5G NRM (Network Resource Model) Configuration Management

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Outline

- Background
- Goal of 5G NRM Configuration use case
- Requirements and status in Frankfurt
- Future work/possibility

Background

- 5G NRM (Network Resource Model) Configuration Management is a sub-usecase, first proposed by Huawei in Sweden DDF, in 5G UC in Frankfurt.
  - UC wiki: https://wiki.onap.org/display/DW/5G+Network+Resource+Model+%28NRM%29+Configuration+in+R6+Frankfurt
- There are two things which are quite critical to this UC.
  - **Network Resource Model**: information model definitions, such as NR NRM, 5GC NRM, network slice NRM, and so on. Since there were hundreds of NRM objects in TS 28.541, this UC only select part of NR NRM objects (target the simplest deployment scenario) for integration and demonstration.
  - **Configuration Management**: CM actions have the objective to control and monitor the actual configuration on the Network Elements and Network Resources. According to the generic provisioning management service in TS 28.532, this UC will leverage create/get/modify/delete operations on the managed objects.

Goal of 5G NRM Configuration use case

- The goal of the UC is integration of ONAP with 3GPP management for 5G networks on NRM configuration management:
  - Support service-based management (In R6, the restful solution is used)
  - Handle with the any number of managed object instances in a dynamic way (In R6, dynamic self-service API is used)
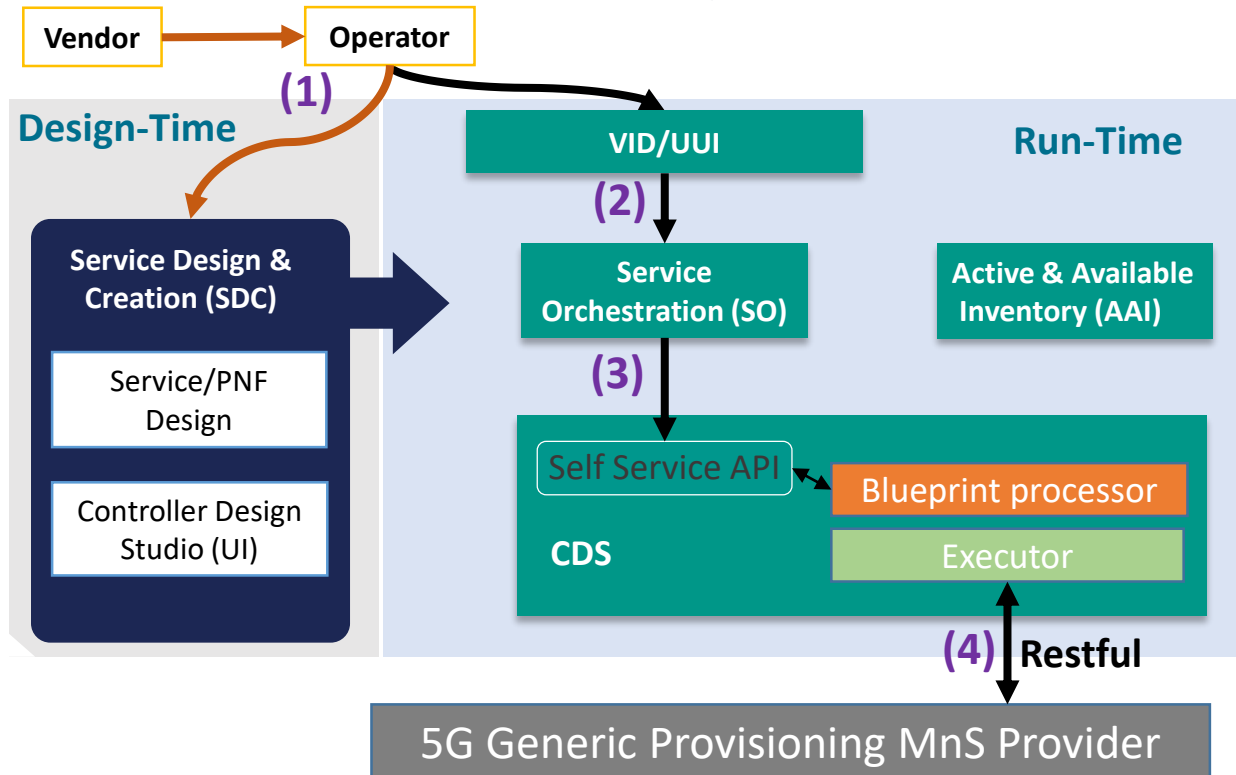
- 1. NRM objects (IOCs) could be modelled in ONAP design time.

- 2. In the run time, service providers can manage these instances (MOIs) through ONAP northbound APIs.

- 3. It leverages the dynamic characteristics of CDS SS API to manage arbitrary number of MOIs or properties of them.

- 4. CM operations are sent from executors to generic provisioning MnS provider.
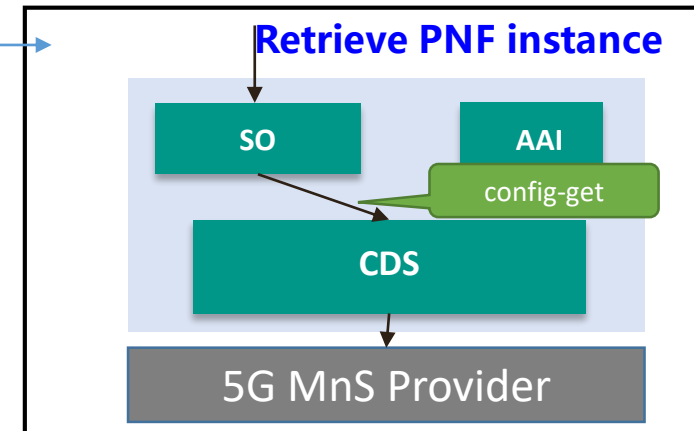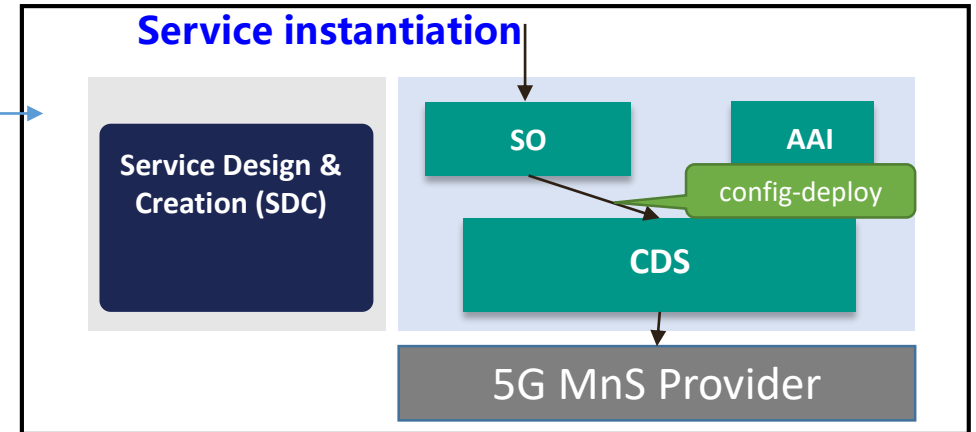
5G NRM Configuration CM: Expected Usage

- Scenario 1: After a PNF finished Plug-and-Play, operators would like to configure network resources on RAN PNF devices.

- Scenario 2: Both network element resource and network resources can be configured at one time in service instantiation.

- Scenario 3: Operators could retrieve the latest or real parameters of some PNF devices because of SON algorithms.

Other scenarios like modify any parameters of MOI or delete MOI.

Service instantiation

Service Design & Creation (SDC)

SO

AAI

config-deploy

CDS

5G MnS Provider

Retrieve PNF instance

SO

AAI

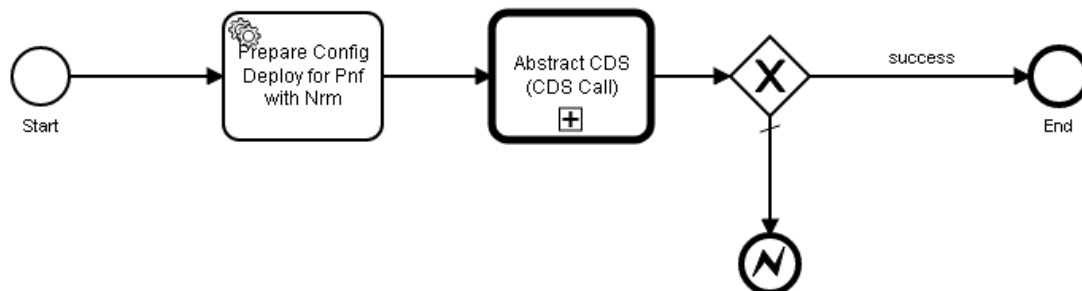config-get

CDS

5G MnS Provider

Requirements in R6

- In a nutshell, NRM CM with RESTful/HTTPS protocol.

- 1. Add a new restful-executor in CDS blueprint processor
  - Should be generic enough to support to configure any type and any number of NRM objects by restful createMOI operation

- 2. Provide CRUD operations on NRM objects via CDS
  - Self-service API should support config-get, config-modify and config-delete actions

- 3. Support custom workflow for NRM configuration management to RAN PNF

- 4. Support SO service/instance management API for NRM configuration
  - Enhance SO workflow and instance management API for RAN PNF

Mapping to SO : Reqs and Status

- Re-use workflow related API for PNFs delivered in PNF S/W Upgrade UC.
  - To retrieve PNF workflow by workflowSpecifications API: GET /onap/so/infra/workflowSpecifications/{version:[vV][1]/workflows?pnfModelVersionId={UUID}. [SO-2540] WIP.
  - To execute custom PNF workflow by instanceManagement API: POST /onap/so/infra/instanceManagement/{version:[vV][1]}/serviceInstances/{serviceInstanceId}/pnfs/{pnfInstanceId}/workflows/{workflowUuid}. [SO-2071] Finished.

- Custom workflow for NRM CM to RAN PNF. WIP
  - BPMN name: **ConfigureRANPnfNrmResource.bpmn**
  - Target Location: so/bpmn/so-bpmn-infrastructure-flows/src/main/resources/process

Note: The existing AbstractCDSProcessingBB can be re-used.

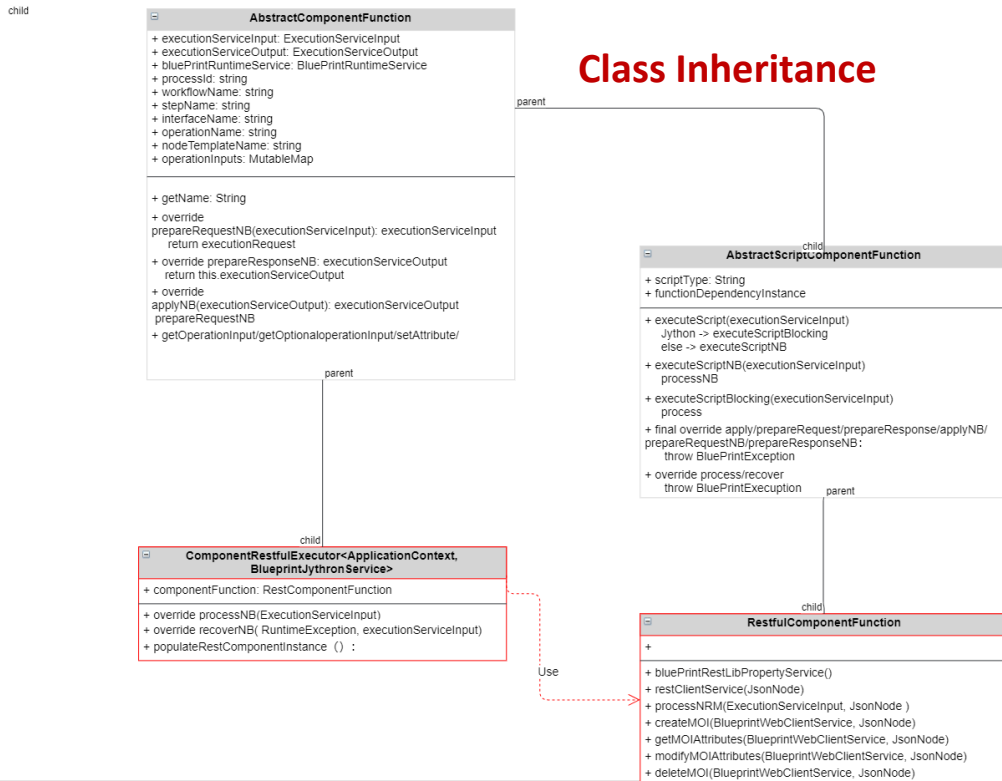# Example： Parameters to trigger configureRANPnfNrmResource

- 1. Path Parameters in URL
  /onap/so/infra/instanceManagement/{version:[vV][1]}/serviceInstances/{serviceInstanceId}/pnfs/{pnfInstanceId}/workflows/{workflowUuid}

- 2. Body parameters

Field Name	Format	Mandatory	Examples	Notes
{				
"requestDetails ": {	Object	M		
"requestParameters": {	Object	M		
"userParams":[	Array	M		Contains all relevant user parameters with key-value pairs
{"name":	String	M	"blueprintName"	TBD. Should query A&AI firstly.
"value": },	String	M	"bp-HW-pnf"	
{"name":	String	M	"blueprintVersion"	TBD. Should query A&AI firstly.
"value": }	String	M	"1.0.0"	
]				
"payload": "xxx"	String	M	"[{\"GNBDUFunction\" :{\"gNBId\":1, \ "gNBDUId\":5}\"}]"	Contains all MOIs for CM
} }}				End

- Add RESTful Executor & Executor Functions
  - RestfulComponentFunction, process the execution service input (from SO)
  - ComponentRestfulExecutor, add instance dependencies and setup componentFunction
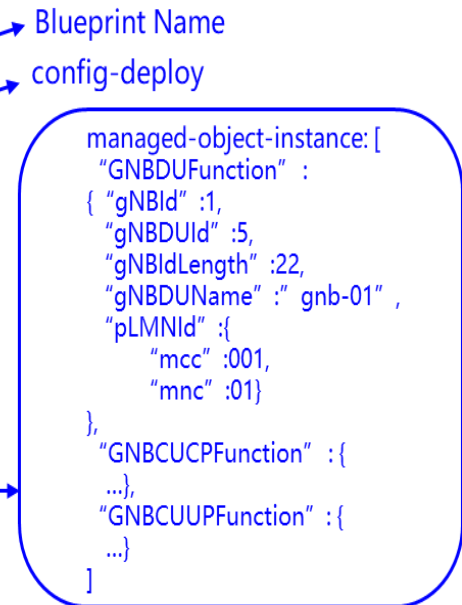
- Leverage the dynamic characteristic of CDS SS API
  - Config-deploy/config-get/config-modify and config-delete

Class Inheritance

[CCSDK-2002] WIP

Mapping to Integration : Reqs and Status

- Simulating 3GPP Generic provisioning MnS Provider
  - Enhance the existing EMS simulator

IS operation	HTTP Method	Resource URI	Qualifier
createMOI	PUT	/{className}/{id}	M
getMOIAttributes	GET	/{className}/{id}	M
modifyMOIAttributes	PATCH	/{className}/{id}	M
deleteMOI	DELETE	/{className}/{id}	M

(Alignment with 3GPP TS 28.532)

Future work/possibility

- Integration of SS gRPC API
- Integration of other executors
- Store MOIs in ONAP (New-proposed RuntimeDB?)
- RAN Service Modeling?
- Deal with NRM IOCs in design time
- …

- In R6, the UC will focus on NR NRM and start from the simplified set of IOCs in TS 28.541(version 16.1.0). Note that, 30+ IOCs were given for NR NRM.
- Three deployment scenarios are provided for the representation of gNB and en-gNB. The UC will start from 'non-split' one.

Deployment scenario focus

IOC focus

GNBDUFunction

Role	Req	End point requirement for 3-split deployment scenario	End point requirement for 2-split deployment scenario	End point requirement for Non-split deployment scenario
gNB		<<IOC>>EP_F1C, <<IOC>>EP_F1U	<<IOC>>EP_F1C, <<IOC>>EP_F1U	None.

GNBCUCPFunction

Role	Req	End point requirement for 3-split deployment scenario	End point requirement for 2-split deployment scenario	End point requirement for Non-split deployment scenario
gNB		<<IOC>>EP_XnC, <<IOC>>EP_NgC, <<IOC>>EP_F1C, <<IOC>>EP_E1.	<<IOC>>EP_XnC, <<IOC>>EP_NgC, <<IOC>>EP_F1C <<IOC>>EP_F1U.	<<IOC>>EP_XnC, <<IOC>>EP_NgC.

GNBCUUPFunction

Role	Req	End point requirement for 3-split deployment scenario	End point requirement for 2-split deployment scenario	End point requirement for Non-split deployment scenario
gNB		<<IOC>>EP_XnU, <<IOC>>EP_NgU, <<IOC>>EP_F1U, <<IOC>>EP_E1.	<<IOC>>EP_XnU, <<IOC>>EP_NgU, <<IOC>>EP_F1U.	<<IOC>>EP_XnU, <<IOC>>EP_NgU.

- 4.3.1 GNBDUFunction
- 4.3.2 GNBCUCPFunction
- 4.3.3 GNBCUUPFunction
- 4.3.4 NRCellCU
- 4.3.5 NRCellDU
- 4.3.6 NRSectorCarrier
- 4.3.7 BWP
- 4.3.8 EP_E1
- 4.3.9 EP_XnU
- 4.3.10 EP_NgC
- 4.3.11 EP_NgU
- 4.3.12 EP_F1C
- 4.3.13 EP_F1U
- 4.3.14 EP_S1U
- 4.3.15 EP_X2C
- 4.3.16 EP_X2U
- 4.3.17 EP_XnC
- 4.3.18 ExternalGNBCUCPFunction
- 4.3.19 ExternalGNBCUUPFunction