

Support xNF Software Upgrade in association to schema updates

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Key contact persons

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BUSINESS DRIVERS

Executive Summary: A schema update in relation to a xNF software upgrades is a routine for network upgrade to support new xNF features, improve efficiency or increase xNF capacity on the field, and to eliminate bugs. This use case provides to ONAP an advantage in orchestrating and managing the Life Cycle of a Network Services in-line with business and service objectives.

Business Impact: Deployment and orchestration of new services over CNFs, VNFs and PNFs in a model and software driven way simplifies the network management. Enables operators and service providers to manage the Life Cycle of a Network Service. Assuring continuity of operation of services is crucial for production and carrier grade environments. The actualization or upgrades of software and in consequence required changes in the service model is a natural part of service instance life cycle. Without the support of ONAP service update with schema change, service life cycle management by ONAP can be very difficult which can impact the quality and continuity of services.

Business Markets: All operators and service providers that are using ONAP for service and network function Life Cycle Management

Funding/Financial Impacts: Reduction in operations expense from using industry standard Interfaces.

Organization Mgmt, Sales Strategies: *There is no additional organizational management or sales strategies for this requirement outside of a service providers "normal" ONAP deployment and its attendant organizational resources from a service provider.*

xNF software upgrade procedure

Note: The descriptor and artifacts information included in the resource and service template are named as schema in this project. The procedure of updating the resource / service template info, i.e. descriptor and artifacts, is named as schema update in this project.

xNF Software Upgrade without xNF artifacts updating in Release F

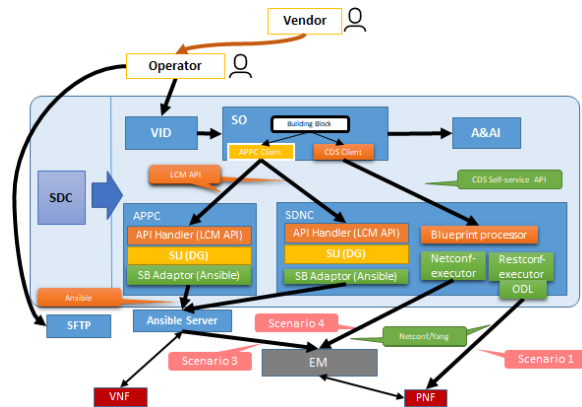
The current VNF in-place software upgrade procedure on a single VNF instance without schema update is describe in [Change Management Dublin Extensions](#).

The current PNF in-place software upgrade procedure on a single PNF instance without schema update

- [Using direct Netconf/Yang interface with PNF](#)
- [Using Ansible protocol with EM](#)
- [Using Netconf/Yang interface with EM](#)

In all the above procedure, Vendor only delivers a new software image to the operator. There is no additional onboarding package which includes a descriptor and its artifacts of the new image. At run time, when the new software image is delivered to the operator, the software upgrade procedure may be triggered.

The current in-place software upgrade procedure is a good solution, if the new software version does not introduce any new functions. For instance, the new version only introduce some bug fixings.



However, with the above ONAP VNF/PNF in-place software upgrade procedure, only the software running in the instance is updated. The corresponding ONAP service / resource management object instances are unchanged. The consequence is that

- There can be a mismatch between the functions running in the VNF/PNF instance and the management instance schema stored in the ONAP, after upgrade.
- The mismatch includes not only the artifacts provided by the vendor, e.g. new CM Yang model, but also the artifacts provided at design time, e.g. CBA files from CDS.
- Then ONAP is not aware of any of new functions supported by the new software, including new PM counters, new CM Yang model, new Alarms, new CBA, new scripts, new Helm chat, etc.
- For the operator, it is difficult to make use of any new functions supported in the new software version.

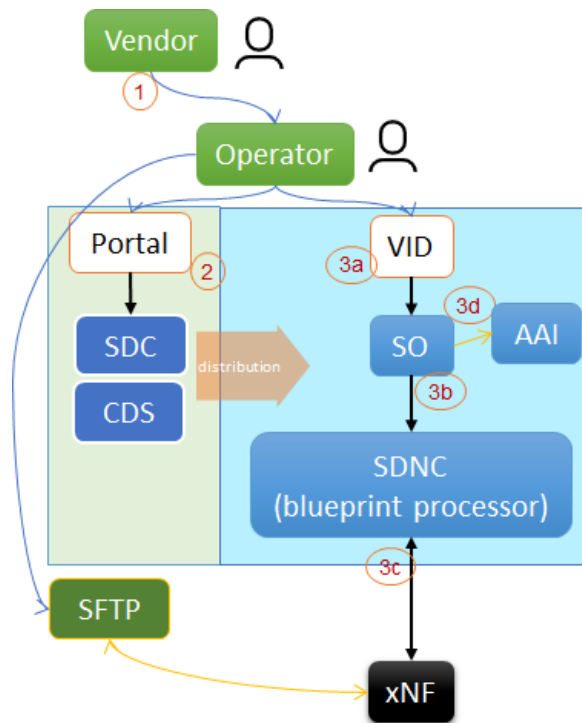
xNF Software Upgrade with xNF artifacts updating in Release G

The following is the xNF software upgrade procedure with schema update.

1. A vendor shall provide
 - a. a new VNF/PNF package with updated artifacts, and
 - b. the new VNF/ PNF software image to the operator.
2. At receiving of the new package, the operator shall
 - a. onboard the new package and create a new resource template or update the existing resource template (PNF or VNF)
 - b. update the existing service template with the new or updated resource template
 - c. distribute the updated service template to run time.
3. At run time, the operator shall, based on the updated service template,
 - a. upgrade a service instance and its resource instances, and
 - b. update the AAI entry accordingly

The above procedure is based on the following conditions:

- When updating a service template at design time, the resource instance name and network topology shall be unchanged.
- A service template must be upgradable from any previous versions, including that any new resource template of a given resource instance (within the service template) must be upgradable from any previous resource template versions.
- At run time, resource upgrade sequence is not sensitive in service instance upgrading procedure



Function limitations in Release G

- The operator shall know the possible/feasible resource upgrade path based on vendor provided information.
- When operator updating a service template, the updated service template must be upgradable from any previous versions:
 - Within the service template, the resource instance name and network topology are unchanged.
 - The new resource template of a given resource instance (within the service template) must be upgradable from any previous resource template versions.

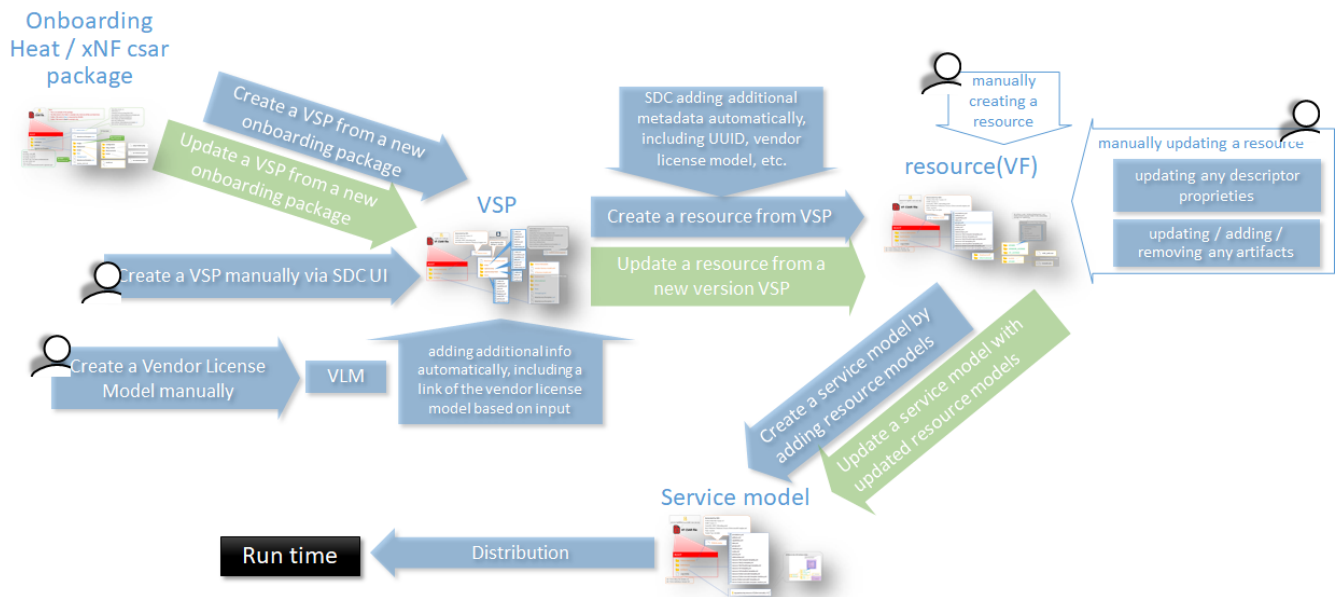
Note: This is to avoid adding possible upgrade paths info and upgrade sequence info into SDC model

Function descriptions

Update a xNF resource template from a new onboarding package

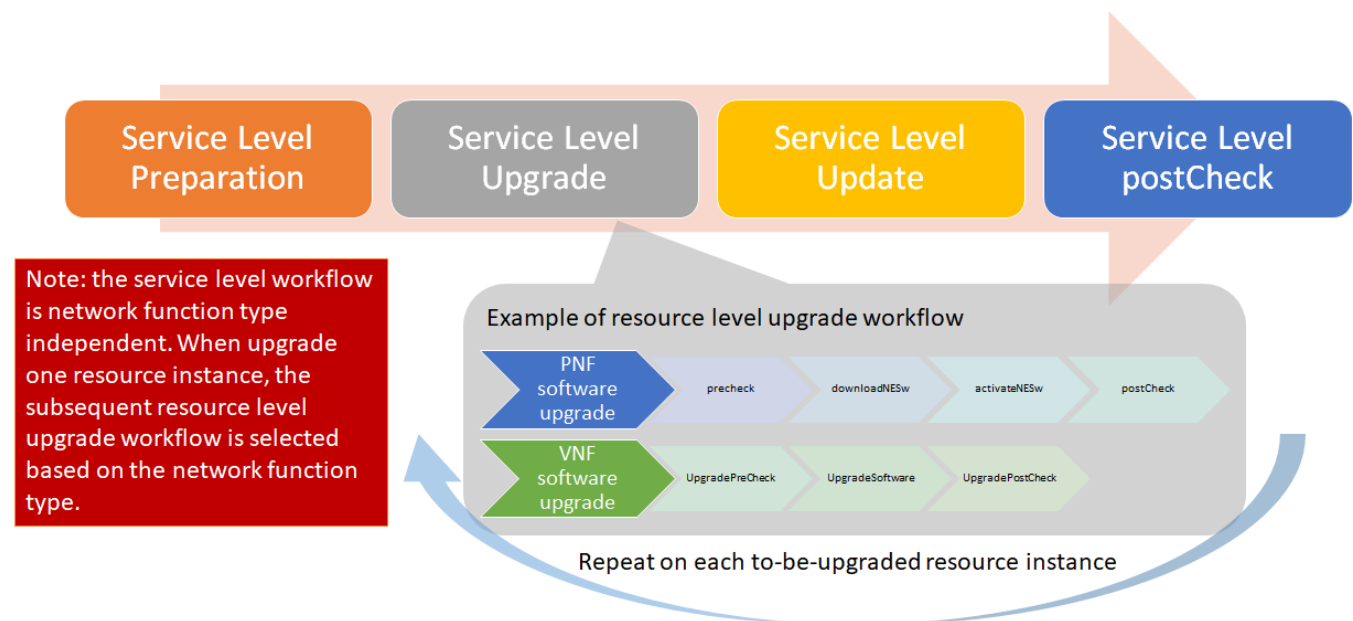
When updating a resource template from a new VSP casr, the new onboarded descriptor and the new onboarded artifacts will be transformed into the new version of the resource csar. The current resource name and invariantUUID will be remained.

As an alternative, a resource csar can be updated manually using SDC GUI.



The update path (green path in above picture) is supported in the current SDC implementation. However, there are bugs which need to be fixed.

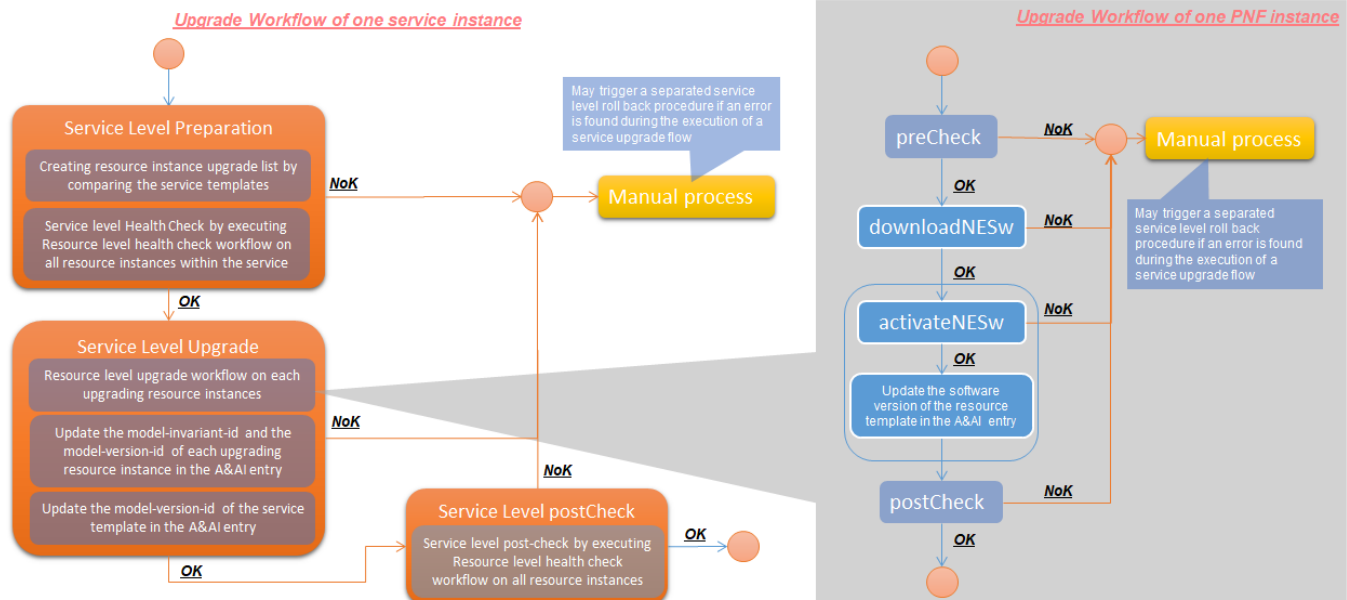
Service level LCM workflow in SO



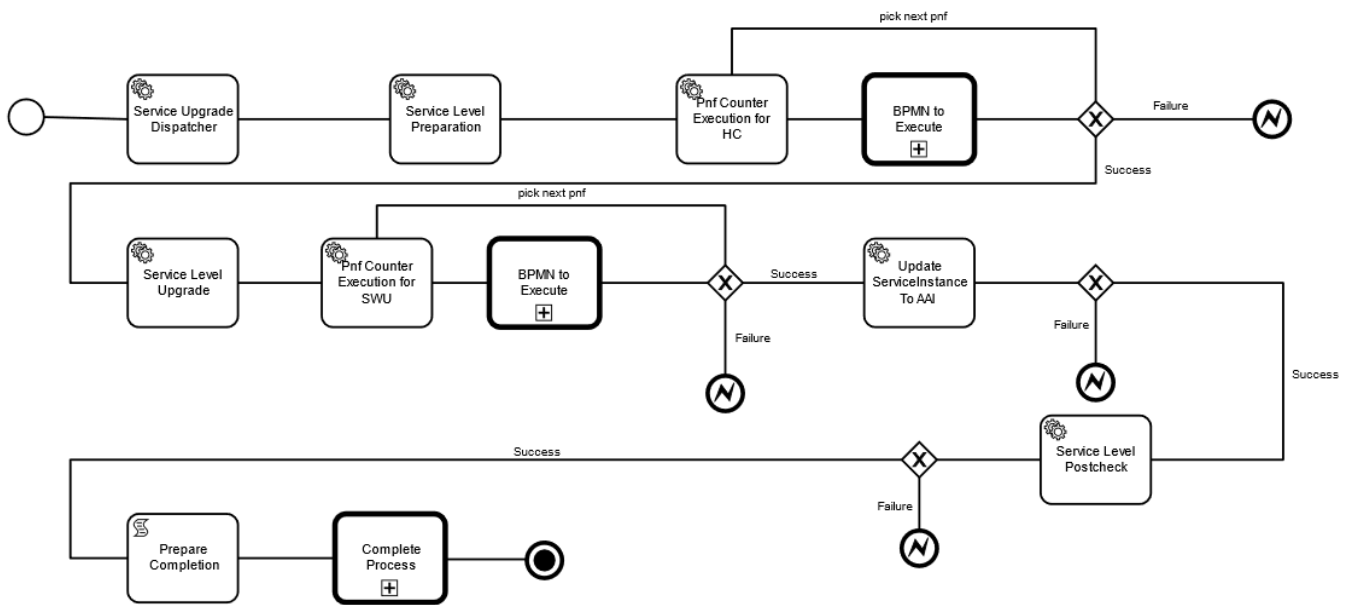
A generic SO workflow is created which can be used to upgrade one service instance based on the updated service template. This service level workflow is network function type independent. When upgrade one resource instance, the subsequent resource level upgrade workflow is selected based on the network function type. It contains following main steps:

- Service Level Preparation
 - Creating resource template instance upgrade list by comparing the service templates
 - Select a resource level health check workflow based on the resource type
 - Execute the selected resource level health check workflow on all resource instances within the service
- Service Level Upgrade
 - Select a resource level upgrade workflow based on the resource type
 - Execute the selected resource level upgrade workflow on each upgrading resource instances
 - Update the software version, model-invariant-id and model-version-id of the resource template in the A&AI entry at end of each Resource level upgrade workflow
- Service Level Update
 - Update the model-version-id of the service template in the A&AI entry
- Service Level postCheck
 - Select a resource level health check workflow based on the resource type
 - Execute the selected resource level health check workflow on all resource instances within the service

The following is an example of the service level workflow with PNF upgrade sub-workflow is called at Service Level Upgrade step:



Workflow view



New SO APIs

API	Service level workflow retrieving API	Service level workflow execution API
Name	RetrieveServiceLevelWorkflow	ExecuteServiceLevelWorkflow
Type	Get	Post
URL	/onap/so/infra/workflowSpecifications/v1/workflows?resourceTarget=service	/onap/so/infra/instanceManagement/v1/serviceInstances/{serviceInstanceId}/workflows/{workflow_UUID}
Request	Headers: application/json Path parameters: resourceTarget=service Body={ } 	Headers: application/json Path parameters: serviceInstances; workflow_UUID Body={ "modelInfo":{ #targetServiceModelVersionId "modelType":"service", "modelInvariantUuid":"fe41489e-1563-46a3-b90a-1db629e4375b", "modelVersionId" : "cd4decf6-4f27-4775-9561-0e683ed43635", "modelVersion":"1.0" }
Response	200 – Successful retrieval of workflows 400 - Bad Request 500 - Internal Server Error	202 - Request has been accepted for processing 400 - Bad Request 500 - Internal Server Error
Jira	SO-2929 - Getting issue details... STATUS	SO-2930 - Getting issue details... STATUS

Interfaces between service workflow and resource workflow

workflows	Workflow Name	Inputs	Out puts	Jira
a generic service level upgrade workflow	GenericServiceLevelUpgrade	/onap/so/infra/instanceManagement/v1/serviceInstances/{serviceInstanceId}/workflows/{workflow_UUID} Path parameters: serviceInstances; workflow_UUID Body: targetServiceModelVersionId	Ok or not ok	SO-2927 - Getting issue details... STATUS
a generic VNF health check workflow	GenericVnfHealthCheck	vnfInstanceId	Ok or not ok	SO-3192 - Getting issue details... STATUS
a generic PNF health check workflow	GenericPnfHealthCheck	Path parameters: serviceInstanceId, pnfInstanceId Body: PNF_Name	Ok or not ok	SO-3018 - Getting issue details... STATUS
a generic VNF software upgrade workflow	GenericVnfSoftwareUpgrade	/onap/so/infra/serviceInstantiation/{version}/serviceInstances/{serviceInstanceId}/vnfs/{vnfInstanceId}/inPlaceSoftwareUpdate Path parameters: serviceInstanceId, vnfInstanceId Body: new_software_version, existing_software_version	Ok or not ok	SO-2952 - Getting issue details... STATUS
a generic PNF software upgrade workflow	GenericPnfSoftwareUpgrade	/onap/so/infra/instanceManagement/v1/serviceInstances/{serviceInstanceId}/pnfs/{pnfName}/workflows/{workflowUuid} Path parameters: serviceInstanceId, pnfInstanceName Body: target software version	Ok or not ok	SO-2515 - Getting issue details... STATUS

Impact Details

Summary

PROJECT	PTL	User Story / Epic	Requirement
SDC	Ofir Sonsino	<ul style="list-style-type: none"> Bug fixing at updating a resource template based on a new onboarding package 	
A&AI	James Forsyth	<ul style="list-style-type: none"> Add software-version attribute on Generic-VNF object level 	
SO	Seshu Kumar Mudiganti	<ul style="list-style-type: none"> Generic service level upgrade workflow New SO building block to enable service level LCM operation including update A&AI, new service level LCM BB, etc. Service level workflow retrieving API Service level workflow execution API In-Place VNF Upgrade workflow with ControllerExecutionBB Update of VNF software-version attribute in A&AI 	
Integration	Morgan Richomme	<ul style="list-style-type: none"> test cases for resource template updating test cases for new SO APIs test cases for service level workflow execution test cases for e2e service level upgrade procedure (with PNF simulator) test cases for e2e service level upgrade procedure (vFW or vLB/DNS use case with CDS) Documentation updates 	

List of PTLs: [Approved Projects](#)

Requirement Status

Key	Summary	Created	Assignee	Reporter	P	arch review	m1 scorecard	m1 approval	m2/3 scorecard	m2/3 approval	m4 scorecard	m4 approval	rc0 scorecard	rc0 approval	Status	tsc priority
REQ-324	Support xNF Software Upgrade in association to schema updates	May 08, 2020	Unassigned	None	⬆										<button>DONE</button>	

Development Status

Key	Summary	T	Created	Updated	Assignee	Reporter	P	Status	Resolution	Sub-Tasks	Fix Version /s
SO-3223	Multiple pnf service level upgrade not working.	🔴	Sep 08, 2020	Sep 29, 2020	Unassigned	None	⬆	<button>CLOSED</button>	Done		Guilin Release
SO-3147	Picking workflow names dynamically for schema update procedure	✅	Aug 12, 2020	Sep 08, 2020	Ramesh Murugan Iyer	Ramesh Murugan Iyer	⬆	<button>CLOSED</button>	Done		Guilin Release
SO-3120	Create swagger api for software upgrade in SO	✅	Aug 04, 2020	Sep 08, 2020	Ramesh Murugan Iyer	None	⬆	<button>CLOSED</button>	Done		Guilin Release
SO-3105	Refactor 'PNF' names in BPMN workflows	✅	Jul 27, 2020	Sep 08, 2020	Ramesh Murugan Iyer	Ramesh Murugan Iyer	⬆	<button>CLOSED</button>	Done		Guilin Release
SO-3018	Pnf Healthcheck implementation	✅	Jul 03, 2020	Sep 08, 2020	Unassigned	Ramesh Murugan Iyer	⬆	<button>CLOSED</button>	Done		Guilin Release
SO-2930	Service level workflow execution API	🟢	May 13, 2020	Aug 27, 2020	Unassigned	None	⬆	<button>CLOSED</button>	Done		Guilin Release

SO-2929	Service level workflow retrieving API		May 13, 2020	Sep 08, 2020	Ramesh Murugan Iyer	None		CLOSED	Done	SO-2986 SO-2987 SO-2988	Guilin Release
SO-2928	Service model retrieving API		May 13, 2020	Jul 14, 2020	Unassigned	None		CLOSED	Done		Guilin Release
SO-2927	Generic service level upgrade workflow		May 13, 2020	Sep 08, 2020	Unassigned	None		CLOSED	Done		Guilin Release
SO-2926	New Service Level postCheck building block		May 13, 2020	Sep 08, 2020	Unassigned	None		CLOSED	Done		Guilin Release
SO-2925	New Service Level Upgrade building block		May 13, 2020	Sep 08, 2020	Unassigned	None		CLOSED	Done		Guilin Release
SO-2924	New Service Level Preparation building block		May 13, 2020	Sep 08, 2020	Ramesh Murugan Iyer	None		CLOSED	Done	SO-2989	Guilin Release
SDC-3104	Error Updating VSP in a resource template for VNF		Jun 08, 2020	Sep 15, 2020	Unassigned	None		CLOSED	Done		Guilin Release
SDC-3090	Error Updating VSP in a resource template for PNF		May 28, 2020	Aug 27, 2020	Unassigned	None		CLOSED	Done		Guilin Release
SDC-3060	Update a resource template from a new onboarding package		May 13, 2020	Aug 26, 2020	Unassigned	None		CLOSED	Done		Guilin Release
REQ-444	Integration Test For Supporting xNF software upgrade		Oct 14, 2020	Nov 23, 2020	Unassigned	None		DONE	Done		Guilin Release
INT-1782	Manual E2E Test case on Service Level Upgrade Procedure.		Nov 18, 2020	Nov 18, 2020	Unassigned	None		CLOSED	Done		Guilin Release
INT-1709	CSIT script changes for 'PNF' name refactoring		Aug 31, 2020	Oct 29, 2020	Ramesh Murugan Iyer	Ramesh Murugan Iyer		CLOSED	Done		Guilin Release
INT-1682	PNF-SW-Upgrade CSIT failing.		Aug 12, 2020	Aug 27, 2020	Unassigned	None		CLOSED	Done		Guilin Release
INT-1681	Update Netconf-Pnp-Simulator to respond Node health status.		Aug 08, 2020	Aug 14, 2020	Unassigned	None		CLOSED	Done		Guilin Release
INT-1590	test cases on resource template updating		May 13, 2020	Nov 18, 2020	Unassigned	None		CLOSED	Done		Guilin Release

21 issues

Test Status : [E2E Test Case PNF-Software Upgrade With Schema Updates](#)

1	There should be a test case for each item in the sequence diagram	NOT YET TESTED
2	create additional requirements as needed for each discreet step	COMPLETE
3	Test cases should cover entire Use Case	PARTIALLY COMPLETE
4	Test Cases should include enough detail for testing team to implement the test	FAILED

Discussion Materials

This section is to review slides for discussion.



PNF Schema update to ONAP Arch.pdf



VNF Software Version.pptx

Meeting Notes/Discussions



ONAP Meeting N...0820 ver2.DOCX



APPC Deprecatio... ONAP Plan.docx