Oracle® Communications

Unified Data Repository Cloud Native User's Guide

Release 1.2

F22595-01

September 2019

Oracle Communications Unified Data Repository Cloud Native User's Guide, Release 1.2

F22595-01

Copyright © 2019, Oracle and/or its affiliates. All rights reserved.

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, then the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, delivered to U.S. Government end users are "commercial computer software" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, use, duplication, disclosure, modification, and adaptation of the programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, shall be subject to license terms and license restrictions applicable to the programs. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software or hardware and documentation may provide access to or information about content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services unless otherwise set forth in an applicable agreement between you and Oracle. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services, except as set forth in an applicable agreement between you and Oracle.

Contents

1 Introduction

Architecture 1-1

Oracle Communications User Data Repository Features 1-2

Locate Product Documentation on the Oracle Help Center Site 1-3

Customer Training 1-4

My Oracle Support 1-4

Emergency Response 1-4

2 Configuring User Parameters for User Data Repository

3 Advanced Customization of User Data Repository

Creating New Data Table 3-1

Supporting New Key in User Data Repository 3-1

Supporting New URI in User Data Repository 3-2

Updating Existing Schema for Data 3-2

Supporting New API_NAME in RESOURCE_MAP Table 3-6

4 KPIs, and Metrics

List of Tables

2-1 nudr-drservice Micro service 2-1

2-2 nudr-notify-service micro service 2-5

2-3 nudr-nrf-client-service micro service 2-8

2-4 ocudr-ambassador Micro service 2-9

4-1 Metrics for OCUDR 4-1

4-2 Micro-service level Metrics for OCUDR 4-2

4-3 KPIs for OCUDR 4-14

1
Introduction

The 5G User Data Repository is one of the main key component of the 5G Service Based Architecture. User Data Repository is a converged repository which is used by other 5G Network Functions to store the data.

User Data Repository supports CRUD operations over HTTP2 that allows 5G elements have their subscriber data provisioned and get them retrieved with ease, using restful services.

The 5G User Data Repository provide flexible URI support, run-time schema validation, and supports multiple keys. User Data Repository uses MySQL NDB Cluster as the Data Tier for DB operations. The 5G User Data Repository registers with Network Repository Function in the 5G network, so the other NFs in the network can discover User Data Repository through Network Repository Function.

As per the 3GPP, Policy Control Function uses User Data Repository to store policy related data, UDM uses UDR to store subscription data and Network Exposure Function uses User Data Repository to store subscriber data that can be exposed to other entities.

In this release, User Data Repository supports only Policy Control Function data.

Architecture

The Cloud Native User Data Repository architecture is based on the following three tiers:

Connectivity Tier

- Ambassador is used as API gateway which will receive all requests and forwards them to Nudr-drservice service in Business Tier.
- It also load balances the traffic and provides required authentication.
- It runs on Kubernetes as a microservice.

Business Tier

- Provides the business logic of 5G User Data Repository.
- It runs on Kubernetes and has three micro services:
  - **Nudr-drservice:** The core service which will handles flexible URI support, runtime schema validation and connects to Data Tier for DB operations.
  - **Nrf-client-service:** Handles Network Repository Function registration, heartbeat, update, and deregistration with Network Repository Function.
  - **Nudr-notify-service:** Handles notification messages to Policy Control Function (PCF) for data subscriptions.

Data Tier

- Uses MySQL NDB Cluster as backend DB which provides HA and geo-redundancy capabilities.
- Runs on VMs.

Oracle Communications User Data Repository Features

This section provides list of the features supported in Oracle Communications User Data Repository.

- Flexible URI support
  - A new URI for any resource can be defined at runtime for basic CRUD operations on the resource.
- Supports multi-keys
  - Supports multiple keys for a subscriber and provides flexibility to define new ones.
- Runtime schema validation
  - The schema for the data stored can be modified and validation can be done without service restart.
- Supports 5G PCF's AM, SM, UEPolicySet and UsageMonitoring data APIs
  - Compliant with v29.519 v15.3
- Provisioning support via REST/JSON
  - Provides provisioning APIs for creating subscribers and adding PCF data
- Schema versioning
  - In this feature different versions of schema will be maintained, staring from default version v0(version with which software shipped to customers) and as customer upgrades schema new versions will be created v0,v1,v2 etc.
- External service mapping to Mysql DB
  - In this feature an external service named as "udrdbservice" will be mapped to Mysql DB. "nudr-drservice" and "nudr-notify-service" will connect to "udrdbservice" to communicate with the database.
- Subscription/Notification feature
  - "nudr-drservice" service will receive and process the subscription request to subscribe the subscriber's resources.
  - Whenever any update/delete request is received for subscribers which are subscriber for notifications, "nudr-drservice" service will send an internal signal (HTTP2 POST request) to "nudr-notify-service".
  - "nudr-notify-service" is a new service which is responsible to send out the notification requests to the target.
- Cross-reference validation of Sm data
  - In this enhancement feature, cross-reference validation of Sm data will be done before storing the Sm data in the database. This means that values of SNSSAI/DNN and LimitIds should be same in "smPolicySnssaiData" and "umData".
- UDSF API support
  - Provides basic CRUD operations for UDSF API
- Integrated with CNE services

  - Prometheus/Garafana for metrics
  - EFK/Kibana for logging
  - Jaegar for tracing

List of Operations Supported

User Data Repository supports the following operations.

Subscriber Profile Related Operations for Provisioning

- **Create Subscriber**: Provisions a subscriber with the given set of keys.
- **Update Subscriber**: Updates the subscriber information.
- **Get subscriber**: Retrieve the subscriber information completely.
- **Delete Subscriber**: Deletes the subscriber information and related data.
- **Subscription Request**: Subscribes to a subscriber's resources and get notified in case of updates.
- **Notification**: This will be generated from UDR in case of updates to subscriber's resources subscribed in previous request. And will be sent to notification uri received in subscription request.

NF Data Related Operations as per 3GPP

- **Insert Data**: Creates a subscriber if not present and insert the specific data (policy_data/udsf_data/udm_data).
- **Update Data**: Creates a subscriber if not present and updates the complete data for a particular subscriber as given in request.
- **Patch Data**: Patch will support update of a specific data or parts of it. If not present it will add the data. This operation is valid only when subscriber is already present.
- **Get Data**: Retrieve the requested data for a particular subscriber.
- **Delete Data**: Delete the requested data for a particular subscriber.

Locate Product Documentation on the Oracle Help Center Site

Oracle Communications customer documentation is available on the web at the Oracle Help Center (OHC) site, http://docs.oracle.com. You do not have to register to access these documents. Viewing these files requires Adobe Acrobat Reader, which can be downloaded at http://www.adobe.com.

1. Access the Oracle Help Center site at http://docs.oracle.com.
2. Click `Industries`.
3. Under the Oracle Communications subheading, click the `Oracle Communications documentation` link.

   The Communications Documentation page appears. Most products covered by these documentation sets will appear under the headings "Network Session Delivery and Control Infrastructure" or "Platforms."
4. Click on your Product and then the Release Number.

   A list of the entire documentation set for the selected product and release appears.

5. To download a file to your location, right-click the PDF link, select `Save target as` (or similar command based on your browser), and save to a local folder.

Customer Training

Oracle University offers training for service providers and enterprises. Visit our web site to view, and register for, Oracle Communications training:

http://education.oracle.com/communication

To obtain contact phone numbers for countries or regions, visit the Oracle University Education web site:

www.oracle.com/education/contacts

My Oracle Support

My Oracle Support is your initial point of contact for all product support and training needs. A representative at Customer Access Support can assist you with My Oracle Support registration.

Call the Customer Access Support main number at 1-800-223-1711 (toll-free in the US), or call the Oracle Support hotline for your local country from the list at http://www.oracle.com/us/support/contact/index.html. When calling, make the selections in the sequence shown below on the Support telephone menu:

1. Select 2 for New Service Request
2. Select 3 for Hardware, Networking and Solaris Operating System Support
3. Select one of the following options:
   - For Technical issues such as creating a new Service Request (SR), Select 1
   - For Non-technical issues such as registration or assistance with MOS, Select 2

You will be connected to a live agent who can assist you with My Oracle Support registration and opening a support ticket.

My Oracle Support is available 24 hours a day, 7 days a week, 365 days a year.

Emergency Response

In the event of a critical service situation, emergency response is offered by the Customer Access Support (CAS) main number at 1-800-223-1711 (toll-free in the US), or by calling the Oracle Support hotline for your local country from the list at http://www.oracle.com/us/support/contact/index.html. The emergency response provides immediate coverage, automatic escalation, and other features to ensure that the critical situation is resolved as rapidly as possible.

A critical situation is defined as a problem with the installed equipment that severely affects service, traffic, or maintenance capabilities, and requires immediate corrective action. Critical situations affect service and/or system operation resulting in one or several of these situations:

- A total system failure that results in loss of all transaction processing capability
- Significant reduction in system capacity or traffic handling capability
- Loss of the system’s ability to perform automatic system reconfiguration

- Inability to restart a processor or the system
- Corruption of system databases that requires service affecting corrective actions
- Loss of access for maintenance or recovery operations
- Loss of the system ability to provide any required critical or major trouble notification

Any other problem severely affecting service, capacity/traffic, billing, and maintenance capabilities may be defined as critical by prior discussion and agreement with Oracle.

2 Configuring User Parameters for User Data Repository

The UDR micro services have configuration options. The user should be able to configure them via deployment values.yaml.

> **Note:**
>
> Some of settings default value may change.

> **Note:**
>
> - **NAME**: is the release name used in helm install command
> - **NAMESPACE**: is the namespace used in helm install command
> - **K8S_DOMAIN**: is the default kubernetes domain (svc.cluster.local)

Default Helm Release Name:- ocudr

Table 2-1 table provides the parameters for nudr-drservice Micro service

Table 2-1 nudr-drservice Micro service

Service	Parameter	Description	Default Value	Range of Possible Values (if applicable)	Notes
-	ambassador.id	Ambassador Identification	ambassador-ocudr	Not applicable	There can be multiple Ambassador installed in same cluster for different NFs. So, this is unique identification for it. Format:- ambassador-NAME
-	deployment.replicaCount	Replicas of UDR pod	2	Not applicable	Number of UDR pods to be maintained by replica set created with deployment

Table 2-1 (Cont.) nudr-drservice Micro service

Service	Parameter	Description	Default Value	Range of Possible Values (if applicable)	Notes
-	hikar.poolsize	Connection pool size	25	Not Applicable	The hikari pool connection size to be created at start up.
-	image.pullPolicy	This setting will tell if image need to be pulled or not	Always	Possible Values - Always IfNotPresent Never	-
-	image.repository	Full Image Path	reg-1:5000/ocudr/nudr_datarepository_service	Not applicable	-
-	image.tag	Tag of Image	1.2.0	Not applicable	-
-	jaeger.service.name	Jaegar Service Name installed in CNE	occne-tracer-jaeger-collector.occne-infra	Not applicable	-
-	jaeger.service.port	Jaegar Service Port installed in CNE	9411	Not applicable	-
-	logging.level.root	Log Level	WARN	Possible Values - WARN INFO DEBUG	Log level of the UDR pod
-	maxReplicas	Maximum Replicas	4	Not applicable	Maximum number of pods
-	minReplicas	Minimum Replicas	1	Not applicable	Minimum number of pods
-	mysql.dbname	Mysql Database name for UDR	udrdb	Not applicable	This is a read only parameter. Do not change the default value.
-	mysql.dspassword	Mysql password for UDR database set by MYSQL DBA	udrDbPasswd	Not applicable	Password example: udrpasswd
-	mysql.dsusername	Mysql Username for UDR database set by MYSQL DBA	udruser	Not applicable	-

Table 2-1 (Cont.) nudr-drservice Micro service

Service	Parameter	Description	Default Value	Range of Possible Values (if applicable)	Notes
-	mysql.primaryhost	Primary MYSQL Host IP or Hostname	ocudr-mysql	Not applicable	UDR will connect Primary MYSQL if not available then it will connect secondary host. Format:- NAME-mysql For MYSQL Cluster use respective IP Address or Service
-	mysql.primaryport	Port of MYSQL Database	3306	Not applicable	-
-	mysql.secondaryhost	Secondary MYSQL Host IP or Hostname	ocudr-mysql	Not applicable	Format:- NAME-mysql For MYSQL Cluster use respective Secondary IP Address or Service
-	mysql.secondaryport	Port of MYSQL Database	3306	Not applicable	-
-	resources.request.cpu	Cpu Allotment for UDR pod	3	Not applicable	The cpu to be allocated for UDR pod during deployment.
-	resources.target.averageCpuUtil	CPU utilization limit for autoscaling	80	Not Applicable	CPU utilization limit for creating HPA.
-	service.http2enabled	Enabled HTTP2 support flag for rest server	true	true/false	Enable/Disable HTTP2 support for rest server.
-	service.port.http	HTTP port	80	Not applicable	The http port to be used in UDR service.
-	service.port.https	HTTPS port	443	Not applicable	The https port to be used for UDR service.
-	service.port.management	Management port	9000	Not applicable	The actuator management port to be used for UDR service.

Table 2-1 (Cont.) nudr-drservice Micro service

Service	Parameter	Description	Default Value	Range of Possible Values (if applicable)	Notes
-	service.type	UDR service type	ClusterIP	Possbile Values- ClusterIP NodePort LoadBalancer	The kubernetes service type for exposing UDR deployment. Note: Suggested to be set as ClusterIP (default value) always
-	subscriber.autocreate	Flag to enable auto creation of subscriber	true	true/false	This flag will enable auto creation of subscriber when creating data for a non existent subscriber.
-	udrdbservice.primaryhost	Primary MYSQL Host IP or Hostname	*ocudr-mysql*	Not applicable	UDR will connect Primary MYSQL if not available then it will connect secondary host. *Format:- NAME-mysql* *For MYSQL Cluster use respective IP Address or Service*
-	udrdbservice.secondaryhost	Secondary MYSQL Host IP or Hostname	*ocudr-mysql*	Not applicable	*Format:- NAME-mysql* *For MYSQL Cluster use respective Secondary IP Address or Service*
-	udrdbservice.port	Port of MYSQL Database	3306	Not applicable	
-	udrdbservice.targetPort	Port of MYSQL Database	3306	Not applicable	

Table 2-1 (Cont.) nudr-drservice Micro service

Service	Parameter	Description	Default Value	Range of Possible Values (if applicable)	Notes
-	validate.smdata	Flag to enable correlation feature for smdata	true	true/false	This flag will control the correlation feature for smdata.

Following table provides information about the nudr-notify-service micro service.

Table 2-2 nudr-notify-service micro service

Service	Parameter	Description	Default value	Range or Possible Values (if applicable)	Notes
-	deployment.replicaCount	Replicas of UDR pod	2	Not applicable	Number of UDR pods to be maintained by replica set created with deployment.
-	hikar.poolsize	Connection pool size	25	Not Applicable	The hikari pool connection size to be created at start up.
-	image.repository	Full Image Path	reg-1:5000/ocudr/nrf_client_service	Not applicable	
-	image.tag	Tag of Image	1.2.0	Not applicable	
-	image.pullPolicy	This setting will tell if image need to be pulled or not	Always	Always IfNotPresent Never	
-	jaeger.service.name	Jaegar Service Name installed in CNE	occne-tracer-jaeger-collector.occne-infra	Not applicable	-
-	jaeger.service.port	Jaegar Service Port installed in CNE	9411	Not applicable	-
-	logging.level.root	Log Level	WARN	Possible Values - WARN INFO DEBUG	Log level of the UDR pod
-	maxReplicas	Maximum Replicas	4	Not applicable	Maximum number of pods

Table 2-2 (Cont.) nudr-notify-service micro service

Service	Parameter	Description	Default value	Range or Possible Values (if applicable)	Notes
-	minReplicas	Minimum Replicas	1	Not applicable	Minimum number of pods
-	mysql.dbname	Mysql Database name for UDR	udrdb	Not applicable	This is a read only parameter. Do not change the default value.
-	mysql.dbServicename	DB service to connect	udrdbservice	Not applicable	This is a read only parameter. Do not change the default value.
-	mysql.dspassword	Mysql password for UDR database set by MYSQL DBA	udrpasswd	Not applicable	
-	mysql.dsusername	Mysql Username for UDR database set by MYSQL DBA	udruser	Not applicable	-
-	mysql.port	Port of MYSQL Database	3306	Not applicable	
-	notification.retrycount	Number of notifications to be attempted	3	Range: 1 - 10	Number of notification attempts to be done in case of notification failures. Whether retry should be done will be based on notification. retryerrorcodes configuration.
-	notification.retryinterval		5	Range: 1 - 60 Unit: Seconds	The retry interval for notifications in case of failure. Unit is in seconds. Whether retry should be done will be based on notification. retryerrorcodes configuration.

Table 2-2 (Cont.) nudr-notify-service micro service

Service	Parameter	Description	Default value	Range or Possible Values (if applicable)	Notes
-	notification.retryerrorcodes	Notification failures eligible for retry	"400,429,500,503"	Valid HTTP status codes comma separated	Comma separated error code should be given. These error codes will be eligible for retry notifications in case of failures.
-	resources.request.cpu	Cpu Allotment for UDR pod	3	Not applicable	The cpu to allocated for notify service pod during deployment.
-	resources.target.averageCpuUtil	CPU utilization limit for autoscaling	80	Not Applicable	CPU utilization limit for creating HPA.
-	service.http2enabled	Enabled HTTP2 support flag for rest server	true	true/false	This is a read only parameter. Do not change this value.
-	service.port.http	HTTP port	80	Not applicable	The http port to be used in notify service to receive signals from nudr_drservice pod.
-	service.port.https	HTTPS port	443	Not applicable	The https port to be used in notify service to receive signals from nudr_drservice pod.
-	service.port.management	Management port	9000	Not applicable	The actuator management port to be used for notify service.
-	service.type	UDR service type	ClusterIP	Possbile Values- ClusterIP NodePort LoadBalancer	The kubernetes service type for exposing UDR deployment. Note: Suggested to be set as ClusterIP (default value) always

Table 2-3 tables provides information about the nudr-nrf-client-service micro service.

Table 2-3 nudr-nrf-client-service micro service

Service	Parameter	Description	Default value	Range or Possible Values (if applicable)	Notes
-	heartBeatTimer	Heart beat timer	90	Unit: Seconds	
-	image.repository	Full Image Path	reg-1:5000/ ocudr/ nrf_client_service	Not applicable	
-	image.tag	Tag of Image	1.0.0	Not applicable	
-	image.pullPolicy	This setting will tell if image need to be pulled or not	Always	Possible Values - Always IfNotPresent Never	
-	groupId	Group ID of UDR	udr-1	Not applicable	
-	host.baseurl	NRF url for registration	http://ocnrf-endpoint.mynrf.svc.cluster.local /nnrf-nfm/v1/nf-instances	Not applicable	Url used for udr to connect and register with NRF
-	host.proxy	Proxy Setting	NULL	nrfClient.host	Proxy setting if required to connect to NRF
-	ssl	SSL flag	false	true/false	SSL flag to enable SSL with udr nrf client pod
-	logging.level.root	Log Level	WARN	Possible Values - WARN INFO DEBUG	Log level of the UDR nrf client pod
-	capacityMultiplier	Capacity of UDR	500	Not applicable	Capacity multiplier of UDR based on number of UDR pods running
-	supirange	Supi Range supported with UDR	[{\"start\": \"10000000000\", \"end\": \"20000000000\"}]	Valid start and end supi range	
-	priority	Priority	10	Priority to be sent in registration request	Priority to be sent in registration request

Table 2-3 (Cont.) nudr-nrf-client-service micro service

Service	Parameter	Description	Default value	Range or Possible Values (if applicable)	Notes
-	livenessProbeUrl	Liveness probe URL for nudr-drservice/ ambassador	http://nudr-drservice.myudr.svc.cluster.local:9000/ actuator/ health,http:// ocudr-ambassador-admin.myudr.svc.cluster.local: 8877/ ambassador/v0/ check_ready	Not Applicable	URL used by nrf-client-service to check liveness probe of nudr-drservice and ocudr-ambassador pods. Note: Be cautious in updating this value. Should consider namespace used for udr deployment and name resolution setting in k8s.
-	fqdn	UDR FQDN	ocudr-ambassador.myudr.svc.cluster.local	Not Applicable	FQDN to used for registering in NRF for other NFs to connect to UDR. Note: Be cautious in updating this value. Should consider namespace used for udr deployment and name resolution setting in k8s.

Table 2-4 table provides information about the ocudr-ambassador Micro service

Table 2-4 ocudr-ambassador Micro service

Service	Parameter	Description	Default Value	Range or Possible Values (if applicable)	Notes
-	adminService.annotations	Annotations with ambassador admin service	metallb.universe.tf/address-pool: signaling	Not applicable	This is a read only parameter. Do not change default value.
-	adminService.create	Enable Admin Service Creation	false	true/false	This is a read only parameter. Do not change default value.

Table 2-4   (Cont.) ocudr-ambassador Micro service

Service	Parameter	Description	Default Value	Range or Possible Values (if applicable)	Notes
-	adminService.type	Type of service of kubernetes service to be exposed	LoadBalancer	Possbile Values- ClusterIP NodePort LoadBalancer	This is a read only parameter. Do not change default value.
-	ambassador.id	Ambassador Identification	ambassador-ocudr	Not applicable	There can be multiple Ambassador installed in same cluster for different NFs. So, this is unique identification for it.
-	fullnameOverride	Name of Ambassador Service		ocudr-ambassador	Not applicable
-	image.repository	Full Image Path	quay.io/datawire/ambassador	Not applicable	-
-	image.tag	Tag of Image	0.50.3	Not applicable	-
-	image.pullPolicy	This setting will tell if image need to be pulled or not	Always	Always/IfNotPresent/Never	-
--	podAnnotations.prometheus.io/scrape	Prometheus related setting	true	true/false	-
--	podAnnotations.prometheus.io/port	Prometheus related setting	9102	-	-
--	prometheusExporter.enabled	Prometheus related setting	true	true/false	-
--	resources.request.cpu	CPU Allotment for Ambassador pod	3	Not applicable	The cpu allocated for ambassador pod during deployment.

Table 2-4 (Cont.) ocudr-ambassador Micro service

Service	Parameter	Description	Default Value	Range or Possible Values (if applicable)	Notes
-	service.annotations	Annotations with ambassador service	metallb.universe.tf/address-pool: signalling getambassador.io/config: | --- apiVersion: ambassador/v1 kind: Module name: ambassador ambassador_id: ambassador-ocudr config: service_port: 8080	Not applicable	This is a read only parameter. Do not change default value Service port can change based on site configurations.
-	service.annotations.getambassador.io/config.ambassador_id	Ambassador Identification	ambassador-*ocudr*	Not applicable	There can be multiple Ambassador installed in same cluster for different NFs. So, this is unique identification for it. Format:-ambassador-*NAME*
-	service.type	Type of service of kubernetes service to be exposed	LoadBalancer	Possbile Values- ClusterIP NodePort LoadBalancer	The kubernetes service type for exposing UDR deployment. Note: Suggested to be set as LoadBalancer(default value) always.

3

Advanced Customization of User Data Repository

5G UDR supports very useful features like Flexi-URI support, flexi-schema support and multiple keys support which can defined and used at runtime.

> **Note:**
>
> Following steps must be executed with caution and with the guidance from Oracle Support/Engineering for making the customization. Note that any wrong configurations would make 5G UDR behave unexpectedly. Users need to be careful before performing these changes.

Creating New Data Table

5G UDR supports a definite set of operations in v1.0.0. Only PCF_DATA is supported in initial release. However a new data table can be added using the following command.

To support operations for newly added data table, user need to put appropriate entries in RESOURCE_MAP table as well which is explained later in this article under section Support a new URI in UDR.

Pre-requisite: Login to the NDB Cluster's SQL node with configured username/password.

Example:

```
CREATE TABLE IF NOT EXISTS TABLE_NAME (COLUMN_NAME bigint NOT NULL, COLUMN_NAME
json , COLUMN_NAME json , COLUMN_NAME json , PRIMARY KEY
(PRIMARY_KEY_COLUMN_NAME))ENGINE=NDBCLUSTER;
Example:
  CREATE TABLE IF NOT EXISTS PCF_DATA2 (DATA_ID bigint NOT NULL, AM_DATA2 json ,
SM_DATA2 json , UE_POLICY_SET2 json , PRIMARY KEY (DATA_ID))ENGINE=NDBCLUSTER;
```

Supporting New Key in User Data Repository

UDR is capable to support a new KEY as run time. To use this feature, user needs to put entry in KEY_MAP table and create a indexing table.

Pre-requisite: Login to the NDB Cluster's SQL node with configured username and password.

Create Entry in KEY_MAP Table:

INSERT INTO KEY_MAP VALUES('EXT_ID', 'INT_ID', 'TABLE_NAME', 'REGEX_PATTERN');

Example:

INSERT INTO KEY_MAP VALUES('MSISDN2', 'ID4', 'ID4TODATA', '^[0-9]{5,15}$');

Supporting New URI in User Data Repository

To support a new request or an operation for any existing or newly created data table, user requires an appropriate entry in RESOURCE_MAP table. User Data Repository application supports only those requests or an operations mentioned in RESOURCE_MAP table.

Following is sample command to put an entry in RESOURCE_MAP table.

Pre-requisite: Login to the NDB Cluster's SQL node with configured username and password.

```
INSERT INTO RESOURCE_MAP VALUES ('API_NAME', 'API_VERSION',
'BASE_RESOURCE_NAME', 'URI_PATTERN', 'DATA_TABLE_NAME',
'DATA_COLUMN_NAME', 'SUPPORTED_OPERATIONS','JSON_SCHEMA');
```

Example:

```
 INSERT INTO RESOURCE_MAP VALUES ('nudr-dr2', 'v1',
'policy-data2', 'ues/{ueId}/am-data2', 'PCF_DATA2', 'AM_DATA2',
'GET,PUT,POST,DELETE,PATCH','{"current":"v0", "additionalProperties": false,"v0":
{"$schema": "http://json-schema.org/draft-07/schema#","type":
"object","properties": {"subscCats": {"type": "array","items":
{"type": "string"},"minItems":1}},"additionalProperties": false}');
```

Updating Existing Schema for Data

User Data Repository validates the incoming request body content against the json schema stored in the RESOURCE_MAP table. User Data Repository supports change in the json schema at run time.

Pre-requisite: Login to the NDB Cluster's SQL node with configured username and password.

To change json schema, UDR supports a management API detailed below

A PUT request with body having the updated schema should be sent to UDR.

PUT http://10.75.213.231:30080 **/nudr-dr-mgm/v1/policy-data/schema/am-data**

```
{
"$schema": "http://json-schema.org/draft-07/schema#",
"additionalProperties": false,
"type": "object",
"properties": {
    "subscCats": {
        "minItems": 1,
        "type": "array",
        "items": {
            "type": "string"
        }
    },
       "custom": {
    "type": "string"
    },
    "praInfos": {
        "patternProperties": {
            "^(.*)$": {
                "additionalProperties": false,
                "type": "object",
                "properties": {
```

```
"ecgiList": {
    "minItems": 1,
    "type": "array",
    "items": {
        "additionalProperties": false,
        "type": "object",
        "required": [
            "plmnId",
            "eutraCellId"
        ],
        "properties": {
            "eutraCellId": {
                "pattern": "^[A-Fa-f0-9]{7}$",
                "type": "string"
            },
            "plmnId": {
                "additionalProperties": false,
                "type": "object",
                "required": [
                    "mcc",
                    "mnc"
                ],
                "properties": {
                    "mnc": {
                        "pattern": "^\\d{2,3}$",
                        "type": "string"
                    },
                    "mcc": {
                        "pattern": "^\\d{3}$",
                        "type": "string"
                    }
                }
            }
        }
    }
},
"globalRanNodeIdList": {
    "minItems": 1,
    "type": "array",
    "items": {
        "additionalProperties": false,
        "type": "object",
        "required": [
            "plmnId"
        ],
        "properties": {
            "gNbId": {
                "additionalProperties": false,
                "type": "object",
                "required": [
                    "bitLength",
                    "gNbValue"
                ],
                "properties": {
                    "bitLength": {
                        "type": "integer"
                    },
                    "gNbValue": {
                        "pattern": "^[A-Fa-f0-9]{6,8}$",
                        "type": "string"
                    }
```

```
                                        }
                                    },
                                    "plmnId": {
                                        "additionalProperties": false,
                                        "type": "object",
                                        "required": [
                                            "mcc",
                                            "mnc"
                                        ],
                                        "properties": {
                                            "mnc": {
                                                "pattern": "^\\d{2,3}$",
                                                "type": "string"
                                            },
                                            "mcc": {
                                                "pattern": "^\\d{3}$",
                                                "type": "string"
                                            }
                                        }
                                    },
                                    "n3IwfId": {
                                        "pattern": "^[A-Fa-f0-9]+$",
                                        "type": "string"
                                    },
                                    "ngeNbId": {
                                        "pattern": "^(MacroNGeNB-[A-Fa-f0-9]{5}|
LMacroNGeNB-[A-Fa-f0-9]{6}|SMacroNGeNB-[A-Fa-f0-9]{5})$",
                                        "type": "string"
                                    }
                                }
                            }
                        },
                        "praId": {
                            "type": "string"
                        },
                        "ncgiList": {
                            "minItems": 1,
                            "type": "array",
                            "items": {
                                "additionalProperties": false,
                                "type": "object",
                                "required": [
                                    "plmnId",
                                    "nrCellId"
                                ],
                                "properties": {
                                    "plmnId": {
                                        "additionalProperties": false,
                                        "type": "object",
                                        "required": [
                                            "mcc",
                                            "mnc"
                                        ],
                                        "properties": {
                                            "mnc": {
                                                "pattern": "^\\d{2,3}$",
                                                "type": "string"
                                            },
                                            "mcc": {
                                                "pattern": "^\\d{3}$",
                                                "type": "string"
                                            }
                                        }
                                    },
                                    "nrCellId": {
                                        "pattern": "^[A-Fa-f0-9]{9}$",
                                        "type": "string"
                                    }
                                }
                            }
                        },
                        "trackingAreaList": {
                            "minItems": 1,
                            "type": "array",
                            "items": {
                                "additionalProperties": false,
                                "type": "object",
                                "required": [
                                    "plmnId",
                                    "tac"
                                ],
                                "properties": {
                                    "tac": {
                                        "default": "",
                                        "pattern": "(^[A-Fa-f0-9]{4}$)|(^[A-Fa-
f0-9]{6}$)",

                                        "type": "string"
                                    },
                                    "plmnId": {
                                        "additionalProperties": false,
                                        "type": "object",
                                        "required": [
                                            "mcc",
                                            "mnc"
                                        ],
                                        "properties": {
                                            "mnc": {
                                                "pattern": "^\\d{2,3}$",
                                                "type": "string"
                                            },
                                            "mcc": {
                                                "pattern": "^\\d{3}$",
                                                "type": "string"
                                            }
                                        }
                                    }
                                }
                            }
                        }
                    }
                }
            },
            "additionalProperties": false
        }
    }
}
```

Supporting New API_NAME in RESOURCE_MAP Table

If we have added new API_NAME in RESOURCE_MAP table, then we need to expose this new API_NAME to ambassador service as well, so that, ambassador does not reject requests when received with new API_NAME.

For this you need to modify *5G-UDR/lifecycle/helm/helm_merged/charts/udr-v1/templates/service.yaml* and add mapping for new API_NAME (say nudr-dr2):

```
apiVersion: ambassador/v0
      kind:  Mapping
      name:  traffic_mapping_http
      grpc: True
      prefix: /nudr-dr2/
      rewrite: /nudr-dr2/
      service: nudr-drservice:80
      ambassador_id: {{ .Values.ambassador.id }}
```

For complete *service.yaml* file, Please view UDR Custom Templates on the Oracle Help Center site.

4

KPIs, and Metrics

This section provides information about the KPIs and Metrics for Oracle Communications User Data Repository (OCUDR).

> **Note:**
>
> A sample Grafana json is available in the UDR Cusomer Documentation on Oracle Help Center. You can download and import the file to your repository.

Metrics

Following provides the metrics information for UDR.

Table 4-1 Metrics for OCUDR

Metric Details	UDR Microservices	Service Operation	Metric	Response Code	Notes
No of Requests	nudr-drservice	All	UDR Ingress Request Rate	Not Applicable	All requests processed by UDR
No of Requests of each type/No of Successful Responses	nudr-drservice	PostRequests	Creates Subscriber/ Creates Subscription	201	
	nudr-drservice	PutRequests	Update Subscriber/ Updates Subscription	201	
	nudr-drservice	GetRequests	Get Subscriber/ Get Subscription	200	
	nudr-drservice	DeleteRequests	Delete Subscriber/ Delete Subscription	204	
	nudr-drservice	CreateData	Insert Data (policy_data/ udm_data)	201	Similar error response code used with all data types
	nudr-drservice	PutData	Update Data (policy_data/ udm_data)	201	Similar error response code used with all data types
	nudr-drservice	PatchData	Patch Data (policy_data/ udm_data)	204	Similar error response code used with all data types

Table 4-1 (Cont.) Metrics for OCUDR

	nudr-drservice	GetData	Get Data (policy_data/ udm_data)	200	Similar error response code used with all data types
	nudr-drservice	DeleteData	Delete Data (policy_data/ udm_data)	204	Similar error response code used with all data types
No of Requests of each type/No of 4xx responses	nudr-drservice	CreateSubscriber/ PutSubscriber/ GetSubscriber/ DeleteSubscriber	4xx	4xx	Provisioning Subscriber Requests
	nudr-drservice	CreateData/ PutData/ PatchData/ GetData/ DeleteData	4xx	4xx	Provisioning Data Requests
	nudr-drservice	CreateSubscription /Update Subscription/ GetSubscription / DeleteSubscription	4xx	4xx	Subscription Requests
No of Requests of each type/No of 5xx responses	nudr-drservice	CreateSubscriber/ PutSubscriber/ GetSubscriber/ DeleteSubscriber	5xx	5xx	Provisioning Subscriber Requests
	nudr-drservice	CreateData/ PutData/ PatchData/ GetData/ DeleteData	5xx	5xx	Provisioning Data Requests
	nudr-drservice	CreateSubscription /Update Subscription/ GetSubscription / DeleteSubscription	5xx	5xx	Subscription Requests

Table 4-2 Micro-service level Metrics for OCUDR

UDR Microservice	Category	Sub-category	Description	Metric Name	Notes
nrf-client-service	UDR Registration with NRF	Registration	UDRNRFRegistration RequestsSent	udr_nrf_registration_requests_total	Total number of registration requests sent by nrf-client-service to NRF

Table 4-2 (Cont.) Micro-service level Metrics for OCUDR

nrf-client-service			UDRNRFRegistrationRequestsSuccessfull	udr_nrf_registration_success_total	Total number for successfully processed registration requests
nrf-client-service		Deregistration	UDRNRFDeRegistrationRequestsSent	udr_nrf_deregistration_requests_total	Total number of registration requests sent by nrf-client-service to NRF
nrf-client-service			UDRNRFDeRegistrationRequestsSuccessfull	udr_nrf_deregistration_success_total	Total number for successfully processed deregistration requests
nrf-client-service	Heartbeat towards NRF	Heartbeat	UDRNRFHeartBeatUpdateRequestsSent	udr_nrf_heartBeatUpdate_requests_total	Total number of heartbeat requests sent by nrf-client-service towards NRF to keep the status of UDR active
nrf-client-service			UDRNRFHeartBeatUpdateRequestsSuccessfull	udr_nrf_heartBeatUpdate_success_total	Total number of successfully processed heartbeat messages
nrf-client-service		LivenessProbe	UDRNRFLivenessProbeFailure	udr_nrf_livenessProbe_failure_total	Total number of failure attempts of liveness probe check on the udr micro services before registration
nudr-drservice	Rest Controller UDR	Aggregate	UDRTotalRequests	udr_rest_allrequests_total	Total number of requests received by nudr-drservice (All UDR operations)
nudr-drservice			UDRTotalResponses	udr_rest_allresponse_total	Total number of responses sent by nudr-drservice (All UDR operations)

Table 4-2   (Cont.) Micro-service level Metrics for OCUDR

nudr-drservice			UDRTotalSuccessResponses	udr_rest_successResponse_total	Total number of success responses sent by nudr-drservice(All UDR operations)
nudr-drservice			UDRTotalFailureResponses	udr_rest_failureResponse_total	Total number of failure responses sent by nudr-drservice(All UDR operations)
nudr-drservice		PUT	UDRPutRequests	udr_rest_request_total{Method="PUT"}	Total number of PUT requests received by nudr-drservice (UDR related)
nudr-drservice			UDRPutSuccessResponses	udr_rest_response_success_total{Method="PUT"}	Total number of PUT success responses sent by nudr-drservice(UDR related
nudr-drservice			UDRPutFailureResponses	udr_rest_response_failure_total{Method="PUT"}	Total number of PUT failure responses sent by nudr-drservice(UDR related)
nudr-drservice		PATCH	UDRPatchRequests	udr_rest_request_total{Method="PATCH"}	Total number of PATCH requests received by nudr-drservice(UDR related)
nudr-drservice			UDRPatchSuccessResponses	udr_rest_response_success_total{Method="PATCH"}	Total number of PATCH success responses sent by nudr-drservice(UDR related)
nudr-drservice			UDRPatchFailureResponses	udr_rest_response_failure_total{Method="PATCH"}	Total number of PATCH failure responses sent by nudr-drservice(UDR related)

Table 4-2 (Cont.) Micro-service level Metrics for OCUDR

nudr-drservice		GET	UDRGetRequests	udr_rest_request_total{Method="GET"}	Total number of GET requests received by nudr-drservice(UDR related)
nudr-drservice			UDRGetSuccessResponses	udr_rest_response_success_total{Method="GET"}	Total number of GET success responses sent by nudr-drservice(UDR related)
nudr-drservice			UDRGetFailureResponses	udr_rest_response_failure_total{Method="GET"}	Total number of GET failure responses sent by nudr-drservice(UDR related)
nudr-drservice		DELETE	UDRDeleteRequests	udr_rest_request_total{Method="DELETE"}	Total number of DELETE requests received by nudr-drservice(UDR related)
nudr-drservice			UDRDeleteSuccessResponses	udr_rest_response_success_total{Method="DELETE"}	Total number of DELETE success responses sent by nudr-drservice(UDR related)
nudr-drservice			UDRDeleteFailureResponses	udr_rest_response_failure_total{Method="DELETE"}	Total number of DELETE failure responses sent by nudr-drservice(UDR related)
nudr-drservice		POST	UDRPostRequests	udr_rest_request_total{Method="POST"}	Total number of GET requests received by nudr-drservice(UDR related)

Table 4-2 (Cont.) Micro-service level Metrics for OCUDR

nudr-drservice			UDRPostSuccessResponses	udr_rest_response_success_total{Method="POST"}	Total number of GET success responses sent by nudr-drservice(UDR related)
nudr-drservice			UDRPostFailureResponses	udr_rest_response_failure_total{Method="POST"}	Total number of GET failure responses sent by nudr-drservice(UDR related)
nudr-drservice	Schema Validation	-	UDRSchemaValidationSuccess	udr_schema_validation_success_total	Total success count of schema validations. Done for all operations with body
nudr-drservice			UDRSchemaValidationFailure	udr_schema_validation_failure_total	Total failure count of schema validations. Done for all operations with body
nudr-drservice	Schema Versioning	PUT	UDRPutSchemaSuccess	udr_schema_operations_success_total{Method="PUT"}	Total number of successful schema updates processed by nudr-drservice
nudr-drservice			UDRPutSchemaFailure	udr_schema_operations_failure_total{Method="PUT"}	Total number of failure schema updates processed by nudr-drservice
nudr-drservice		GET	UDRGetSchemaSuccess	udr_schema_operations_success_total{Method="GET"}	Total number of successful schema GET operations processed by nudr-drservice
nudr-drservice			UDRGetSchemaFailure	udr_schema_operations_failure_total{Method="GET"}	Total number of failure schema GET operations processed by nudr-drservice

Table 4-2   (Cont.) Micro-service level Metrics for OCUDR

nudr-drservice		DELETE	UDRDeleteSchemaSuccess	udr_schema_operations_success_total{Method="DELETE"}	Total number of successful schema deletion processed by nudr-drservice
nudr-drservice			UDRDeleteSchemaFailure	udr_schema_operations_failure_total{Method="DELETE"}	Total number of successful schema deletion processed by nudr-drservice
nudr-drservice	DB	Reads	DbReadSuccess	udr_db_operations_success_total{Method="READ"}	Total number of successful DB reads performed by nudr-drservice on the back end NDB Cluster
nudr-drservice			DbReadFailure	udr_db_operations_failure_total{Method="READ"}	Total number of failed DB reads performed by nudr-drservice on the back end NDB Cluster
nudr-drservice		Writes/ Updates	DbUpdateSuccess	udr_db_operations_success_total{Method="UPDATE"}	Total number of successful DB writes performed by nudr-drservice on the back end NDB Cluster
nudr-drservice			DbUpdateFailure	udr_db_operations_failure_total{Method="UPDATE"}	Total number of failed DB writes performed by nudr-drservice on the back end NDB Cluster

Table 4-2 (Cont.) Micro-service level Metrics for OCUDR

nudr-drservice		Transaction	DbTotalTxnAttempted	udr_total_transactions_total	Total number of successful DB transactions (includes all DB operations) performed by nudr-drservice on the back end NDB Cluster
nudr-drservice			DbTxnSuccess	udr_successfull_transactions_total	Total number of failed DB transactions (includes all DB operations) performed by nudr-drservice on the back end NDB Cluster
nudr-drservice	Rest Controller UDSF	Aggregate	UDSFTotalRequests	udsf_rest_allrequests_total	Total number of requests received by nudr-drservice (All UDSF operations)
nudr-drservice			UDSFTotalResponse	udsf_rest_allresponse_total	Total number of responses sent by nudr-drservice (All UDSF operations)
nudr-drservice			UDSFTotalSuccessResponses	udsf_rest_successResponse_total	Total number of success responses sent by nudr-drservice (All UDSF operations)
nudr-drservice			UDSFTotalFailureResponses	udsf_rest_failureResponse_total	Total number of failure responses sent by nudr-drservice (All UDSF operations)

Table 4-2 (Cont.) Micro-service level Metrics for OCUDR

nudr-drservice		PUT	UDSFPutRequests	udsf_rest_request_total{Method="PUT"}	Total number of PUT requests received by nudr-drservice (UDSF related)
nudr-drservice			UDSFPutSuccessResponses	udsf_rest_response_success_total{Method="PUT"}	Total number of PUT success responses sent by nudr-drservice (UDSF related)
nudr-drservice			UDSFPutFailureResponses	udsf_rest_response_failure_total{Method="PUT"}	Total number of PUT failure responses sent by nudr-drservice (UDSF related)
nudr-drservice		GET	UDSFGetRequests	udsf_rest_request_total{Method="GET"}	Total number of GET requests received by nudr-drservice (UDSF related)
nudr-drservice			UDSFGETSuccessResponses	udsf_rest_response_success_total{Method="GET"}	Total number of GET success responses sent by nudr-drservice (UDSF related)
nudr-drservice			UDSFGETFailureResponses	udsf_rest_response_failure_total{Method="GET"}	Total number of GET failure responses sent by nudr-drservice (UDSF related)
nudr-drservice		DELETE	UDSFDeleteRequests	udsf_rest_request_total{Method="DELETE"}	Total number of DELETE requests received by nudr-drservice (UDSF related)

Table 4-2 (Cont.) Micro-service level Metrics for OCUDR

nudr-drservice			UDSFDeleteSuccessResponses	udsf_rest_response_success_total{Method="DELETE"}	Total number of DELETE success responses sent by nudr-drservice (UDSF related)
nudr-drservice			UDSFDeleteFailureResponses	udsf_rest_response_failure_total{Method="DELETE"}	Total number of DELETE failure responses sent by nudr-drservice (UDSF related)
nudr-drservice	Subscription	Aggregate	UDRSubscriptionRequests	nudr_dr_all_subscription_requests_total	Total number of subscription requests received by nudr-drservice (All operations)
nudr-drservice			UDRSubscriptionRequestSuccessful	nudr_dr_all_subscription_responses_total	Total number of successful subscription request processed successfully by nudr-drservice (All operations)
nudr-drservice			UDRSubscriptionResponseSuccessful	nudr_dr_all_subscription_successful_responses_total	Total number of successful subscription response sent by nudr-drservice (All operations)
nudr-drservice			UDRSubscriptionResponseFailure	nudr_dr_all_subscription_failed_responses_total	Total number of successful subscription response sent by nudr-drservice (All operations)
nudr-drservice		POST	UDRPostSubscriptionRequests	nudr_dr_subscription_request_total{Method="POST"}	Total number of POST Subscription Requests received by nudr-drservice

Table 4-2 (Cont.) Micro-service level Metrics for OCUDR

nudr-drservice			UDRPostSubscriptionResponseSuccess	nudr_dr_subscription_successful_response_total{Method="POST"}	Total number of successful POST Subscription response sent by nudr-drservice
nudr-drservice			UDRPostSubscriptionResponseFailure	nudr_dr_subscription_failed_response_total{Method="POST"}	Total number of failed POST Subscription response sent by nudr-drservice
nudr-drservice		PUT	UDRPutSubscriptionRequests	nudr_dr_subscription_request_total{Method="PUT"}	Total number of PUT Subscription Requests received by nudr-drservice
nudr-drservice			UDRPutSubscriptionResponseSuccess	nudr_dr_subscription_successful_response_total{Method="PUT"}	Total number of successful PUT Subscription response sent by nudr-drservice
nudr-drservice			UDRPutSubscriptionResponseFailure	nudr_dr_subscription_failed_response_total{Method="PUT"}	Total number of failed PUT Subscription response sent by nudr-drservice
nudr-drservice		GET	UDRGetSubscriptionRequests	nudr_dr_subscription_request_total{Method="GET"}	Total number of GET Subscription Requests received by nudr-drservice
nudr-drservice			UDRGetSubscriptionResponseSuccess	nudr_dr_subscription_successful_response_total{Method="GET"}	Total number of successful GET Subscription response sent by nudr-drservice
nudr-drservice			UDRGetSubscriptionResponseFailure	nudr_dr_subscription_failed_response_total{Method="GET"}	Total number of failed GET Subscription response sent by nudr-drservice

Table 4-2 (Cont.) Micro-service level Metrics for OCUDR

nudr-drservice		DELETE	UDRDeleteSubscriptionRequests	nudr_dr_subscription_request_total{Method="DELETE"}	Total number of DELETE Subscription Requests received by nudr-drservice
nudr-drservice			UDRDeleteSubscriptionResponseSuccess	nudr_dr_subscription_successful_response_total{Method="DELETE"}	Total number of successful DELETE Subscription response sent by nudr-drservice
nudr-drservice			UDRDeleteSubscriptionResponseFailu	nudr_dr_subscription_failed_response_total{Method="DELETE"}	Total number of failed DELETE Subscription response sent by nudr-drservice
nudr-drservice	Notification	Notifications to notification service	UDRNotificationRequests	nudr_dr_notif_signal_sent_total	Total notification sent successfully by nudr-drservice to nudr-notify-service
nudr-drservice			UDRNotificationFailure	nudr_dr_notif_signal_failed_notifications_total	Total notification failed to send to nudr-notify-service
nudr-drservice			UDRDeleteNotificationSuccess	nudr_dr_notif_signal_notification_delete_success_total	Total delete notifications sent successfully to nudr-notify-service
nudr-drservice			UDRDeleteNotificationFailure	nudr_dr_notif_signal_notification_delete_failed_total	Total delete notifications failed to send to nudr-notify-service
nudr-notify-service		Notifications received on notify service	Notifyservice_UDRNotificationRequests	nudr_notif_notifications_signals_received_total	Total number of notifications received on nudr-notify-service from nudr-drservice

Table 4-2 (Cont.) Micro-service level Metrics for OCUDR

nudr-notify-service			Notifyservice_UDRFailedNotificationsProcessing	nudr_notif_notifications_processing_failed_total	Total number of notification failure processing on nudr-notify-service
nudr-notify-service		Notifications to network	Notifyservice_UDRNotificationsSent	nudr_notif_notifications_sent_total	Total number of notifications sent to network
nudr-notify-service			Notifyservice_UDRSendNotificationFa	nudr_notif_notifications_send_fail_total	Total number of notifications failed to send to network
nudr-notify-service			Notifyservice_UDRNotificationsMarkedRetry	nudr_notif_notifications_marked_for_r	Total number of notifications marked for retry after notification failure response
nudr-notify-service			NotifyService_UDRNotificationResponses	nudr_notif_notifications_ack_total	Total number of responses for notifications sent to network
nudr-notify-service			NotifyService_UDRNotificationSuccessResponses	nudr_notif_notifications_ack_2xx_total	Total number of success responses for notifications sent to network
nudr-notify-service			NotifyService_UDRNotification4xxRes	nudr_notif_notifications_ack_4xx_total	Total number of 4xx error responses for notifications sent to network
nudr-notify-service			NotifyService_UDRNotification5xxResponses	nudr_notif_notifications_ack_5xx_total	Total number of 5xx error responses for notifications success sent to network

Key Performance Indicators (KPIs)

Following table provides information about the KPIs for OCUDR.

Table 4-3 KPIs for OCUDR

KPI Details	NRF Microservice	Service Operation	KPI	Response Code	Notes
Requests/sec	nudr-drservice	All	UDR Ingress Request Rate	Not Applicable	
No of Requests of each type/No of Successful Responses per second	nudr-drservice	CreateSubscriber/ CreateData/ CreateSubscription	Creates Subscriber/Data (policy/udm)	201	Similar error response code used with all data types/ subscriber requests
	nudr-drservice	PutSubscriber/ PutData/ UpdateSubscripiton	Update Subscriber/Data (policy/udm)	201	
	nudr-drservice	GetSubscriber/ GetData/ GetSubscription	Gets Subsriber/ Data (policy/udm)	200	
	nudr-drservice	DeleteSubscriber/ DeleteData/ DeleteSubscription	Deletes Subsriber/ Data (policy/udm)	204	
	nudr-drservice	PatchData	Patch Subsriber/ Data (policy/udm)	204	
No of Requests of each type/No of 4xx responses per second	nudr-drservice	CreateSubscriber/ PutSubscriber/ GetSubscriber/ DeleteSubscriber	4xx	4xx	Provisioning Subscriber Requests
	nudr-drservice	CreateData/ PutData/PatchData/ GetData/ DeleteData	4xx	4xx	Provisioning Data Requests
	nudr-drservice	CreateSubscription /Update Subscription/ GetSubscription / DeleteSubscription	4xx	4xx	Provisioning Subscriptions for Subscriber resource
No of Requests of each type/No of 5xx responses per second	nudr-drservice	CreateSubscriber/ PutSubscriber/ GetSubscriber/ DeleteSubscriber	5xx	5xx	Provisioning Subscriber Requests
	nudr-drservice	CreateData/ PutData/PatchData/ GetData/ DeleteData	5xx	5xx	Provisioning Data Requests
	nudr-drservice	CreateSubscription /Update Subscription/ GetSubscription / DeleteSubscription	5xx	5xx	Provisioning Subscriptions for Subscriber resource