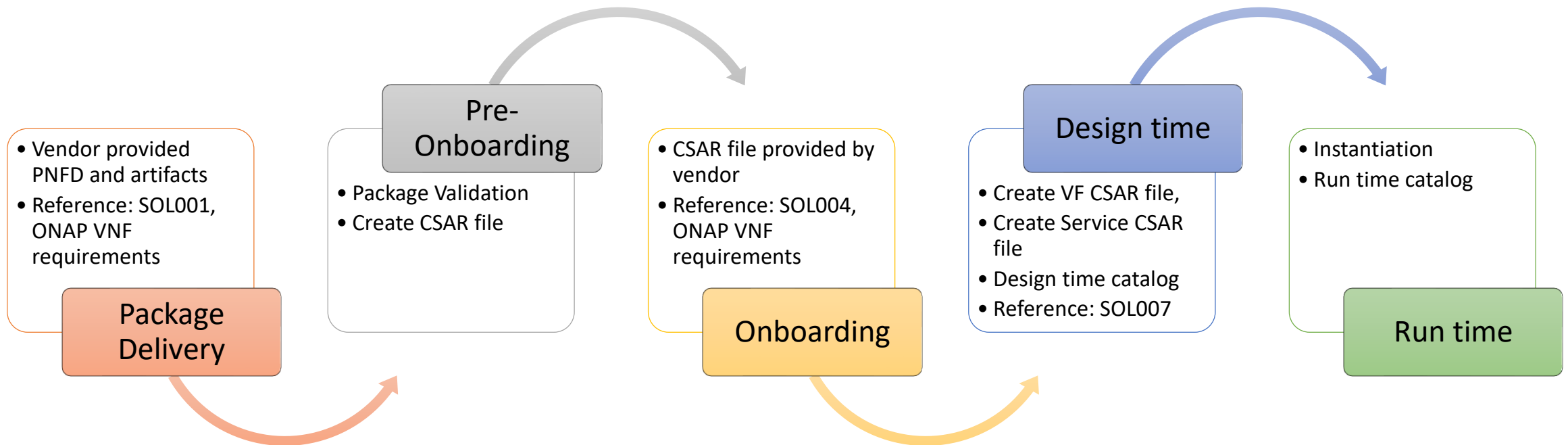# PNF Package Discussion

Ericsson

PNF Package

✓ ETSI
  - ✓ Introduce PNF package into ETSI NFV
  - ✓ PNF / VNF package format should be aligned

✓ ONAP
  - ✓ Defining the PNF Descriptor / Package in ONAP Dublin release based on the proposed ETSI NFV PNF package format.
  - ✓ Improve the ONAP VNFSDK to support PNF package
  - ✓ Update the ONAP VNF requirements for PNF package
  - ✓ Improve ONAP SDC to support PNF package onboarding

ONAP onboarding procedure

- Vendor provided PNFD and artifacts
- Reference: SOL001, ONAP VNF requirements

Package Delivery

Pre-Onboarding

- Package Validation
- Create CSAR file

- CSAR file provided by vendor
- Reference: SOL004, ONAP VNF requirements

Onboarding

Design time

- Create VF CSAR file,
- Create Service CSAR file
- Design time catalog
- Reference: SOL007

- Instantiation
- Run time catalog

Run time

NFV Release 2: stage 2 and stage 3 specification summary

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

PNF Descriptor impacts

PNF package impacts

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

NFV-IFA 013 NFV-SOL005

NFV-IFA 010 (NFV-MANO Functional Reqs)

SOL004 (VNF Packaging)

NFV-IFA 011 (VNF Pkg)

NFV-SOL007 (NSD file structure)

NFV-IFA 014 (NS templates)

NFV-SOL 001 NFV-SOL 006 (VNF and NS Descriptors)

NFV-IFA 007 NFV-SOL 003

NFV-IFA 008 NFV-SOL 002

NFV-IFA 006

NFV-IFA 005

NFV-TST 008 (NFVI metrics)
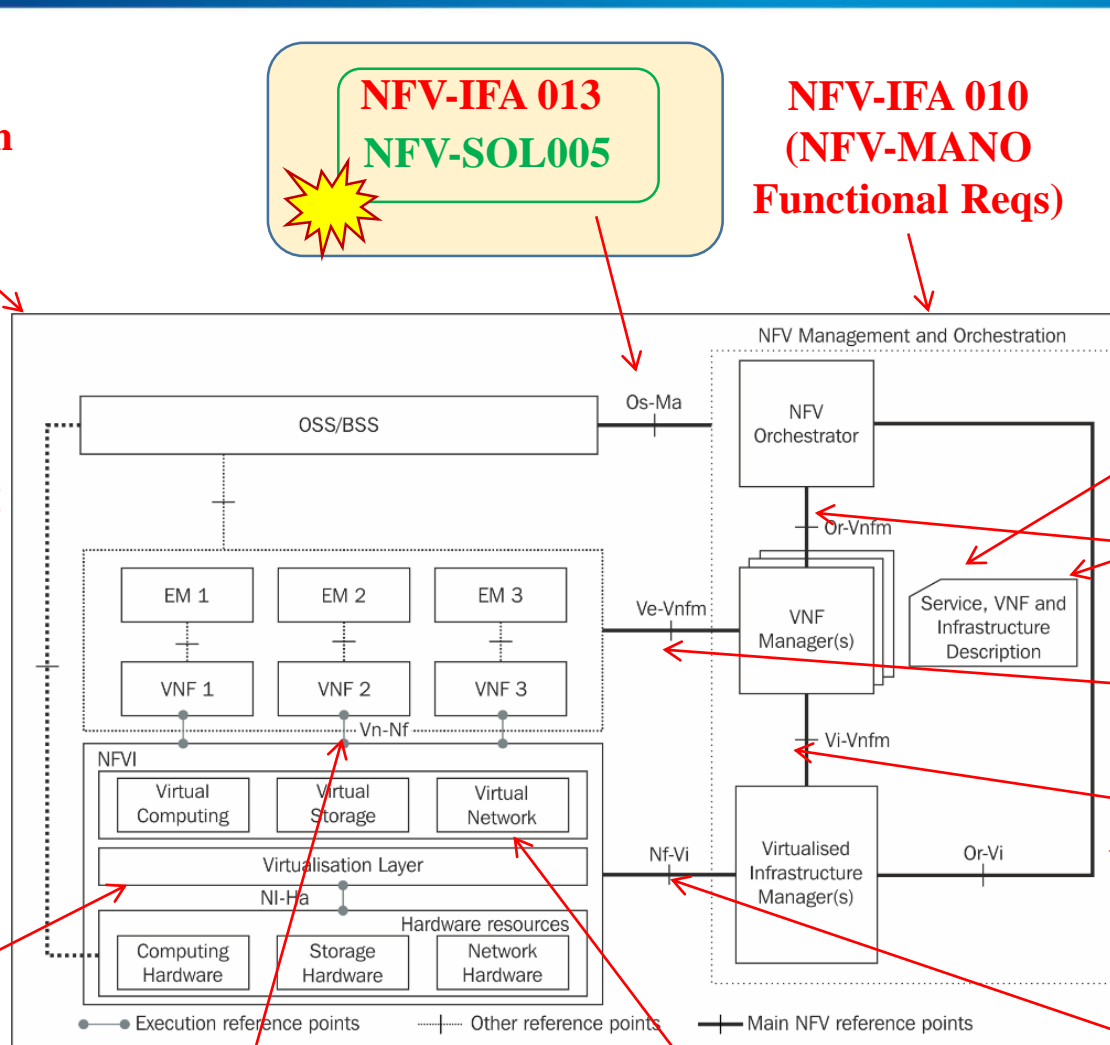
NFV-IFA 002 (Acceleration)

NFV-IFA 003 (Acceleration)

NFV-IFA 004 (Acceleration)

Published!

NFV Management and Orchestration

OSS/BSS — Os-Ma — NFV Orchestrator

Or-Vnfm

EM 1 EM 2 EM 3

Ve-Vnfm — VNF Manager(s) — Service, VNF and Infrastructure Description

VNF 1 VNF 2 VNF 3

Vn-Nf

NFVI

Vi-Vnfm

Virtual Computing Virtual Storage Virtual Network

Virtualisation Layer

Nl-Ha

Nf-Vi — Virtualised Infrastructure Manager(s) — Or-Vi

Hardware resources

Computing Hardware Storage Hardware Network Hardware

●—● Execution reference points   ┆ Other reference points   — Main NFV reference points

VNFD/PNFD/NSD PROPERTIES ALIGNMENT

PNFD	VNFD	NSD	Comments
descriptor_id	descriptor_id	descriptor_id	
version	descriptor_version	descriptor_version	Proposed new name in PNFD: **descriptor_version**
provider	provider	provider	
name	product_info_name	name	Better to be aligned. Proposed new name in VNFD: name
-	software_version	software_version	**New in PNFD** 1. Better to align with VNFD. VNFD uses **software_version** for only software change. **descriptor_id** might be changed only due to descriptor evolution itself like security adding. 2. Long-term view, it would be useful to upgrade PNF software. 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 4. Align with ONAP model
function_description	product_info_description	-	Proposed new name in VNFD: function_description. Add function_description into NSD
descriptor_invariant_id	product_name	invariant_id	Proposed new name in VNFD / PNFD: invariant_id
geographical_location_info	-	-	

SOL004 EXPANDED SCOPE OPTION

- Tentative <u>updated SOL004 title</u> :
"Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; VNF Package specification and PNF file specification"

- <u>Tentative updated scope:</u>
The present document specifies the structure and format of a ~~V~~NF 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.

- <u>Working schedule:</u>

Milestone name	Target date
• 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

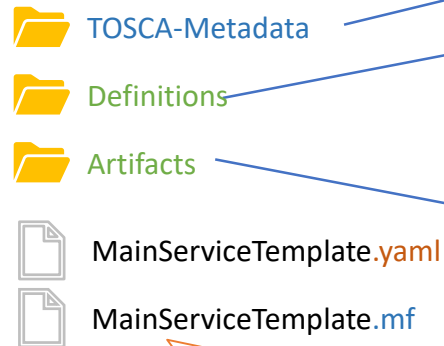# ONAP vender provided VNF packaging
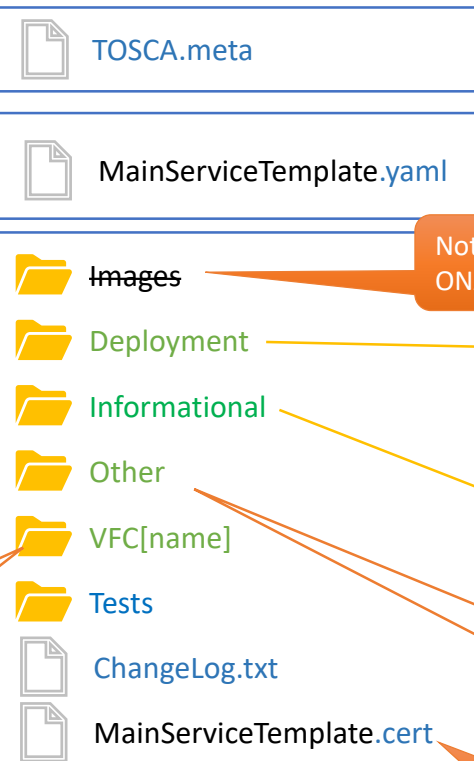
CSAR file

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.

ROOT

- 📁 TOSCA-Metadata
- 📁 Definitions
- 📁 Artifacts
- 📄 MainServiceTemplate.yaml
- 📄 MainServiceTemplate.mf

metadata:
vnf_product_name: gNB
vnf_provider_id: Ericsson
vnf_package_version:1.0
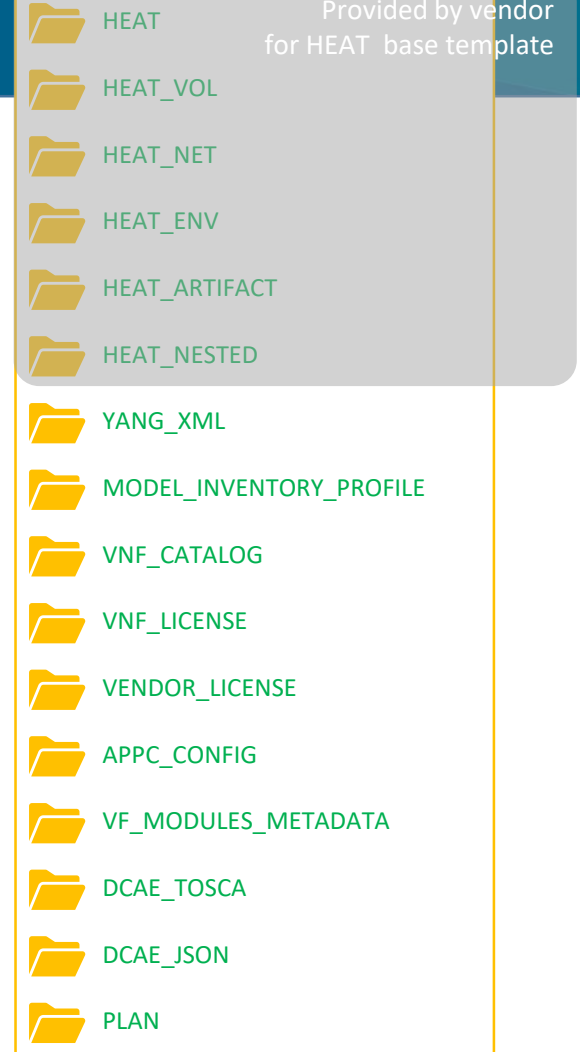vnf_release_date_time:2018-11-07T08:44-05:00

📄 TOSCA.meta

📄 MainServiceTemplate.yaml — NF descriptor

- 📁 Images — Not supported by ONAP Casablanca
- 📁 Deployment
- 📁 Informational
- 📁 Other
- 📁 VFC[name]
- 📁 Tests
- 📄 ChangeLog.txt
- 📄 MainServiceTemplate.cert — Not supported by ONAP Casablanca

Copy of NF descriptor

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

Any unrecognized artifacts

Provided by vendor for HEAT base template

- 📁 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

- 📁 GUIDE
- 📄 Install.csh
- 📄 ...

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# Example for PNF packaging with TOSCA-Metadata

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 green is expected by ONAP.
- 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
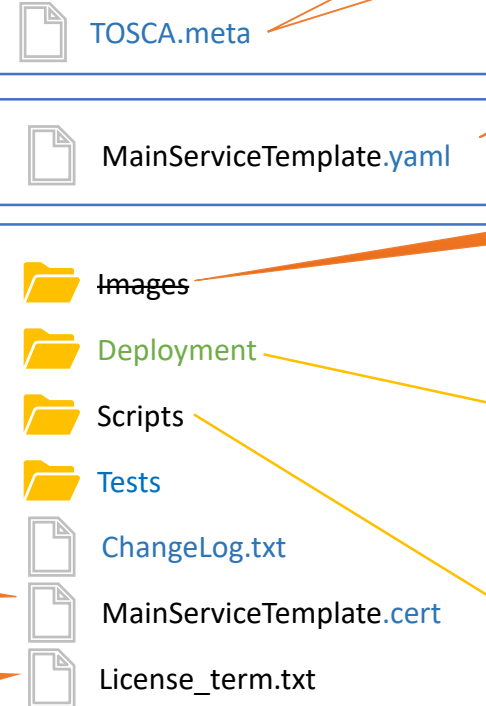Entry-xxx: Artifacts/xxx

ROOT

📁 TOSCA-Metadata
📁 Definitions
📁 Artifacts
📄 MainServiceTemplate.yaml
📄 MainServiceTemplate.mf
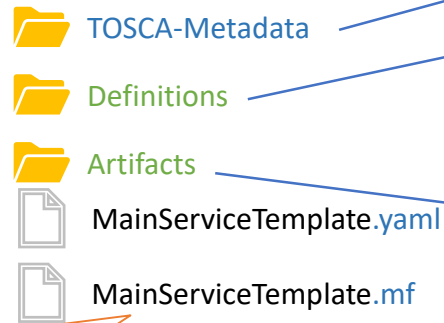
metadata:
pnf_product_name: gNB
pnf_provider_id: Ericsson
pnf_package_version:1.0
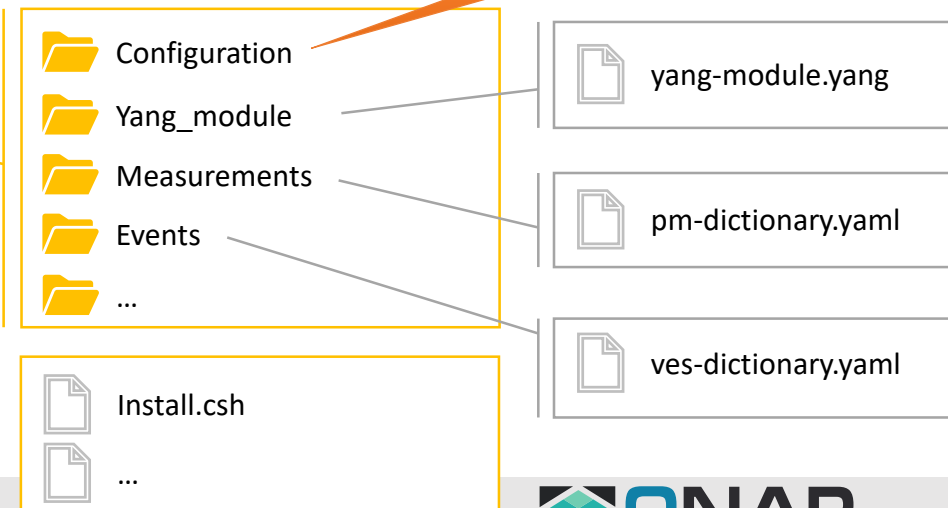pnf_release_date_time:2018-12-03T08:44:00-05:00

📄 TOSCA.meta

📄 MainServiceTemplate.yaml

NF descriptor

📁 Images
📁 Deployment
📁 Scripts
📁 Tests
📄 ChangeLog.txt
📄 MainServiceTemplate.cert
📄 License_term.txt

Copy of NF descriptor?

No ONAP requirement

Maybe empty if no open source licenses

Not supported by ONAP Casablanca

If HEAT is not used…

📁 Configuration
📁 Yang_module
📁 Measurements
📁 Events
📁 …

📄 yang-module.yang

📄 pm-dictionary.yaml

📄 ves-dictionary.yaml

📄 Install.csh
📄 …

SDC Impacts

- **SDC-1973**: (H) Supporting PNF onboarding CSAR package based SOL004
- **SDC-1974**: (H) Supporting PNF manifest file
- **SDC-1975**: (H) Design time catalog to associate artifacts with PNF
- **SDC-1976**: (H) Supporting PNFD (SOL001) mapping to AID model
- **SDC-1977**: (M) Removing folder name dependence
- **SDC-1978**: (M) Removing the duplicate descriptor yaml file
- **SDC-1979**: (M) Allowing the dedicated artifact folder with Entry-point in TOSCA.meta
- **SDC-1980**: (M) Supporting packaging security

ONAP VNF CSAR Package (5.1.6)

R number	Description	Comments
R-51347	The VNF package **MUST** be arranged as a CSAR archive as specified in TOSCA Simple Profile in YAML 1.2.	Should applicable to PNF package
R-87234	The VNF package provided by a VNF vendor **MAY** 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. **Note:** SDC supports only the CSAR Option 1 in Casablanca. The Option 2 will be considered in future ONAP releases,	Should applicable to PNF package
R-10087	The VNF package **MUST** contain all standard artifacts as specified in ETSI GS NFV-SOL004 including Manifest file, VNFD (or Main TOSCA/YAML based Service Template) and other optional artifacts. CSAR Manifest file as per SOL004 - for example ROOT\ **MainServiceTemplate.mf**	Should applicable to PNF package
R-01123	The VNF package Manifest file **MUST** 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 MUST 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.	Should applicable to PNF package With new valid names/values - pnf_provider_id - pnf_product_name - pnf_release_date_time - pnf_package_version
R-21322	The VNF provider **MUST** provide their testing scripts to support testing as specified in ETSI NFV-SOL004 - Testing directory in CSAR	Should applicable to PNF package
R-26885	The VNF provider **MUST** provide the binaries and images needed to instantiate the VNF (VNF and VNFC images) either as: • Local artifact in CSAR: ROOT\Artifacts\ **VNF_Image.bin** • externally referred (by URI) artifact in Manifest file (also may be referred by VNF Descriptor) Note: Currently, ONAP doesn't have the capability of Image management, we upload the image into VIM/VNFM manually.	Should applicable to PNF package Nit supported with current release
R-40820	The VNF provider MUST enumerate all of the open source licenses their VNF(s) incorporate. CSAR License directory as per ETSI SOL004. for example ROOT\Licenses\ **License_term.txt**	Should applicable to PNF package
R-xxxxx	**VNF Package Authenticity**	Should applicable to PNF package

PNF on-boarding requirements (7.2)

R number	Description	Comments
R-77707	The **xNF provider MUST** include a Manifest File that contains a list of **all** the components in the **xNF package**	OK. Overlapped with R-10087 in section 5.1.6.3
R-66070	The xNF Package **MUST** 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
R-98617	The xNF provider **MUST** provide information regarding any dependency (e.g., affinity, anti-affinity) with other xNFs and resources.	Part of the descriptor
R-22346	The VNF package MUST provide VES Event Registration for all VES events provided by that xNF.	VES event Registration Should be applicable to PNF
R-89571	The xNF **MUST** support and provide artifacts for configuration management using at least one of the following technologies; a) Netconf/YANG, b) Chef, or c) Ansible.	
R-30278	The xNF provider **MUST** 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.	
R-27711	The xNF provider **MUST** 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
R-74763	The xNF provider **MUST** 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., VES Event Listener)	VES event Listener
R-35851	The xNF Package **MUST** 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?
R-26881	The xNF provider **MUST** provide the binaries and images needed to instantiate the xNF (xNF and VNFC images).	Not supported by Casablanca
R-96634	The xNF provider **MUST** describe scaling capabilities to manage scaling characteristics of the xNF.	Not supported by PNF
R-04298	The xNF provider **MUST** provide their testing scripts to support testing.	Testing Requirements.
R-58775	The xNF provider **MUST** 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.	
R-85653	The xNF **MUST** 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
R-40827	The xNF provider **MUST** enumerate all of the open source licenses their xNF(s) incorporate.	
R-85991	The xNF provider **MUST** 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.	
R-47849	The xNF provider **MUST** 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.	

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VNF requirements impacts

- Project scope to include PNF

- Add PNFD requirements

- Section 5.1.6:
  - Adding the support of PNF onboarding CSAR package structure based SOL004
  - Adding package security requirements

- Section 7.2:
  - Clarifications on the documentation requirements
  - Clarifications on the artifacts requirements
  - Clarifications on artifacts structure requirements

VNFSDK impacts

- Project scope to include PNF
- Supporting PNF onboarding CSAR package validation and creation:
  - PNF CSAR structure based SOL004
  - PNF manifest file
- Support packaging security
- Any usage of the test scripts in the package?

Impacts

- Proposed changes to ONAP
  - Update VNFSDK tool to include PNF
    - VNFSDK-xxx: PNF packaging support
  - Update VNF requirement documentation to include PNF package
    - VNFRQTS-497: Adding xNF Package security `opened`
    - VNFRQTS-498: Adding VES Event Registration requirement to PNF package `merged`
    - VNFRQTS-499: PNF on boarding CSAR Package `opened`
    - ?
  - Update SDC to adopt PNF package requirements
    - SDC-1970: (H) Support PNF package onboarding `opened`
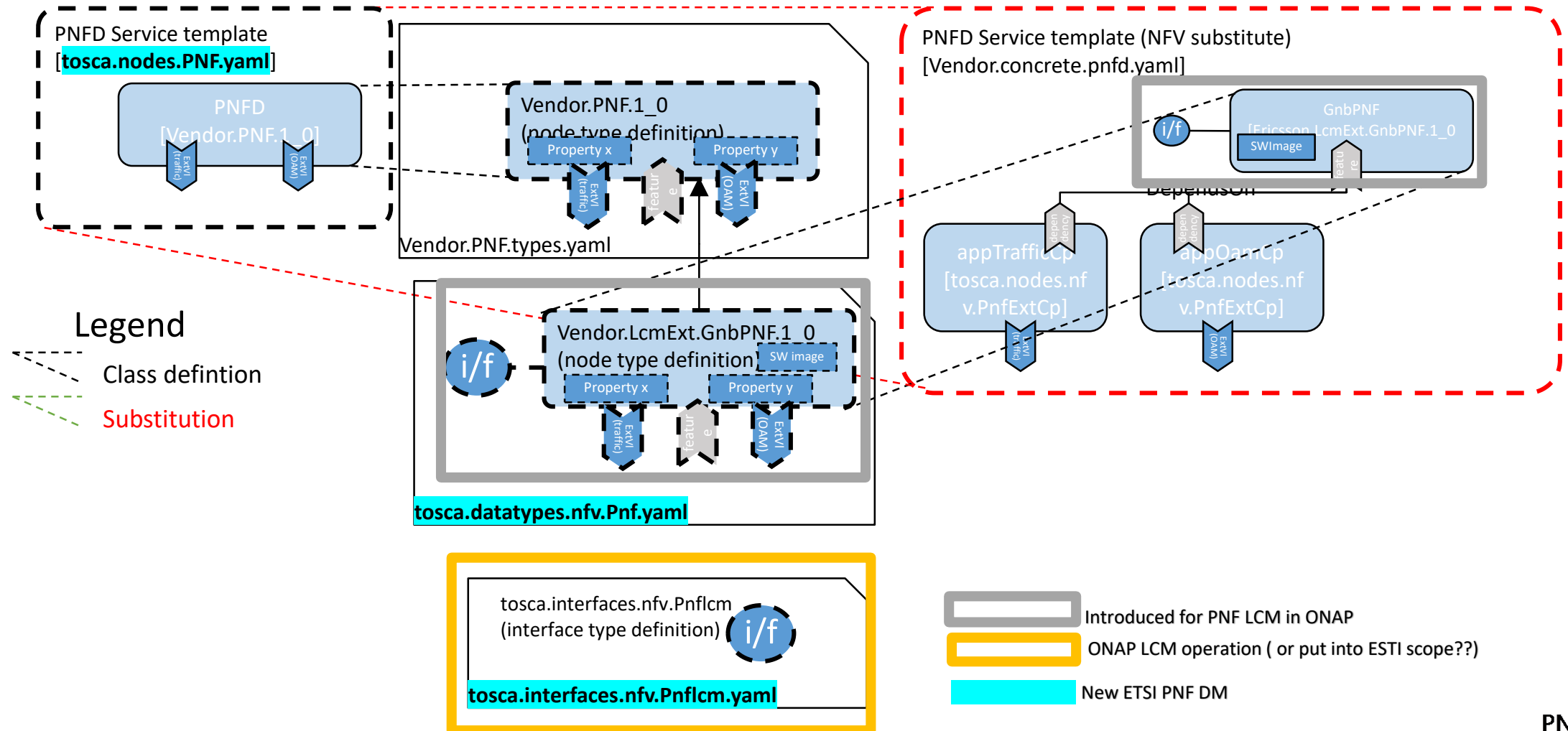
- Proposed changes to ETSI NFV
  - Adding PNF package requirements to SOL004
    - Extend SOL004 WI proposed: Specification of PNF Package file structure
    - Adding PNF Package Support in SOL004 CR
  - Update PNFD in SOL001

ETSI PNFD latest proposal (not yet approved)
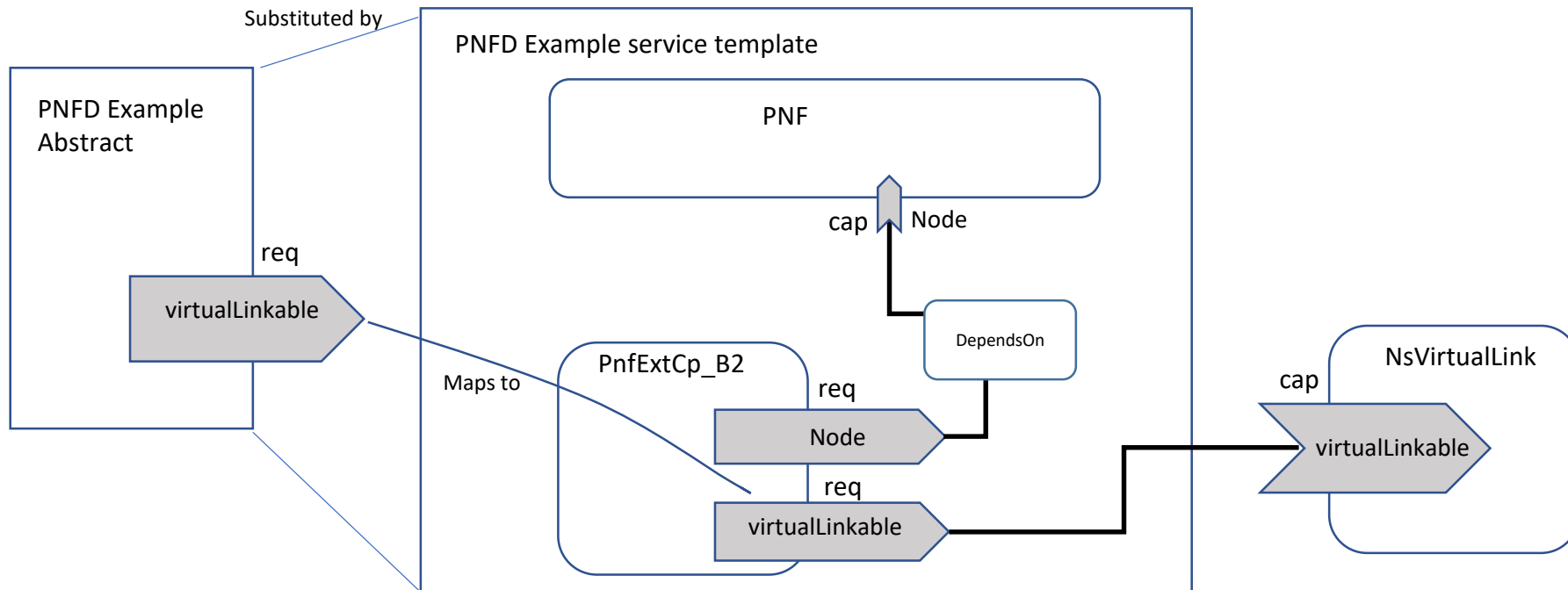
PNFD with LCM, min add classes with separation – Modeling and files