ONAP xNF software upgrade status of art and extendibility point

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ONAP xNF Software Upgrade Roadmap

Rel A / B

✓Ansible based **VNF in-place software upgrade** with Ansible adaptor in APPC

Rel C / D

✓**Partially complete PNF software upgrade procedure by leveraging legacy Ansible LCM API to support PNF software upgrade**

- Ansible adaptor for PNF software upgrade in SDNC including Pre-check, Upgrade-software, and Post-check
- Additional adaptor including
  Extend upgrade-software operation by leveraging sub-operations from 3GPP

Rel F

✓**Complete PNF software upgrade procedure with support of three scenarios using the SO decision tree**

- Using direct Netconf/Yang interface with PNF: using CDS self-service API, with direct Netconf/Yang interface with the PNF
- Using Ansible protocol with EM : using legacy Ansible LCM API, with EM between ONAP and PNF, and leveraging the development from release C and D,
- Using Netconf/Yang interface with EM: using CDS self-service API, with EM between ONAP and PNF, and Netconf/Yang interface

Rel G

✓**Partially complete xNF software upgrade procedure with schema update by enabling xNF software upgrade at service level**

- A generic service level upgrade workflow in SO
- A generic PNF software upgrade workflow leveraging the the development from release F
- New SO APIs for service level workflow retrieving and execution

Rel H

✓**Additional enhancements on the generic PNF software upgrade workflow**

- Adding PNF software version at onboarding and SO catalog
- Support SDC CSAR upgrade with multiple xNFs in a service template

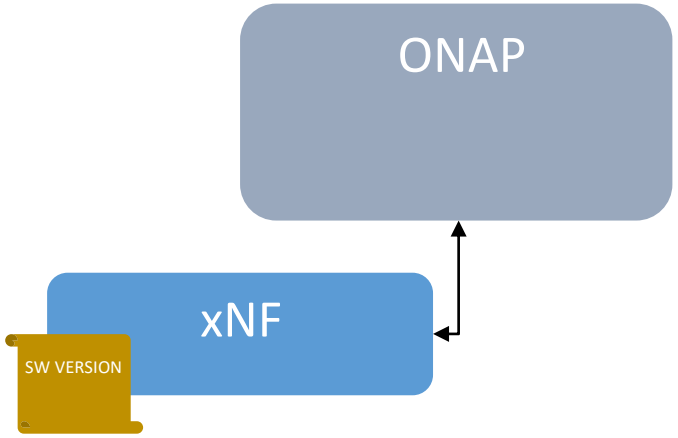
Rel ? +

✓**Support generic VNF software upgrade workflow using CDS self-service API**

xNF Sw Upgrade Use Cases

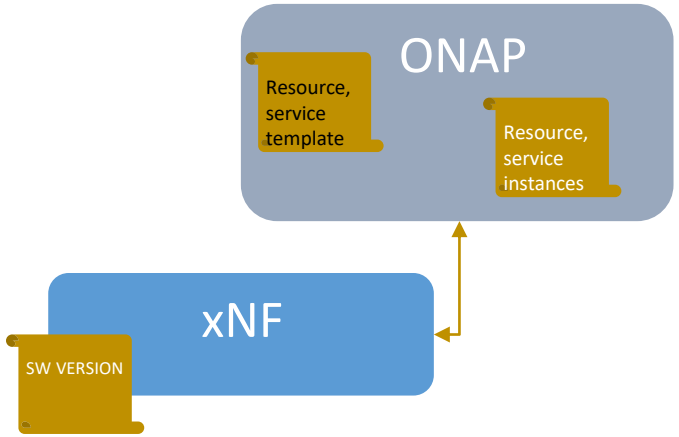
A new xNF software version, with/without interface changes, is available.

xNF Resource Software Upgrade Use Case



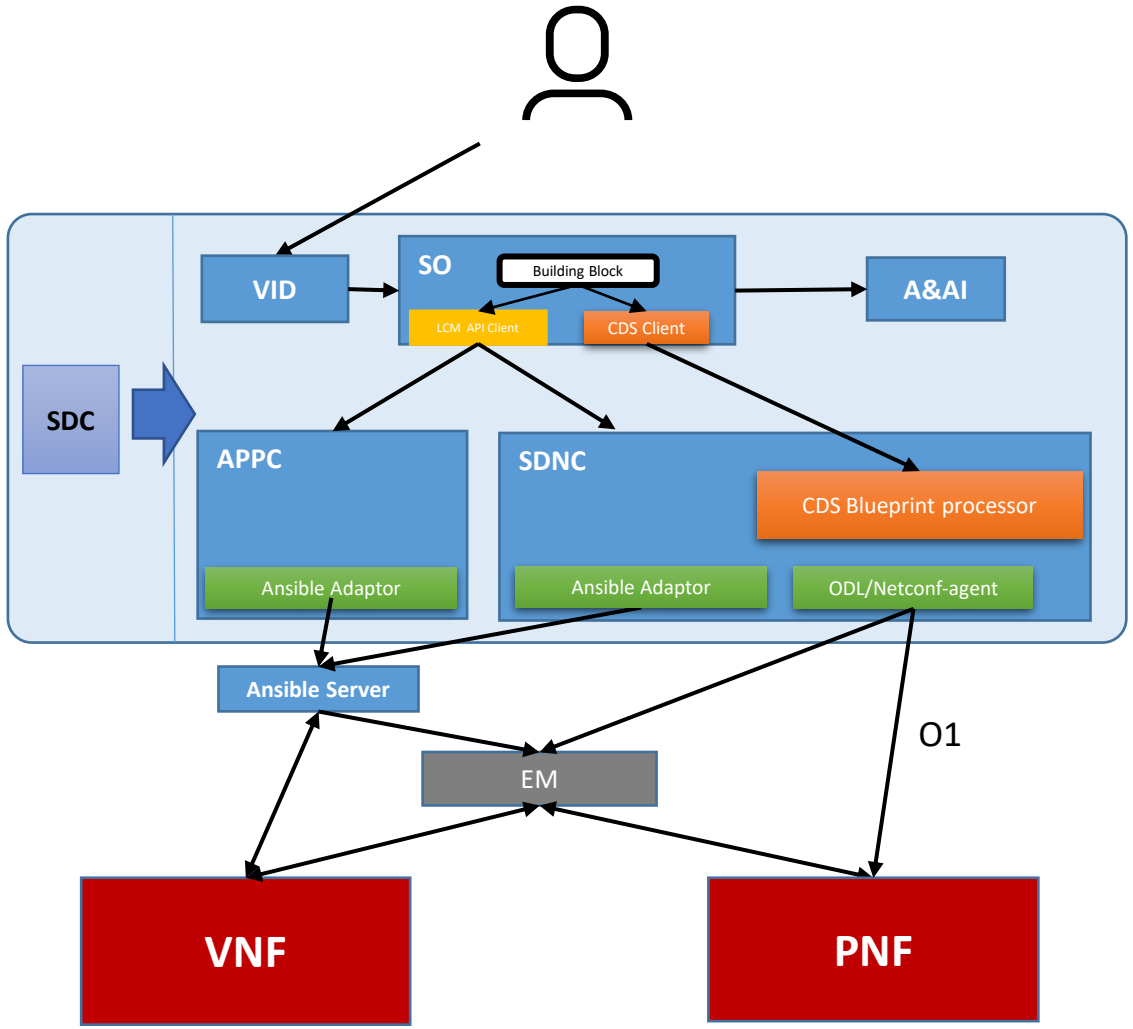
Upgrade the software version of the xNF instance

Network Service Software Upgrade Use Case



In addition to sw version upgrade of the xNF instance, an ONAP update is required to support new interface capabilities

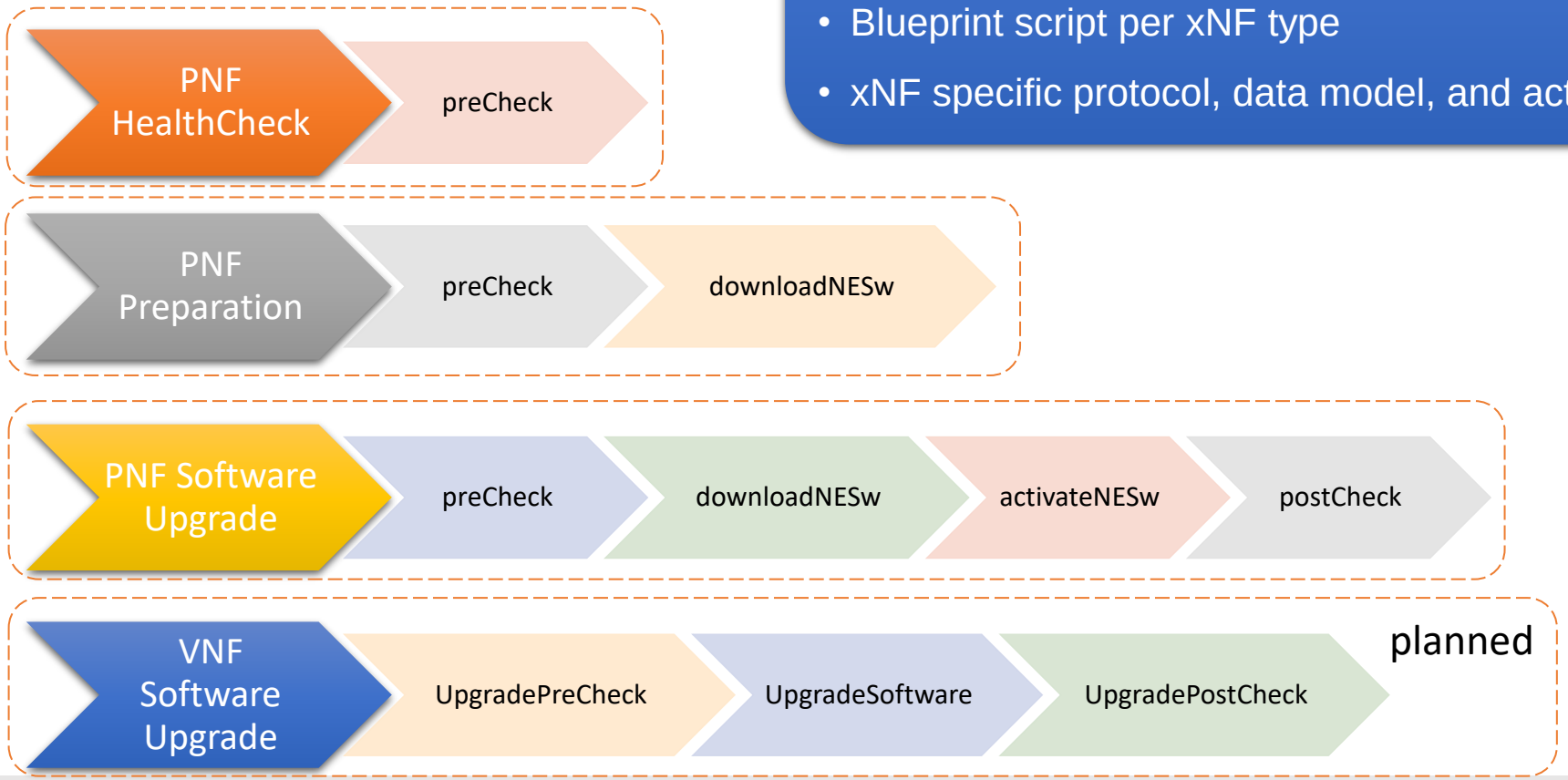
xNF Software Upgrade Implementation in ONAP

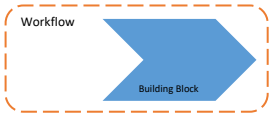


- PNF Resource Sw upgrade (in-place) scenarios:
  a) Using direct Netconf/Yang interface with PNF
  b) Using Ansible protocol with EM
  c) Using Netconf/Yang interface with EM
- VNF Resource Sw upgrade (in-place) :
  - New VNF in-place software upgrade procedure is planned (CDS based)
  - Existing (APPC based) VNF in-place software upgrade procedure to be discontinued
- CNF software upgrade, under discussion

ONAP SO Workflows for xNF Software Upgrade

- SO Workflows can be customized (i.e. add/remove Building Blocks)
- Building block actions are xNF independent
- Building block actions execution demanded to ONAP controller blueprints
- Blueprint script per xNF type
- xNF specific protocol, data model, and actions managed by blueprint





O-RAN O1 Requirements and ONAP implementations

PNF Software Management Services Requirements in O-RAN ALLIANCE O1

Software Inventory: retrieves information about the software packages on the PNF

Software Download: triggers software package downloading onto PNF
- to specify the location of software
- to verify if a software download is in progress
- to deny download of software if request is not valid
- to download needed files from specified location
- to perform integrity checks on downloaded software.
- to install the software into the software slot

Software Activation Pre-Check: confirms that PNF is in a good state to activate the software.
- to confirm that the software in the passive slot targeted for activation is good.
- to determine whether the activation of the targeted software requires a reset and/or data migration

Software Activation: triggers activation of a software package on the PNF.
- to allow its authorized consumer to activate valid software in a specific softwarePackage
- to verify whether a software activation is in progress and deny a concurrent activation of software
- to deny in invalid activation request
- to activate the softwarePackage
- to reset and send a reset reason notification
- to perform data migration
- to fallback to previously version and factory set

Realized by

Realized by

PNF sw upgrade procedure in ONAP

Pre-Check: verify PNF is in good condition before any upgrade actions

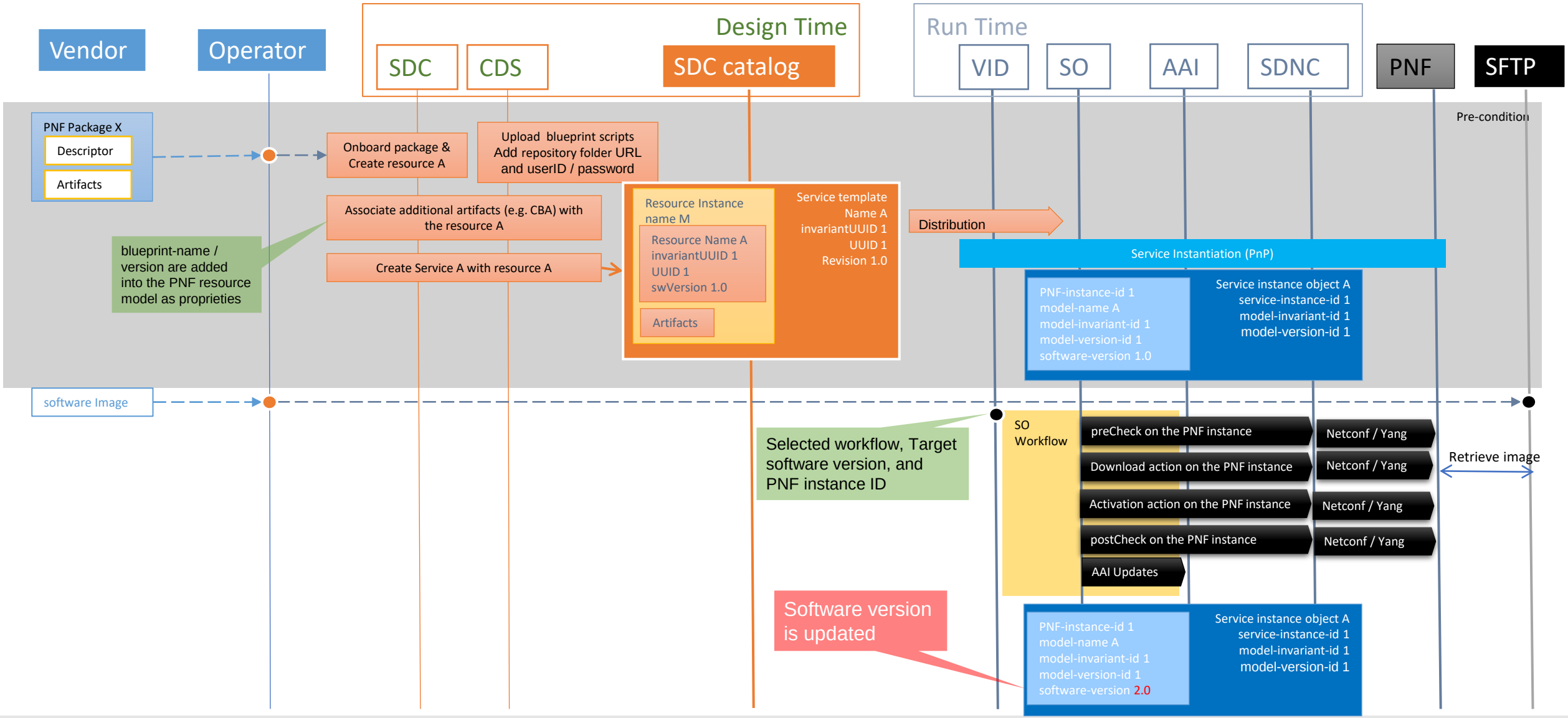
DownloadNESw: Triggers a download of a software package into the PNF, including:
- package downloading if needed,
- package integrity check,
- progress report,
- etc.

ActivateNESw : Triggers activation of a software package on the PNF, including:
- activation,
- data migration,
- fallback in case of activation failure,
- etc.

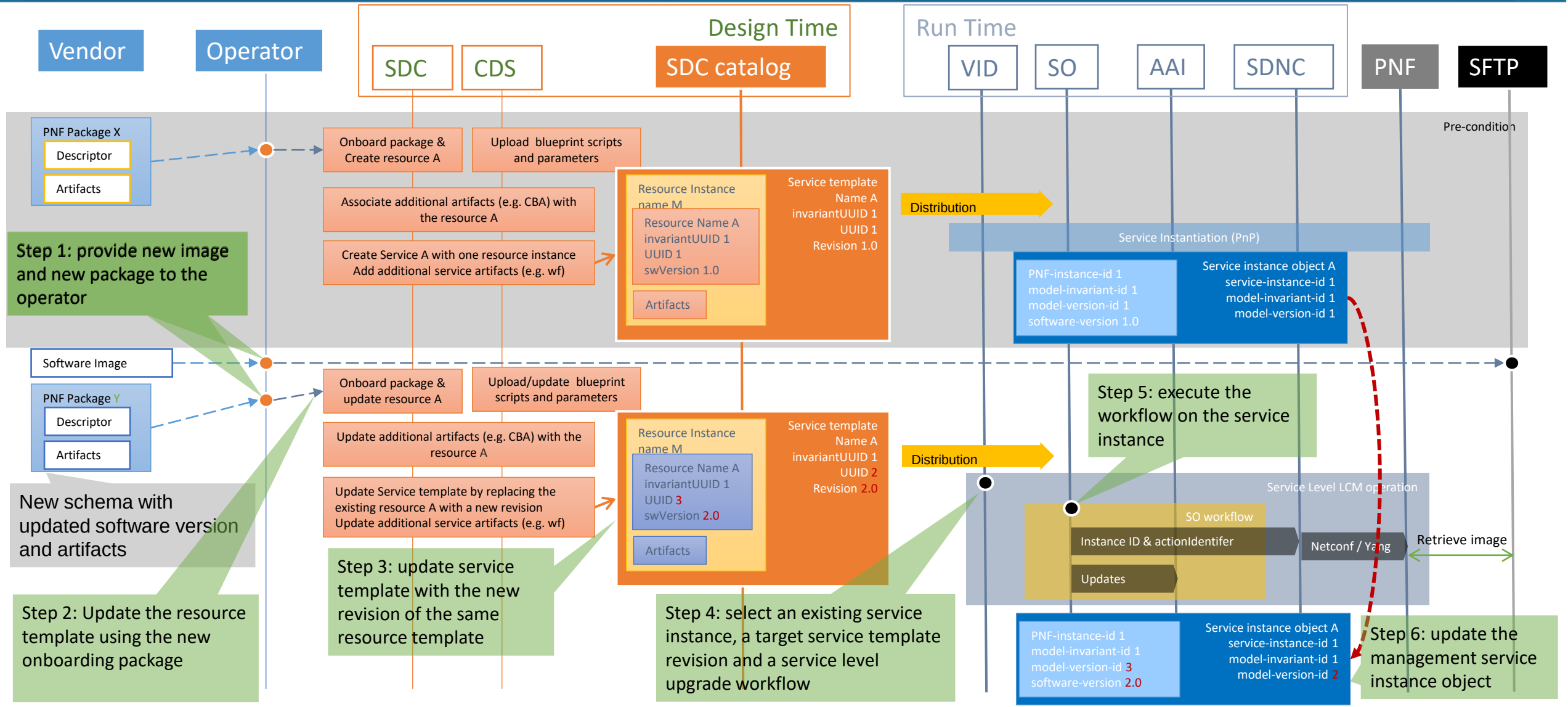
Post-Check: verify PNF is in good condition after upgrade

ONAP defines only generic upgrade workflow and basic building blocks. Building block implementation (including definition of xNF actions / protocols / interface) is realized by blueprint script, and the blueprint script is onboarded per PNF type

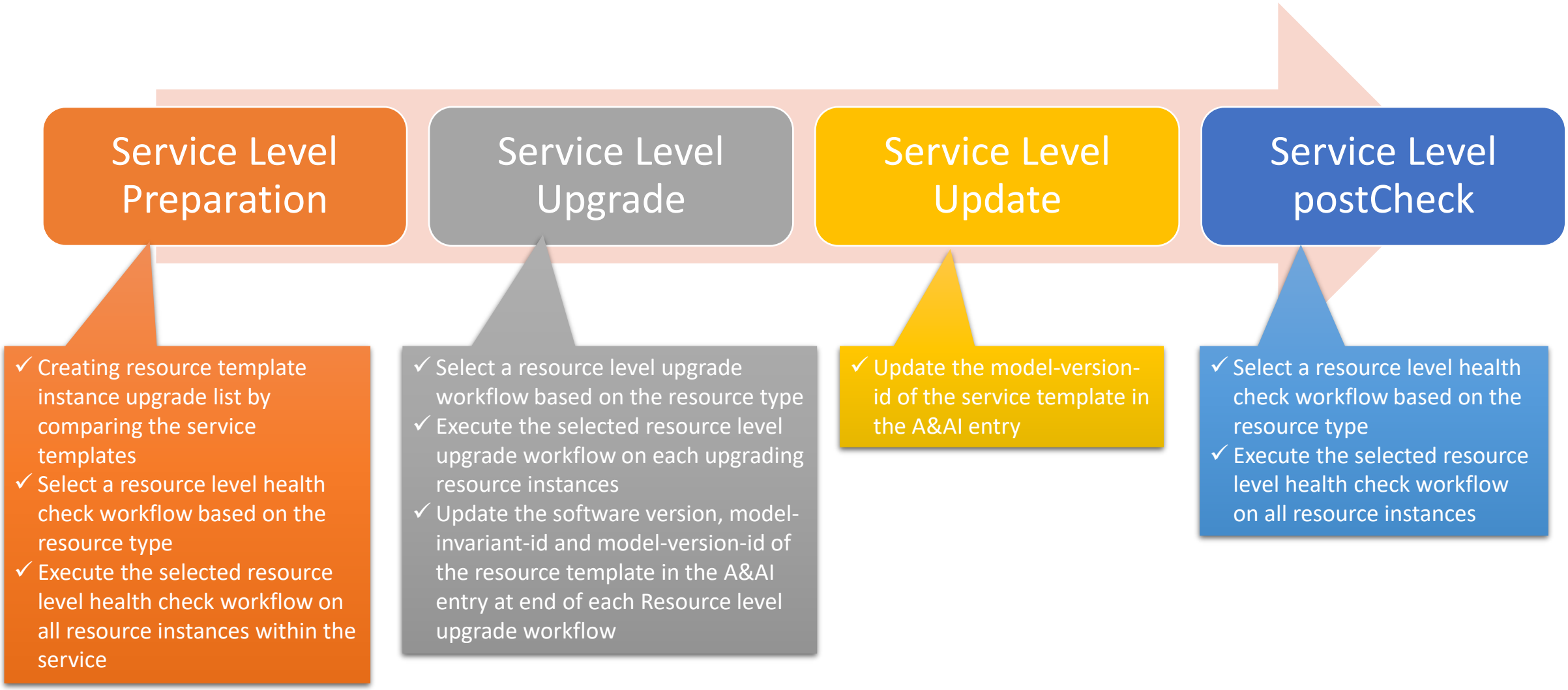
Update one PNF instance without schema update



Service level software upgrade example
with one PNF resource



SO Service level upgrade workflow



SO Service level upgrade workflow

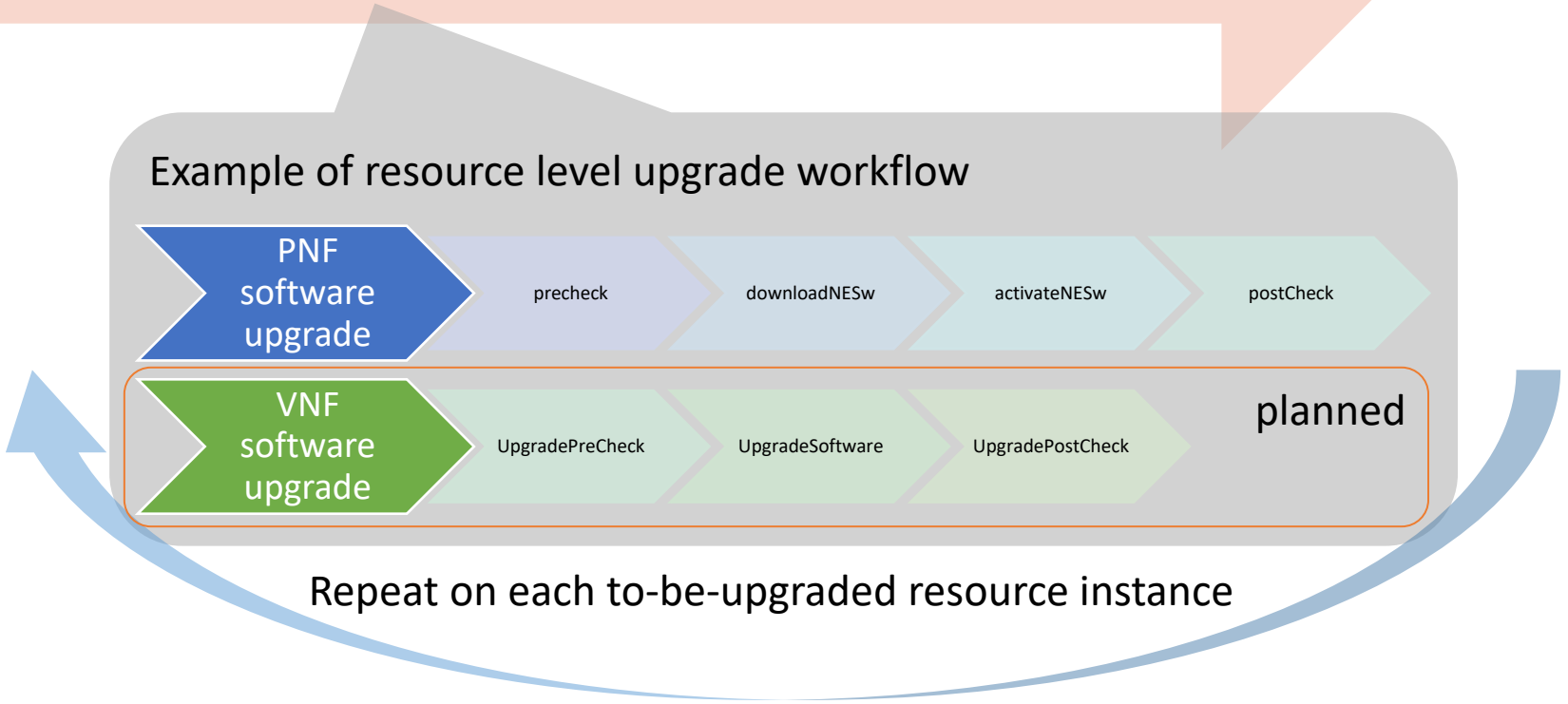
Service Level Preparation

Service Level Upgrade

Service Level Update

Service Level postCheck

Note: the service level workflow is network function type independent. When upgrade one resource instance, the subsequent resource level upgrade workflow is selected based on the network function type.



Demo: Service level software upgrade example
with one PNF resource

Demo link

Query PNF status from AAI and PNF node before software upgrade

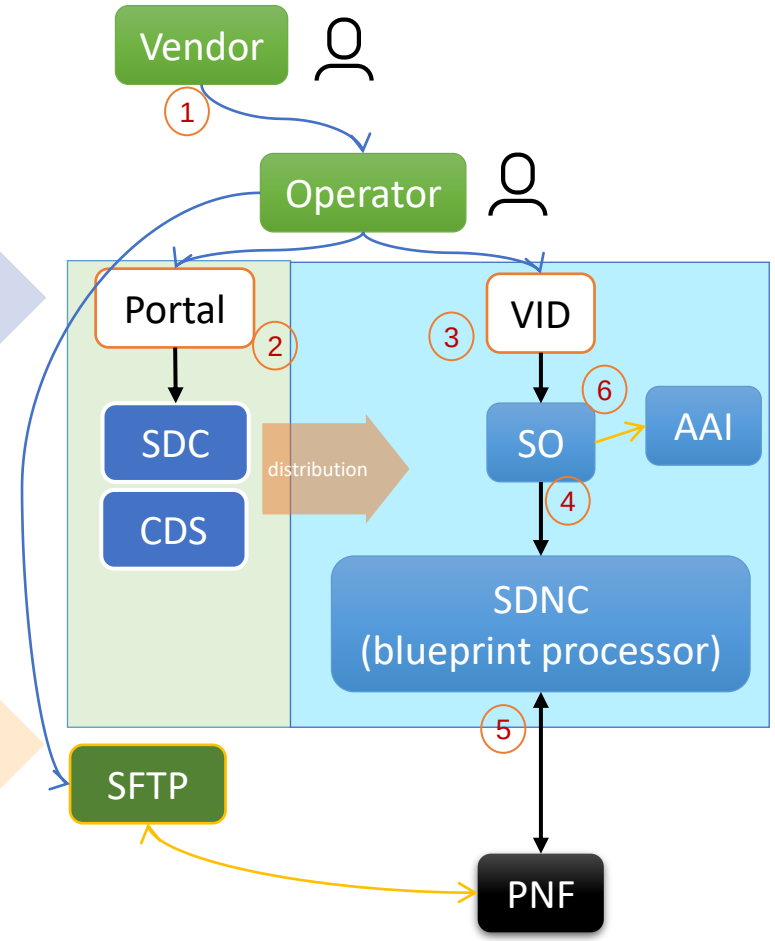
Demo of Service template Upgrade with a new PNF onboarding package

Onboard the new PNF package → Update the PNF resource template → Update the service template → distribution

Demo of Service level Software Upgrade workflow with one PNF instance

Service Level Preparation → Service Level Upgrade: run PNF software upgrade workflow to upgrade the PNF instance to software version 3.0.0 → Service Level Update: update A&AI → Service Level postCheck

Query PNF status from AAI and PNF node after software upgrade



Thank you