

5G Network Resource Model (NRM) Configuration in R6 Frankfurt

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R6 Use Case Objectives

5G NRM CM with RESTful/HTTPS protocol.

1. Add a new restful-executor in CDS blueprints processor
 - Should be generic enough to support to **configure** any type and any number of NRM objects by restful createMOI operation in 3GPP
2. Provide CRUD operations on NRM objects via CDS
 - Self-service API should support config-get, config-modify and config-delete actions
3. Add new NRM related data types, corresponding PNF packages and BPMN enhancements as well
 - Use several NR NRM IOCs for demonstrations in PNF on-boarding package (Descope of UC)
 - BPMN support for NRM configuration (Stretch goal, Deferred to R7)
4. Support SO service/instance management API for NRM configuration
 - Modify or Add additional SO NB APIs (Implemented)
 - Define corresponding NRM IOCs in SO and BBs (Stretch goal, Deferred to R7)

BUSINESS DRIVERS

This section describes Business Drivers for this Use Case.

This section describes Business Drivers needs.

Executive Summary - Network Resource Management (NRM) configuration management allows the service providers to control and monitor the actual configuration on the Network Resources. They may be used within the first PNF or VNF instantiation or routine operations after PNF or VNF is running.

Business Impact - Network resources are the fundamental resources to the mobility networks. Only the network resource are ready then the service like eMBB service can be instantiated. Better service quality can be achieved by suitable NRM configuration management.

Business Markets - Considering the Network Resources are basic for mobility network, New 5G deployments as well as legacy 4G systems should be considered as target markets. Both radio and core and other sub-network domains could also benefit from it.

Funding/Financial Impacts - Orchestrating and Controlling the network resources could reduce the OPEX.

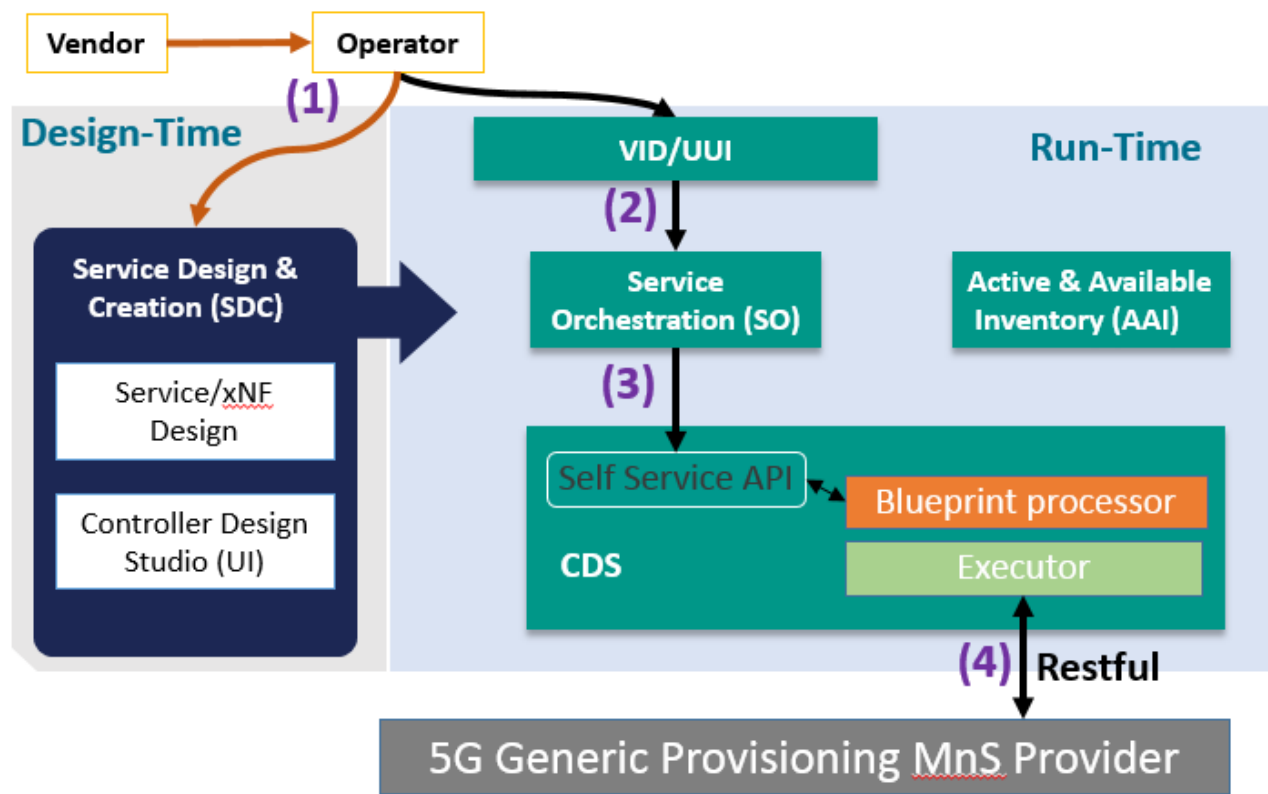
Organization Mgmt, Sales Strategies - (It is suggested that you use the following wording): *There is no additional organizational management or sales strategies for this use case outside of a service providers "normal" ONAP deployment and its attendant organizational resources from a service provider.* (This would typically describe the "WHO", but because use cases are all deployed with ONAP itself, these two areas come with the actual ONAP deployment and uses the organizational management and sales strategies of a particular service provider's ONAP deployment)

Current Status of 5G NRM Configuration

This is a new UC will start in R6.

Presentation in LFN DDF is [here](#).

High-level Design:



Development Status

DEVELOPMENT IMPACTS SUMMARY

PROJECT	PTL	User Story / Epic	Requirement
A&AI	James Forsyth	(Future Functionality)	R7 To store NRM Objects with in PNF in ONAP as need. <u>Out of Scope in R6.</u>
AAF	Jonathan Gathman		
APPC	Takamune Cho		
CLAMP	Gervais-Martial Ngueko		
CC-SDK	Dan Timoney		
DCAE	Vijay Venkatesh Kumar		
DMaaP	Mandar Sawant		
External API	Matthieu Geerebaert		
MODELING	Hui Deng	Epic #1: 5G NRM Configuration with restful protocol Data types and node types for 3GPP NR NRM	Add NRM information in PNF package for onboarding
Multi-VIM / Cloud	Bin Yang		
OOF	Shankaranarayanan Puzhavakath Narayanan		
POLICY	Pamela Dragosh		
PORTAL	Manoop Talasila		
SDN-C	Dan Timoney		

SDC	Ofir Sonsino		
SO	Seshu Kumar Mudiganti	Epic #1: 5G NRM Configuration with restful protocol Support NRM CM during PNF instantiation and separate workflows	1. New BBs coding for PnP instantiation 2. Enhance related workflowSpecifications API 3. Add new NB API for instance management for pnf 4.add workflow for modify/delete/query NRM config
VID	Ittay Stern	(Future Functionality)	No impact R6 Planned future (R7+): Optional: Trigger NRM CM procedure via UI
VNFRQTS	Steven Wright		
VNF-SDK	Weitao Gao		
CDS	Yuriy Malakov	Epic #1: 5G NRM Configuration with restful protocol Provide a http-based restful component (including executor and function)	1. Restful component for NRM CM, executor and function 2. controller blueprint and cba file 3. get, modify, create, delete action support for NRM mgmt

List of PTLs: [Approved Projects](#)

Impacts

SO Impacts:

- 1. Enhance related workflowSpecifications API:

GET /onap/so/infra/workflowSpecifications/{version:[vV][1]}/workflows?pnfModelVersionId={UUID}

- 2. New NB API to trigger the custom workflow:

POST /onap/so/infra/instanceManagement/{version:[vV][1]}/serviceInstances/{serviceInstanceId}/pnfs/{pnfInstanceId}/workflows/{workflowUuid}

- 3. Enhance configuration related BB to support NRM Configuration (*NOT* additional API):

ConfigAssignBB

ConfigDeployBB

- 4. New native specific workflows(*NOT* additional API)::

modifyPnfNrmconf.bpmn --call config-modify via SS API

deletePnfNrmconf.bpmn --call config-delete via SS API

queryPnfNrmconf.bpmn --call config-get via SS API

CCSDK/CDS Impacts:

- 1. Add a restful executor in CDS blueprint processor

including the executor and the component function

Integration Impacts:

- Support generic provisioning management service simulator for integration test

EPIC / REQ

The 5G NRM configuration for R6 Frankfurt:

REQ-49 - Getting issue details...

STATUS

INT-1245 - Getting issue details...

STATUS

INT-1387 - Getting issue details...

STATUS

CCSDK-1909 - Getting issue details...

STATUS

CCSDK-1965 - Getting issue details...

STATUS

INT-1514 - Getting issue details...

STATUS

Test Status

No	Test cases	Test Status
1	5G NRM CM config-deploy Test	COMPLETE
2	5G NRM CM config-get Test	COMPLETE
3	5G NRM CM config-modify Test	COMPLETE
4	5G NRM CM config-delete Test	COMPLETE

Detailed Description of Integration Testcases and Results

Test case ID	1
Test case name	5G NRM CM config-deploy Test
Test case description	Trigger the config-deploy workflow to create multiple MOIs (Management Object Instance)
Release	Frankfurt
Pre-conditions	<ol style="list-style-type: none">1. run the Provision MnS provider2. upload the corresponding blueprint
Testing Steps	<div>Test Command curl -s -k -u "ccsdkapps:ccsdkapps" -H "Content-Type: application/json" -H "Accept: application/json" -X POST http://cds.onap:port/api/v1/execution-service/process -d @NRM_create.json python -m json.tool</div> <div>NRM_create.json { "commonHeader": { "originatorId": "CurlTest", "requestId": "1234-5678", "subRequestId": "5678-9012" }, "actionIdentifiers": { "blueprintName": "NRMblueprint", "blueprintVersion": "1.0.0", "actionName": "config-deploy", </div>

```
"mode": "sync"
},
"payload": {
  "config-deploy-request": {
    "config-deploy-properties": {
      "service-instance-id": "PNF_service_1",
      "pnf-id": "PNF1",
      "pnf-name": "PNF1",
      "service-model-uuid": "90e00209-779b-4732-b0f1-7d7dfa88745c",
      "pnf-customization-uuid": "e65d3f05-9558-4e58-aeb0-3a1eae1db742",
      "managed-object-instances": [
        {
          "className": "GNBCUCPFunction",
          "data": {
            "gNBId": "1",
            "gNBIdLength": "5",
            "gNBCUName": "gnb-01",
            "pLMNId": {
              "mcc": "001",
              "mnc": "01"
            }
          }
        }
      ],
      {
        "className": "GNBCUUPFunction",
        "data": {
          "gNBId": "1",
          "gNBIdLength": "5",
          "pLMNId": {
            "mcc": "001",
            "mnc": "01"
          }
        }
      },
      {
        "className": "GNBDUFunction",
        "data": {
          "gNBDUId": "1",
          "gNBDUName": "gnb-01",
          "gNBId": "1",
          "gNBIdLength": "5",
```

```
    "pLMNId": {
      "mcc": "001",
      "mnc": "01"
    }
  }
}
]
}
}
}
```

Response of CDS

```
{
  "actionIdentifiers": {
    "actionName": "config-deploy",
    "blueprintName": "NRMblueprint",
    "blueprintVersion": "1.0.0",
    "mode": "sync"
  },
  "commonHeader": {
    "flags": null,
    "originatorId": "CurlTest",
    "requestId": "1234-5678",
    "subRequestId": "5678-9012",
    "timestamp": "2020-03-13T06:11:33.218Z"
  },
  "payload": {
    "config-deploy-response": {
      "result": {
        "/GNBCUCPFunction/f64bc1a8-28c1-4da2-81e8-b5963b4b4e70": {
          "body": {
            "data": {
              "attributes": {
                "gNBCUName": "gnb-01",
                "gNBId": "1",
                "gNBIdLength": "5",
                "pLMNId": {
                  "mcc": "001",
                  "mnc": "01"
                }
              }
            }
          }
        }
      }
    }
  }
}
```

```
    },
    "class": "GNBCUCPFFunction",
    "href": "/GNBCUCPFFunction/f64bc1a8-28c1-4da2-81e8-b5963b4b4e70",
    "id": "f64bc1a8-28c1-4da2-81e8-b5963b4b4e70"
  }
},
"status": 201
},
"/GNBCUUPFunction/2a78c55a-2762-4d15-9204-037ca6fecf87": {
  "body": {
    "data": {
      "attributes": {
        "gNBId": "1",
        "gNBIdLength": "5",
        "pLMNId": {
          "mcc": "001",
          "mnc": "01"
        }
      },
      "class": "GNBCUUPFunction",
      "href": "/GNBCUUPFunction/2a78c55a-2762-4d15-9204-037ca6fecf87",
      "id": "2a78c55a-2762-4d15-9204-037ca6fecf87"
    }
  },
  "status": 201
},
"/GNBDUFunction/261690cc-f221-45e0-86e6-2b980cb8e808": {
  "body": {
    "data": {
      "attributes": {
        "gNBDUId": "1",
        "gNBDUName": "gnb-01",
        "gNBId": "1",
        "gNBIdLength": "5",
        "pLMNId": {
          "mcc": "001",
          "mnc": "01"
        }
      },
      "class": "GNBDUFunction",
```

	<pre> "href": "/GNBDUFunction/261690cc-f221-45e0-86e6-2b980cb8e808", "id": "261690cc-f221-45e0-86e6-2b980cb8e808" } }, "status": 201 } } }, "status": { "code": 200, "errorMessage": null, "eventType": "EVENT_COMPONENT_EXECUTRD", "message": "success", "timestamp": "2020-03-13T06:11:33.331Z" }, "stepData": { "name": "config-deploy-process", "properties": { "response-data": "", "status": "success" } } } } </pre>
Conclusion (Pass /Fail)	PASS
Test lab	
Test case ID	2
Test case name	5G NRM CM config-get Test
Test case description	Trigger the config-get workflow to get multiple MOIs attributes (Management Object Instance)
Release	Frankfurt
Pre-conditions	<ol style="list-style-type: none"> 1. run the Provision MnS provider 2. upload the corresponding blueprint 3. already create some MOIs
Testing Steps	<div> Test Command <pre>curl -s -k -u "ccsdkapps:ccsdkapps" -H "Content-Type: application/json" -H "Accept: application/json" -X POST http://cds.onap:port/api/v1/execution-service/process -d @NRM_get.json python -m json.tool</pre> </div>

NRM_get.json

```
{
  "commonHeader": {
    "originatorId": "CurlTest",
    "requestId": "1234-5678",
    "subRequestId": "5678-9012"
  },
  "actionIdentifiers": {
    "blueprintName": "NRMblueprint",
    "blueprintVersion": "1.0.0",
    "actionName": "config-get",
    "mode": "sync"
  },
  "payload": {
    "config-get-request": {
      "config-get-properties": {
        "service-instance-id": "PNF_service_1",
        "pnf-id": "PNF1",
        "pnf-name": "PNF1",
        "service-model-uuid": "90e00209-779b-4732-b0f1-7d7dfa88745c",
        "pnf-customization-uuid": "e65d3f05-9558-4e58-aeb0-3a1eae1db742",
        "managed-object-instances": [
          {
            "className": "GNBCUCPFunction",
            "id": "e65d3f05-9558-4e58-aeb0-3a1eae1db742",
            "scope": "BASE_ONLY",
            "filter": "GNBCUCPFunction",
            "fields": ["gNBId", "gNBIdLength"]
          }
        ]
      }
    }
  }
}
```

Response of CDS

```
{
  "actionIdentifiers": {
    "actionName": "config-get",
    "blueprintName": "NRMblueprint",
```

```
"blueprintVersion": "1.0.0",
"mode": "sync"
},
"commonHeader": {
  "flags": null,
  "originatorId": "CurlTest",
  "requestId": "1234-5678",
  "subRequestId": "5678-9012",
  "timestamp": "2020-03-13T06:13:43.166Z"
},
"payload": {
  "config-get-response": {
    "result": {
      "response": {
        "/GNBCUCPFunction/e65d3f05-9558-4e58-aeb0-3a1eae1db742": {
          "body": {
            "data": [
              {
                "attributes": {
                  "gNBId": "1",
                  "gNBIdLength": "5"
                },
                "class": "GNBCUCPFunction",
                "href": "/GNBCUCPFunction/e65d3f05-9558-4e58-aeb0-3a1eae1db742",
                "id": "e65d3f05-9558-4e58-aeb0-3a1eae1db742"
              }
            ]
          },
          "status": 200
        }
      }
    }
  },
  "status": {
    "code": 200,
    "errorMessage": null,
    "eventType": "EVENT_COMPONENT_EXECUTRD",
    "message": "success",
    "timestamp": "2020-03-13T06:11:33.331Z"
```

	<pre> }, "stepData": { "name": "config-get-process", "properties": { "response-data": "", "status": "success" } } } }</pre>
Conclusion (Pass /Fail)	PASS
Test lab	
Test case ID	3
Test case name	5G NRM CM config-modify Test
Test case description	Trigger the config-modify workflow to modify multiple MOIs attributes (Management Object Instance)
Release	Frankfurt
Pre-conditions	<div>1. run the Provision MnS provider</div> <div>2. upload the corresponding blueprint</div> <div>3. already create some MOIs</div>
Testing Steps	<div>Test Command</div> <div>curl -s -k -u "ccsdkapps:ccsdkapps" -H "Content-Type: application/json" -H "Accept: application/json" -X POST http://cds.onap:port/api/v1/execution-service/process -d @NRM_modify.json python -m json.tool</div>

NRM_modify.json

```
{
  "commonHeader": {
    "originatorId": "CurlTest",
    "requestId": "1234-5678",
    "subRequestId": "5678-9012"
  },
  "actionIdentifiers": {
    "blueprintName": "NRMblueprint",
    "blueprintVersion": "1.0.0",
    "actionName": "config-modify",
    "mode": "sync"
  },
  "payload": {
    "config-modify-request": {
      "config-modify-properties": {
        "service-instance-id": "PNF_service_1",
        "pnf-id": "PNF1",
        "pnf-name": "PNF1",
        "service-model-uuid": "90e00209-779b-4732-b0f1-7d7dfa88745c",
        "pnf-customization-uuid": "e65d3f05-9558-4e58-aeb0-3a1eae1db742",
        "managed-object-instances": [
          {
            "className": "GNBCUCPFunction",
            "id": "e65d3f05-9558-4e58-aeb0-3a1eae1db742",
            "scope": "BASE_ONLY",
            "filter": "GNBCUCPFunction",
            "data": {
              "gNBId": "12345",
              "gNBIdLength": "5"
            }
          }
        ]
      }
    }
  }
}
```

Response of CDS

```
{
```

```
"actionIdentifiers": {
  "actionName": "config-modify",
  "blueprintName": "NRMblueprint",
  "blueprintVersion": "1.0.0",
  "mode": "sync"
},
"commonHeader": {
  "flags": null,
  "originatorId": "CurlTest",
  "requestId": "1234-5678",
  "subRequestId": "5678-9012",
  "timestamp": "2020-03-13T06:14:45.274Z"
},
"payload": {
  "config-modify-response": {
    "result": {
      "response": {
        "/GNBCUCPFunction/e65d3f05-9558-4e58-aeb0-3a1eae1db742": {
          "body": {
            "data": [
              {
                "attributes": {
                  "gNBCUName": "gnb-01",
                  "gNBId": "12345",
                  "gNBIdLength": "5",
                  "pLMNId": {
                    "mcc": "001",
                    "mnc": "01"
                  }
                },
                "class": "GNBCUCPFunction",
                "href": "/GNBCUCPFunction/e65d3f05-9558-4e58-aeb0-3a1eae1db742",
                "id": "e65d3f05-9558-4e58-aeb0-3a1eae1db742"
              }
            ]
          },
          "status": 200
        }
      }
    }
  }
}
```

	<pre> } }, "status": { "code": 200, "errorMessage": null, "eventType": "EVENT_COMPONENT_EXECUTRD", "message": "success", "timestamp": "2020-03-13T06:11:33.331Z" }, "stepData": { "name": "config-modify-process", "properties": { "response-data": "", "status": "success" } } } } } </pre>
Conclusion (Pass /Fail)	PASS
Test lab	
Test case ID	4
Test case name	5G NRM CM config-delete Test
Test case description	Trigger the config-delete workflow to get multiple MOIs attributes (Management Object Instance)
Release	Frankfurt
Pre-conditions	<ol style="list-style-type: none"> 1. run the Provision MnS provider 2. upload the corresponding blueprint 3. already create some MOIs
Testing Steps	<div> Test Command <pre> curl -s -k -u "ccsdkapps:ccsdkapps" -H "Content-Type: application/json" -H "Accept: application/json" -X POST http://cds.onap:port/api/v1/execution-service/process -d @NRM_delete.json python -m json.tool </pre> </div>

NRM_delete.json

```
{
  "commonHeader": {
    "originatorId": "CurlTest",
    "requestId": "1234-5678",
    "subRequestId": "5678-9012"
  },
  "actionIdentifiers": {
    "blueprintName": "NRMblueprint",
    "blueprintVersion": "1.0.0",
    "actionName": "config-delete",
    "mode": "sync"
  },
  "payload": {
    "config-delete-request": {
      "config-delete-properties": {
        "service-instance-id": "PNF_service_1",
        "pnf-id": "PNF1",
        "pnf-name": "PNF1",
        "service-model-uuid": "90e00209-779b-4732-b0f1-7d7dfa88745c",
        "pnf-customization-uuid": "e65d3f05-9558-4e58-aeb0-3a1eae1db742",
        "managed-object-instances": [
          {
            "className": "GNBCUCPFunction",
            "id": "e65d3f05-9558-4e58-aeb0-3a1eae1db742",
            "scope": "BASE_ONLY",
            "filter": "GNBCUCPFunction"
          }
        ]
      }
    }
  }
}
```

Response of CDS

```
{
  "actionIdentifiers": {
    "actionName": "config-delete",
    "blueprintName": "NRMblueprint",
    "blueprintVersion": "1.0.0",
```

```
    "mode": "sync"
  },
  "commonHeader": {
    "flags": null,
    "originatorId": "CurlTest",
    "requestId": "1234-5678",
    "subRequestId": "5678-9012",
    "timestamp": "2020-03-13T06:15:55.413Z"
  },
  "payload": {
    "config-delete-response": {
      "result": {
        "response": {
          "/GNBCUCPFunction/e65d3f05-9558-4e58-aeb0-3a1eae1db742": {
            "body": {
              "data": [
                "/GNBCUCPFunction/e65d3f05-9558-4e58-aeb0-3a1eae1db742"
              ]
            },
            "status": 200
          }
        }
      }
    }
  },
  "status": {
    "code": 200,
    "errorMessage": null,
    "eventType": "EVENT_COMPONENT_EXECUTRD",
    "message": "success",
    "timestamp": "2020-03-13T06:11:33.331Z"
  },
  "stepData": {
    "name": "config-delete-process",
    "properties": {
      "response-data": "",
      "status": "success"
    }
  }
}
```


Conclusion (Pass /Fail)	PASS
Test lab	

Reference

Discussion Materials

This section is to review slides for discussion.



Slides at LFN Developer & Testing Forum, Prague, Jan 13 - 16, 2020:



Meeting Schedule for Impacted Project Discussion

The meeting schedule is to present this use case slides to the impacted projects.

Plannd Date	Related Projects/UC	Meeting Host	Status	Other
2019-08-07	5G UC	Ben/Vimal	Completed	Record: Use Case Realization Call: August 7, 2019
2019-09-03	CDS	MALAKOV, YURIY	Completed	NA

2019-09-09	Modeling: Resource IM	Xu Yang	Completed	Minutes: ONAP R6 Resource IM Call 2019-9-9
2019-09-10	Modeling sub-committee	Hui Deng	Completed	Modeling 2019-09-10
xx	SDC	Ofir Sonsino	Planning	
xx	SO	Seshu	Planning	