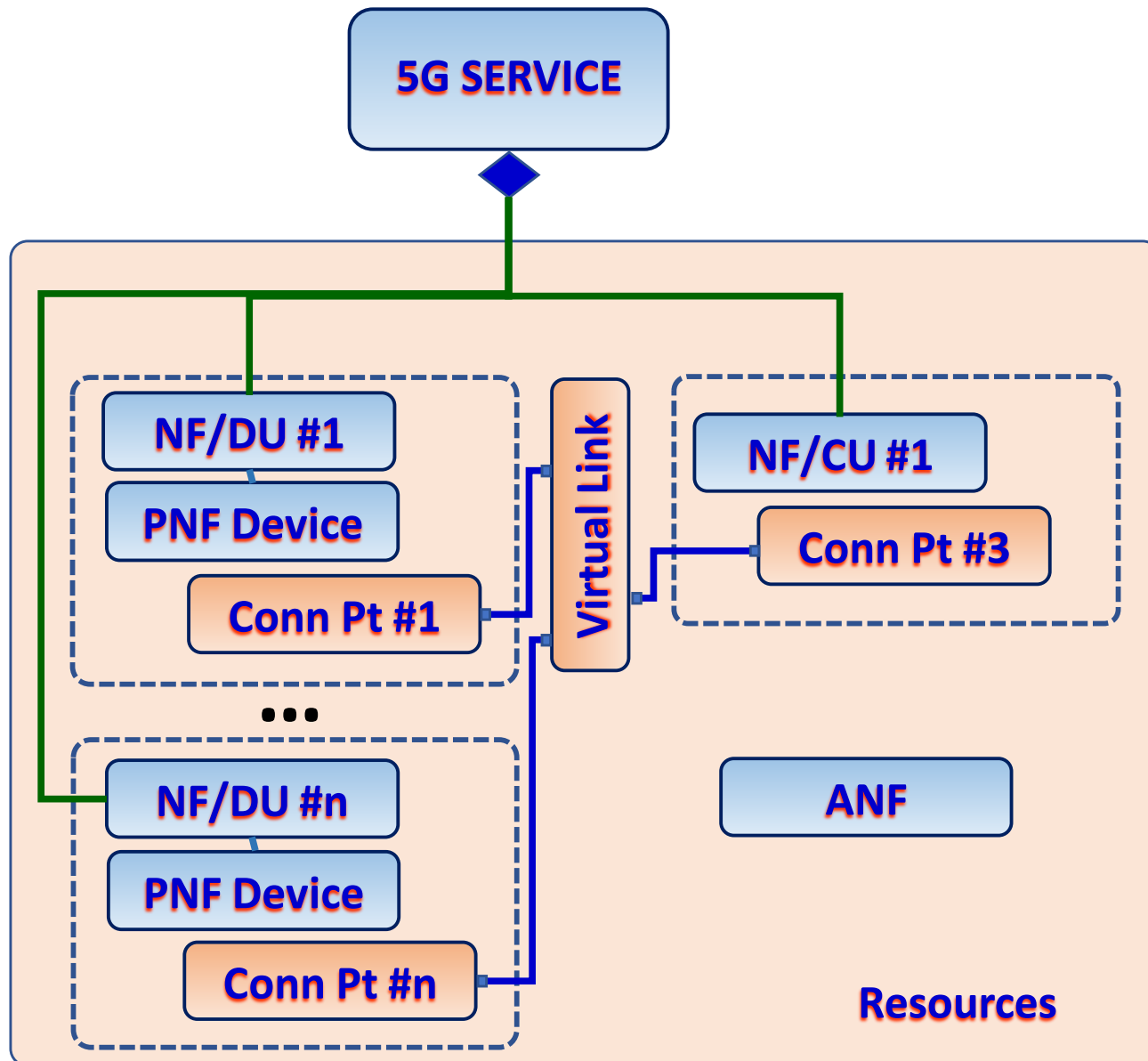
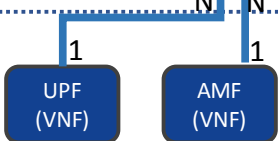
# R4: 5G Base Station (gNodeB)



## RAN Network Elements



## Core Network Elements



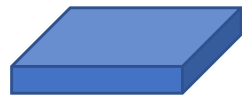
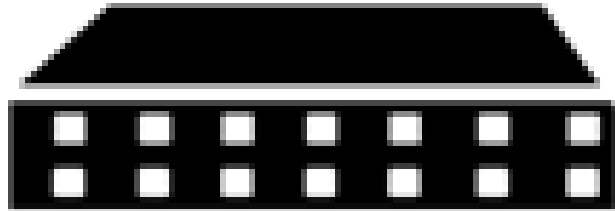
# Configurations



# MODELING WITHIN A PNF (DU)

## 5G DU (PNF)

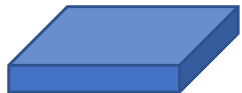
NF PNF – “Application” S/W does 5G voice/data  
N/F Node Type  
Hardware PNF - Modem (5G DU) [Hardware]  
H/W Node Type



Sub-Component #1



Sub-Component #2



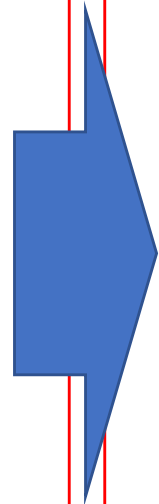
Sub-Component #n



SFP #1 = Port #1



SFP #n = Port #n



*Software Function of a DU*

**Network Function**

*“Hardware Aspects of a PNF”*

**Connection Point**

Ports / NICs

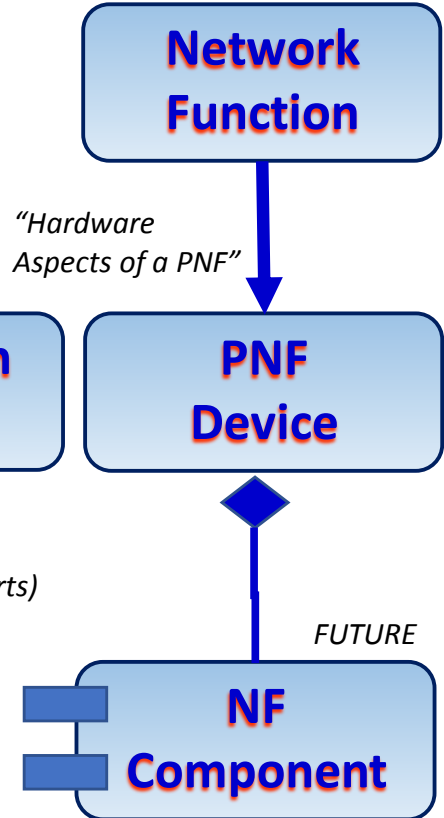
*The hardware Ports  
(e.g. SFP/Backhaul Ports)*

**PNF Device**

*FUTURE*

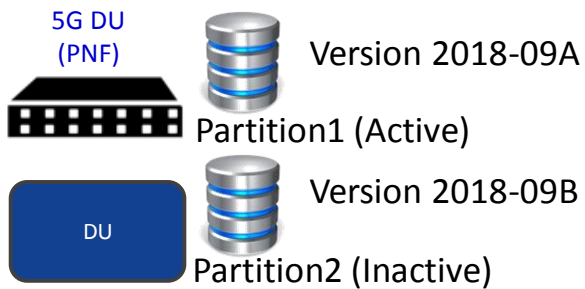
**NF Component**

*Sub-components within PNF*

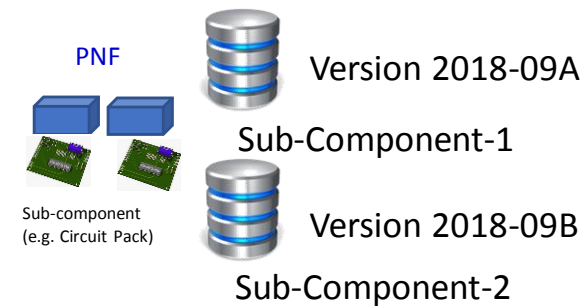


# DU Configurations

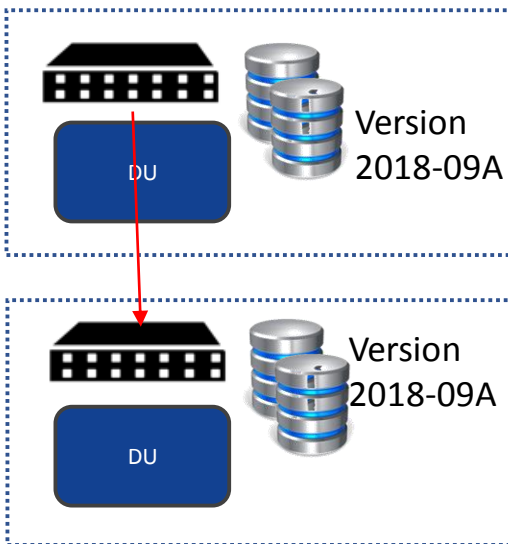
## DRIVE PARTITIONS



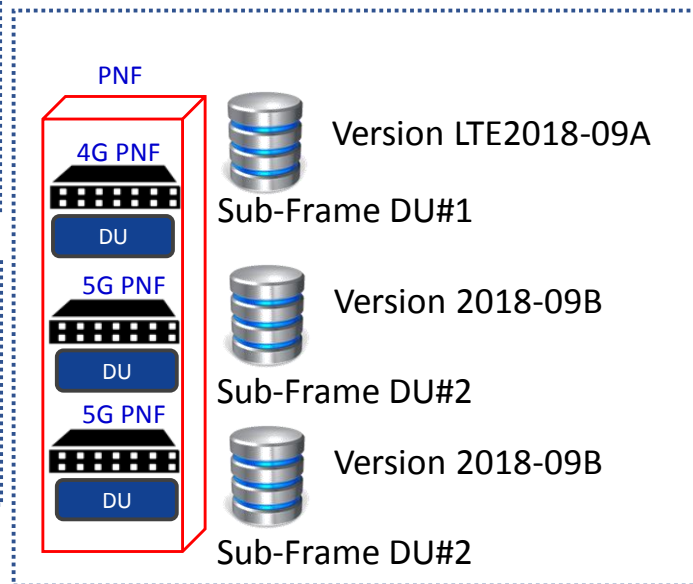
## SUBCOMPONENTS (R4+)



## MULTI-PNF DAISY CHAIN CONFIG



## TANDEM CHASSIS CONFIGURATIONS



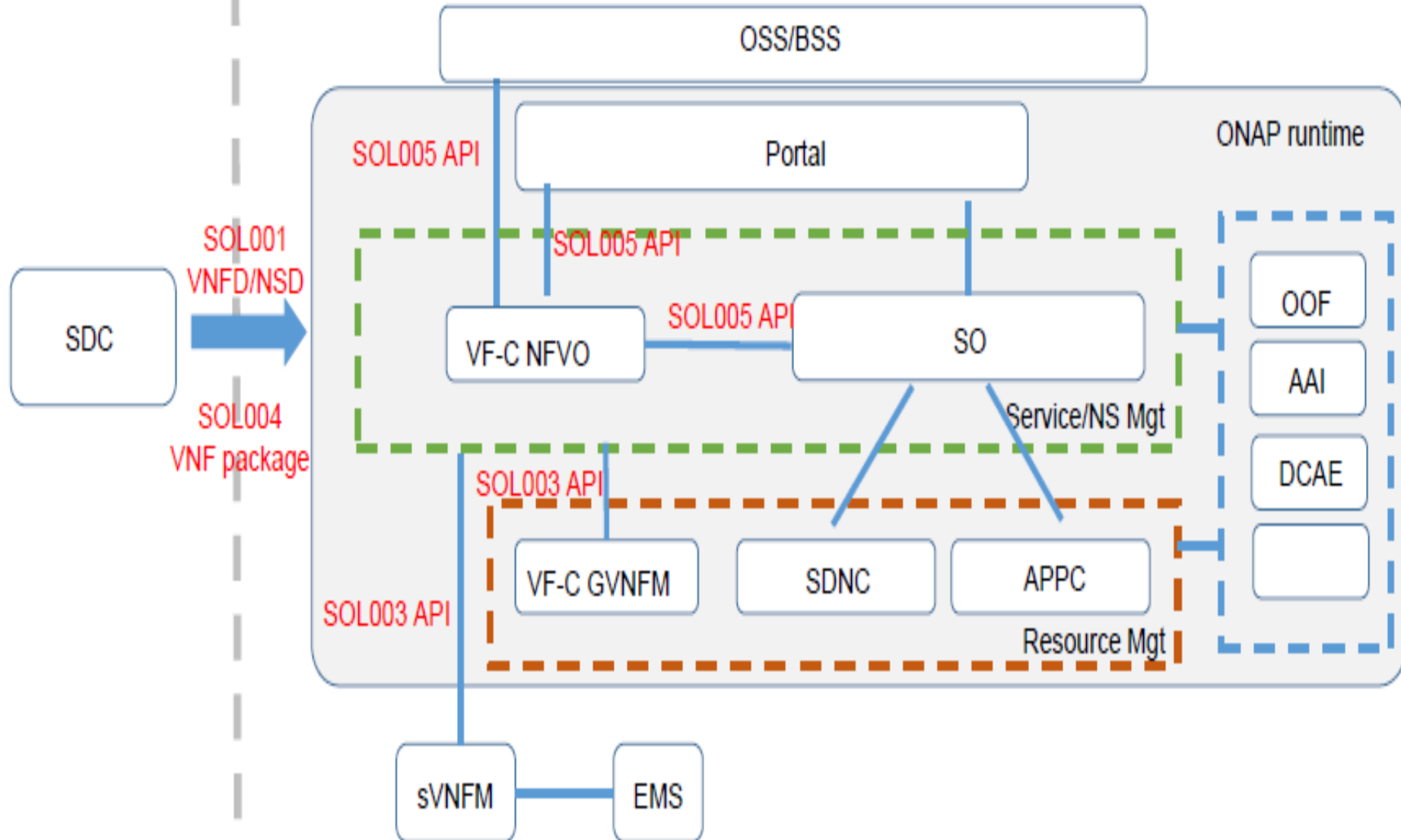
ETSI (SOL 001, SOL 004, SOL005, SOL 007)



# ETSI SOL Standards

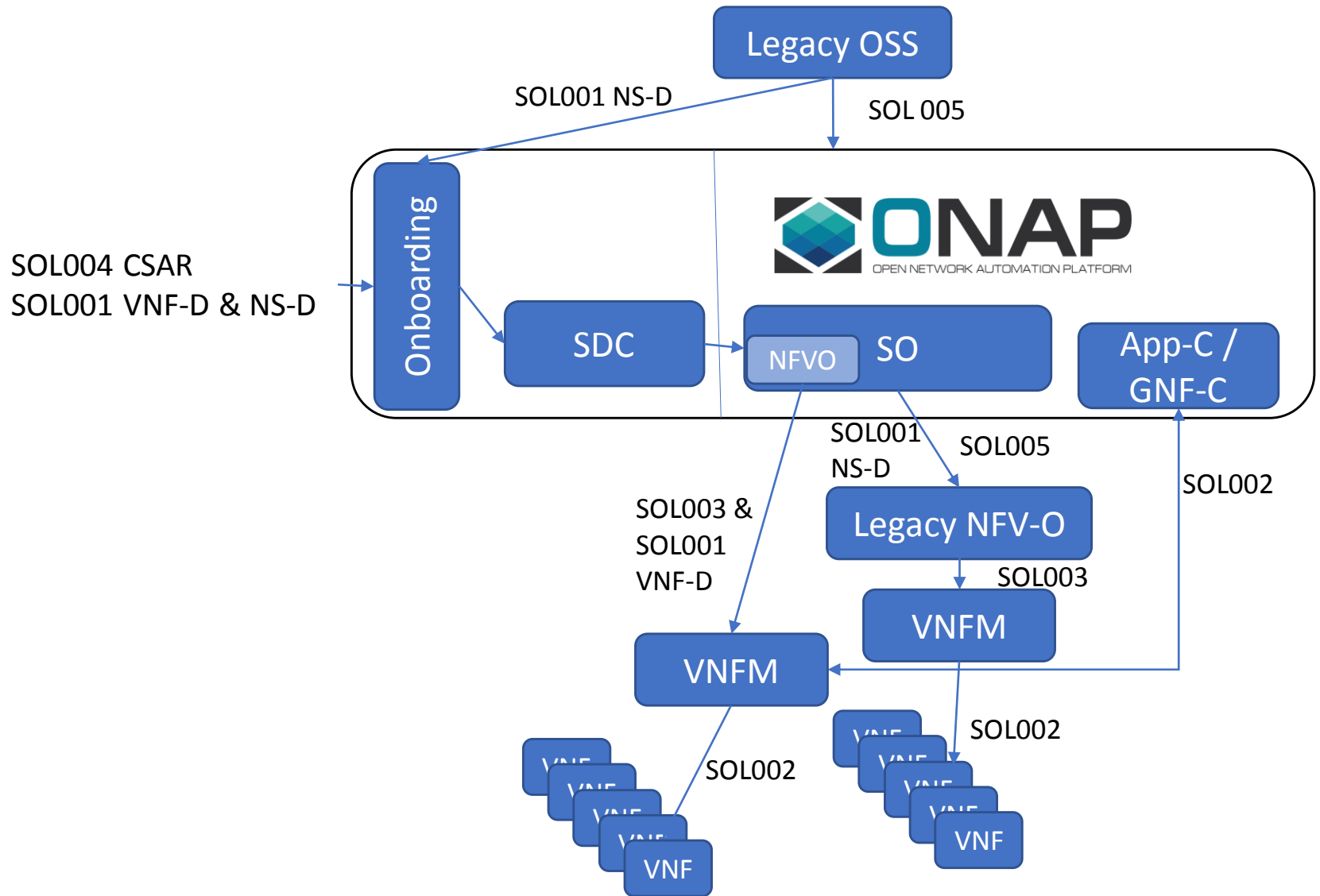
Design Time

Run Time





# ETSI SOL Standards Alignment



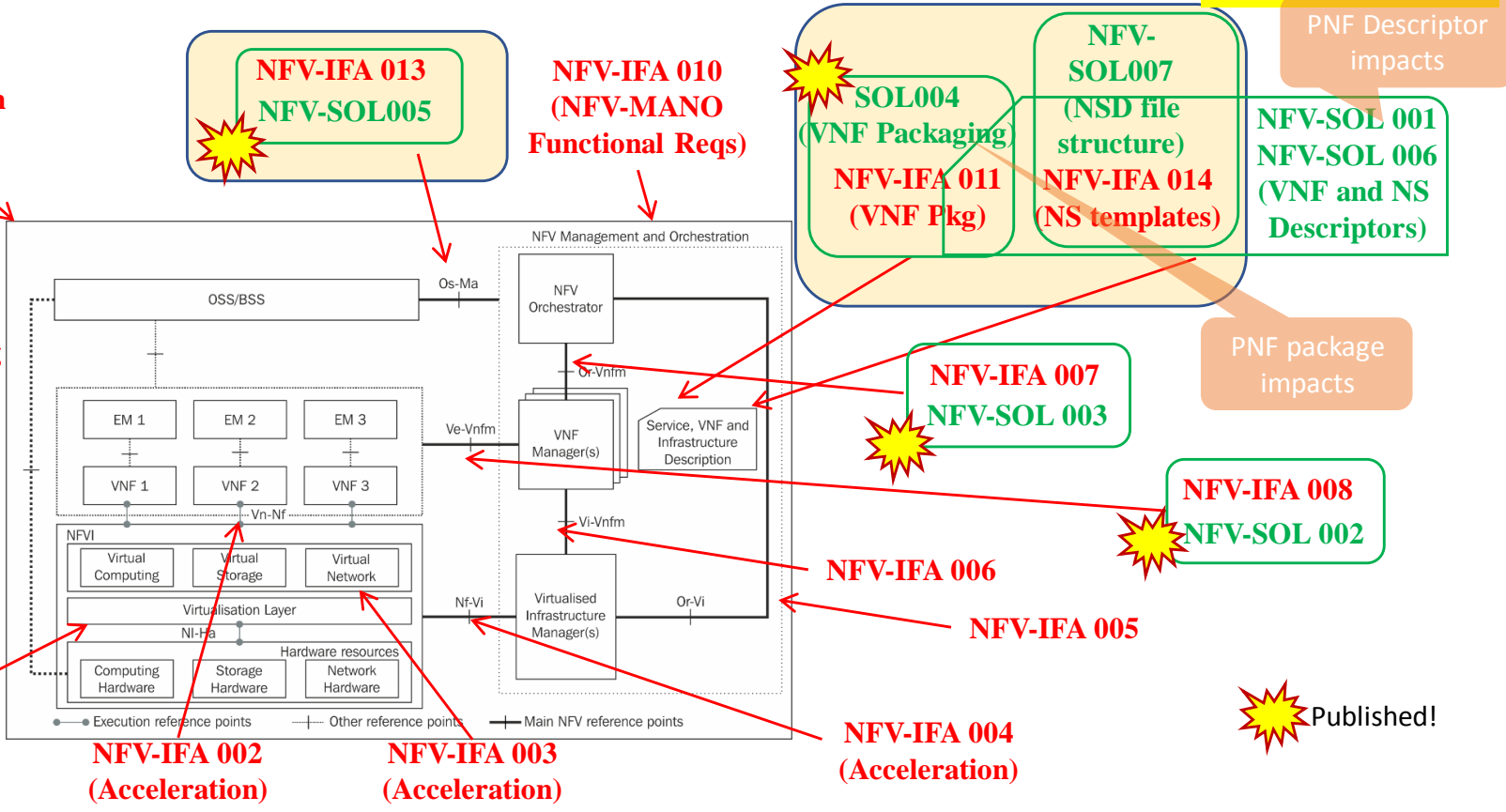
# NFV Release 2: stage 2 and stage 3 specification summary

(\* ) Release 2 Stage 3 work items in "green"

Status as of Apr. 2018

- NFV-IEA 015**  
(NFV Information Model Report)
- + **NFV-IEA 016**  
(Papyrus Guidelines),
- NFV-IEA 017**  
(UML Modeling Guidelines),
- NFV-IEA 024**  
(NFV Information Model External Touchpoints)

**NFV-TST 008**  
(NFVI metrics)



Published!

# VNFD/PNFD/NSD PROPERTIES ALIGNMENT

On-going ETSI discussion

PNFD	VNFD	NSD	Comments
descriptor_id	descriptor_id	descriptor_id	
version	descriptor_version	descriptor_version	Proposed new name in PNFD: <b>descriptor_version</b>
provider	provider	provider	
name	product_info_name	name	Better to be aligned. Proposed new name in VNFD: <b>name</b>
-	software_version	software_version	<p><b>New in PNFD</b></p> <ol style="list-style-type: none"> <li>1. Better to align with VNFD. VNFD uses <b>software_version</b> for only software change. <b>descriptor_id</b> might be changed only due to descriptor evolution itself like security adding.</li> <li>2. Long-term view, it would be useful to upgrade PNF software.</li> <li>3. It is also useful for service provider to get such information for OAM view like trouble-shooting, service checking, PNF packability checking and so on</li> <li>4. Align with ONAP model</li> </ol>
function_description	product_info_description	-	Proposed new name in VNFD: <b>function_description</b> .
descriptor_invariant_id	product_name	invariant_id	Add <b>function_description</b> into NSD
geographical_location_info	-	-	Proposed new name in VNFD / PNFD: <b>invariant_id</b>

# SOL004 EXPANDED SCOPE OPTION

On-going ETSI discussion

● Tentative updated SOL004 title :

“Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; VNF Package specification **and PNF file specification**”

● Tentative updated scope:

The present document specifies the structure and format of a VNF package file and its constituents, fulfilling the requirements specified in ETSI GS NFV-IFA 011 [1] for a VNF package **and in ETSI GS NFV-IFA 014 [x] for a PNFD.**

● Working schedule:

<u>Milestone name</u>	<u>Target date</u>
• CR approval with expanded scope of 2.6.1	2018/12/07
• Functional CRs approved	2018/12/13
• WG approval	2018/12/31
• TB approval	2019/01/31



# Requirements

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# ONAP VNF Descriptor (5.1.9) Requirements

R number	Description	Comments
<a href="#">R-35854</a>	The VNF Descriptor (VNFD) provided by VNF vendor <b>MUST</b> comply with TOSCA/YAML based Service template for VNF descriptor specified in ETSI NFV-SOL001.	Shall applicable to PNFD
<a href="#">R-65486</a>	The VNFD <b>MUST</b> comply with ETSI GS NFV-SOL001 document endorsing the above mentioned NFV Profile and maintaining the gaps with the requirements specified in ETSI GS NFV-IFA011 standard.	Shall applicable to PNFD
<a href="#">R-17852</a>	The VNFD <b>MAY</b> include TOSCA/YAML definitions that are not part of NFV Profile. If provided, these definitions <b>MUST</b> comply with TOSCA Simple Profile in YAML v.1.2.	Shall applicable to PND
<a href="#">R-46527</a>	A VNFD is a deployment template which describes a VNF in terms of deployment and operational behavior requirements. ... including topology, deployment aspect, and VNF lifecycle management (LCM) operations	PNF LCM is not defined yet
<a href="#">R-15837</a>	The major TOSCA Types specified in ETSI NFV-SOL001 standard draft	
<a href="#">R-54356</a> <a href="#">R-54876</a>	VNF Data Types	CpProtocolData AddressData L2AddressData L3AddressData LocationInformation CivicAddressElement
<a href="#">R-67895</a>	VNF Capability Types	VirtualLinkable
<a href="#">R-95321</a>	VNF Relationship Types	VirtualLinksTo
<a href="#">R-32155</a>	VNF Interface Types	
		PNF Node Types: PNF, PnfExtCp, Cp
		PBF Policy Types

# ONAP VNF CSAR Package (5.1.6) Requirements

R number	Description	Comments
<a href="#">R-51347</a>	The VNF package <b>MUST</b> be arranged as a CSAR archive as specified in TOSCA Simple Profile in YAML 1.2.	Shall applicable to PNF package
<a href="#">R-87234</a>	The VNF package provided by a VNF vendor <b>MAY</b> be either with TOSCA-Metadata directory (CSAR Option 1) or without TOSCA-Metadata directory (CSAR Option 2) as specified in ETSI GS NFV-SOL004. On-boarding entity (ONAP SDC) must support both options. <b>Note:</b> SDC supports only the CSAR Option 1 in Casablanca. The Option 2 will be considered in future ONAP releases,	Shall applicable to PNF package
<a href="#">R-10087</a>	The VNF package <b>MUST</b> contain all standard artifacts as specified in ETSI GS NFV-SOL004 including Manifest file, VNFD (or Main TOSCA/YAMLbased Service Template) and other optional artifacts. CSAR Manifest file as per SOL004 - for example ROOT\ <b>MainServiceTemplate.mf</b>	Shall applicable to PNF package
<a href="#">R-01123</a>	The VNF package Manifest file <b>MUST</b> contain: VNF package meta-data, a list of all artifacts (both internal and external) entry's including their respected URI's, an algorithm to calculate a digest and a digest result calculated on the content of each artifacts, as specified in ETSI GS NFV-SOL004. The VNF Package <b>MUST</b> include VNF Identification Data to uniquely identify the resource for a given VNF provider. The identification data must include: an identifier for the VNF, the name of the VNF as was given by the VNF provider, VNF description, VNF provider, and version.	Shall applicable to PNF package With new valid names/values <ul style="list-style-type: none"> <li>- pnf_provider_id</li> <li>- pnf_product_name</li> <li>- pnf_release_date_time</li> <li>- pnf_package_version</li> </ul>
<a href="#">R-21322</a>	The VNF provider <b>MUST</b> provide their testing scripts to support testing as specified in ETSI NFV-SOL004 - Testing directory in CSAR	Should applicable to PNF package
<a href="#">R-26885</a>	The VNF provider <b>MUST</b> provide the binaries and images needed to instantiate the VNF (VNF and VNFC images) either as: <ul style="list-style-type: none"> <li>• Local artifact in CSAR: ROOT\Artifacts\<b>VNF_Image.bin</b></li> <li>• externally referred (by URI) artifact in Manifest file (also may be referred by VNF Descriptor)</li> </ul> Note: Currently, ONAP doesn't have the capability of Image management, we upload the image into VIM/VNFM manually.	May applicable to PNF package Not supported with current release
<a href="#">R-40820</a>	The VNF provider <b>MUST</b> enumerate all of the open source licenses their VNF(s) incorporate. CSAR License directory as per ETSI SOL004. for example ROOT\Licenses\ <b>License_term.txt</b>	May applicable to PNF package
R-xxxxx	<b>VNF Package Authenticity</b>	May applicable to PNF package

# PNF on-boarding requirements (7.2)

R number	Description	Comments
<a href="#">R-77707</a>	The xNF provider <b>MUST</b> include a Manifest File that contains a list of <b>all</b> the components in the <b>xNF package</b>	<a href="#">OK. Overlapped with R-10087</a> in section 5.1.6.3
<a href="#">R-66070</a>	The xNF Package <b>MUST</b> include xNF Identification Data to uniquely identify the resource for a given xNF provider. The identification data must include: an identifier for the xNF, the name of the xNF as was given by the xNF provider, xNF description, xNF provider, and version.	Part of the descriptor
<a href="#">R-98617</a>	The xNF provider <b>MUST</b> provide information regarding any dependency (e.g., affinity, anti-affinity) with other xNFs and resources.	Part of the descriptor
<a href="#">R-22346</a>	The VNF package <b>MUST</b> provide VES Event Registration for all VES events provided by that xNF.	VES event Registration Should be applicable to PNF
<a href="#">R-89571</a>	The xNF <b>MUST</b> support and provide artifacts for configuration management using at least one of the following technologies; a) Netconf/YANG, b) Chef, or c) Ansible.	
<a href="#">R-30278</a>	The xNF provider <b>MUST</b> provide a Resource/Device YANG model as a foundation for creating the YANG model for configuration. This will include xNF attributes/parameters and valid values/attributes configurable by policy.	
<a href="#">R-27711</a>	The xNF provider <b>MUST</b> provide an XML file that contains a list of xNF error codes, descriptions of the error, and possible causes/corrective action	Not the proposed FM dictionary
<a href="#">R-74763</a>	The xNF provider <b>MUST</b> provide an artifact per xNF that contains all of the xNF Event Records supported. The artifact should include reference to the specific release of the xNF Event Stream Common Event Data Model document it is based on. (e.g., <a href="#">VES Event Listener</a> )	VES event Listener
<a href="#">R-35851</a>	The xNF Package <b>MUST</b> include xNF topology that describes basic network and application connectivity internal and external to the xNF including Link type, KPIs, Bandwidth, latency, jitter, QoS (if applicable) for each interface.	Part of the descriptor?
<a href="#">R-26881</a>	The xNF provider <b>MUST</b> provide the binaries and images needed to instantiate the xNF (xNF and VNFC images).	Not supported by Casablanca
<a href="#">R-96634</a>	The xNF provider <b>MUST</b> describe scaling capabilities to manage scaling characteristics of the xNF.	Not supported by PNF
<a href="#">R-04298</a>	The xNF provider <b>MUST</b> provide their testing scripts to support testing.	Testing Requirements.
<a href="#">R-58775</a>	The xNF provider <b>MUST</b> provide software components that can be packaged with/near the xNF, if needed, to simulate any functions or systems that connect to the xNF system under test. This component is necessary only if the existing testing environment does not have the necessary simulators.	
<a href="#">R-85653</a>	The xNF <b>MUST</b> provide metrics (e.g., number of sessions, number of subscribers, number of seats, etc.) to ONAP for tracking every license.	Only if Licensing is needed
<a href="#">R-40827</a>	The xNF provider <b>MUST</b> enumerate all of the open source licenses their xNF(s) incorporate.	
<a href="#">R-85991</a>	The xNF provider <b>MUST</b> provide a universal license key per xNF to be used as needed by services (i.e., not tied to a VM instance) as the recommended solution. The xNF provider may provide pools of Unique xNF License Keys, where there is a unique key for each xNF instance as an alternate solution. Licensing issues should be resolved without interrupting in-service xNFs.	
<a href="#">R-47849</a>	The xNF provider <b>MUST</b> support the metadata about licenses (and their applicable entitlements) as defined in this document for xNF software, and any license keys required to authorize use of the xNF software. This metadata will be used to facilitate onboarding the xNF into the ONAP environment and automating processes for putting the licenses into use and managing the full lifecycle of the licenses.	



# PNF on-boarding requirements (7.2)

- [VNFRQTS-506: Supporting PNF package onboarding](#)
  - [VNFRQTS-507](#): Project scope to include PNF
  - [VNFRQTS-508](#): Add PNFD requirements
  - Section 5.1.6:
    - [VNFRQTS-499](#): PNF onboarding CSAR package structure based SOL004
    - [VNFRQTS-497](#): Adding package security requirements
  - Section 7.2:
    - Clarifications on the documentation requirements
    - [VNFRQTS-505](#): PNF onboarding package artifacts
    - [VNFRQTS-498](#): Adding VES Event Registration requirement to PNF package
    - Clarifications on artifacts structure requirements
    - [VNFRQTS-496](#): supporting Ansible protocol in PNF

- Proposed changes to ONAP
  - Update VNFSDK tool to include PNF
    - [VNFSDK-337](#): Supporting PNF package onboarding
  - Update VNF requirement documentation to include PNF package requirements
    - [VNFQRQS-506](#): Supporting PNF package onboarding
  - Update SDC to adopt PNF package requirements
    - [SDC-1970](#): Support PNF package onboarding
- Proposed changes to ETSI NFV
  - Adding PNF package requirements to SOL004
    - Extend SOL004 WI proposed: [Specification of PNF Package file structure](#)
    - Adding PNF Package Support in SOL004 CR
  - Update PNF in SOL001



# REFERENCES / APPENDIX / BACKUP SLIDES

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- General
- Deployment Artifact**
- Information Artifact
- TOSCA Artifacts
- Composition
- Operation
- Activity Log
- Deployment
- Properties Assignment

## Deployment Artifact

Name	Type	Deployment timeout	Version	UUID	
VF License	VF_LICENSE		1	e6e2400c-a2de-483f-acd1-c31aeba7ef46	<a href="#">↓</a>
base_vfw	HEAT	60	2	1622eb22-0902-4468-979e-23f4dfed4c4f	<a href="#">↓</a>
VF HEAT ENV	HEAT_ENV		0		<a href="#">↓</a>
Vendor License	VENDOR_LICENSE		1	08c22b3a-6087-45ee-9192-af9399491239	<a href="#">↓</a>



Deployment Artifact

Name	Type	Deployment timeout	Version	UUID	
VF License	VF_LICENSE		1	e6e2400c-a2de-483f-act1-c31acba7ef46	<a href="#">↓</a>
base_vfw	HEAT	60	2	1622eb22-0902-4468-079e-23f4dfe4c4f	<a href="#">↓</a>
VF HEAT ENV	HEAT_ENV		0		<a href="#">↓</a>
Vendor License	VENDOR_LICENSE		1	08c22b3a-6087-46ee-9192-af9399491239	<a href="#">↓</a>

General

Deployment Artifact

Information Artifact

TOSCA Artifacts

Composition

Operation

Activity Log

Deployment

Properties Assignment

```

171 networks:
172 - network: { get_param: public_net_id }
173 - port: { get_resource: vfw_private_0_port }
174 - port: { get_resource: vfw_private_1_port }
175 - port: { get_resource: vfw_private_2_port }
176 metadata: {vnf_id: { get_param: vnf_id }, vf_module_id: { get_param: vf_module_id }}
177 user_data format: RAM
178 user_data:
179   str_replace:
180     params:
181       __dcae_collector_ip__ : { get_param: dcae_collector_ip }
182       __dcae_collector_port__ : { get_param: dcae_collector_port }
183       __repo_url_blob__ : { get_param: repo_url_blob }
184       __repo_url_artifacts__ : { get_param: repo_url_artifacts }
185       __demo_artifacts_version__ : { get_param: demo_artifacts_version }
186 template: |
187   #!/bin/bash
188
189   DCAE_COLLECTOR_IP=__dcae_collector_ip__
190   DCAE_COLLECTOR_PORT=__dcae_collector_port__
191   REPO_URL_BLOB=__repo_url_blob__
192   REPO_URL_ARTIFACTS=__repo_url_artifacts__
193   DEMO_ARTIFACTS_VERSION=__demo_artifacts_version__
194
195   # Download required dependencies
196   add-apt-repository -y ppa:openjdk-r/ppa
197   apt-get update
198   apt-get install -y make wget openjdk-8-jdk gcc libcurl4-
199   apt-get install -y maven
200   pip install jsonschema
201
202   # Download vFirewall code for virtual firewall
203   mkdir /opt/config
204   mkdir /opt/honeycomb
205   cd /opt
206   wget $REPO_URL_BLOB/org.openecomp.demo/vnfs/vfw/$DEMO_ARTIFACTS_VERSION/v firewall_init.sh
207   wget $REPO_URL_BLOB/org.openecomp.demo/vnfs/vfw/$DEMO_ARTIFACTS_VERSION/vfirewall.sh
208
209   mvn org.apache.maven.plugins:maven-dependency-plugin:2.10:get -DremoteRepositories=$REPO_URL_ARTIFACTS
210   -Dartifact=org.openecomp.demo.vnf:sample-distribution:$DEMO_ARTIFACTS_VERSION:tar.gz:hc -Dtransitive=false -Ddest=.
211   mvn org.apache.maven.plugins:maven-dependency-plugin:2.10:get -DremoteRepositories=$REPO_URL_ARTIFACTS -Dartifact=org.openecomp.demo.vnf:ves:ves:$DEMO_ARTIFACTS_VERSION:tar.gz:
212   -Dtransitive=false -Ddest=.
213   mvn org.apache.maven.plugins:maven-dependency-plugin:2.10:get -DremoteRepositories=$REPO_URL_ARTIFACTS
214   -Dartifact=org.openecomp.demo.vnf:ves:ves_vfw_reporting:$DEMO_ARTIFACTS_VERSION:tar.gz:demo -Dtransitive=false -Ddest=.
215
216   tar -zxvf ves-$DEMO_ARTIFACTS_VERSION-demo.tar.gz
217   mv ves-$DEMO_ARTIFACTS_VERSION VES
218   tar -zxvf ves_vfw_reporting-$DEMO_ARTIFACTS_VERSION-demo.tar.gz
219   mv ves_vfw_reporting-$DEMO_ARTIFACTS_VERSION VESreporting_vfw
220   tar -zxvf sample-distribution-$DEMO_ARTIFACTS_VERSION-hc.tar.gz
221   mv sample-distribution-$DEMO_ARTIFACTS_VERSION honeycomb

```



certificates