Oracle® Communications User Data Repository

Network Impact Report

Release 12.2

E74901-01

January 2017

ORACLE

Oracle Communications User Data Repository Network Impact Report, Release 12.2

TABLE OF CONTENTS

List of Tables

List of Figures

1 Introduction

1.1 Purpose/Scope

Purpose of this Feature Guide document is to highlight the changes of the product that may have impact on the customer network operations, and should be considered by the customer during planning for this release.

The scope of this document is limited to the changes between User Data Repository 12.1 and User Data Repository 12.2

1.2 Disclaimers

This document summarizes Release User Data Repository 12.2 new and enhancement features as compared to User Data Repository 12.1, and the operations impacts of these features, at a high level. The Feature Requirements (FRS) documents remain the defining source for the expected behavior of these features.

Note that feature implementations may change slightly during product test.

1.3 Glossary

This section lists terms and acronyms specific to this document.

Table 1: Acronyms

Acronym/Term	Definition
ACID	Atomicity, Consistency, Isolation, Durability
CLI	Command Line Interface
COMCOL	Communications Core Object Library
DR	Disaster Recovery
HIDS	Host Intrusion Detection System
LDAP	Lightweight Directory Access Protocol
MPE	Multimedia Policy Engine
NOAMP	Network Operations, Administration, Maintenance and Provisioning
PM&C	Platform Management and Control
PNR	Push Notification Request, when in the context of an Sh message
PNA	Push Notification Answer, when in the context of an Sh message
PSO	Pool Spanning User Data Repositorys
PUA	Profile Update Answer, when in the context of an Sh message
PUR	Profile Update Request, when in the context of an Sh message
RAR	Re-Auth Request, when in the context of a Gx message
REST	Representational State Transfer
SDO	Subscription Data Object
SEC	Subscriber Entity Configuration
SNA	Subscribe Notification Answer, when in the context of an Sh message
SNR	Subscribe Notification Request, when in the context of an Sh message
SOAM	System Operation, Administration, and Maintenance

SOAP	Simple Object Access Protocol
UDA	User Data Answer, when in the context of an Sh message sent from User Data Repository to Policy Management
UDR	User Data Request, when in the context of an Sh message sent from Policy Management to User Data Repository

Table 2: Terminologies

Acronym/Term	Definition
Affinity (and anti-affinity) rules	Affinity rules are setting that establish the relationship between a virtual maching (VM) and its host. An affinity rule indicates that VMs can co-exist on the same host. An anti-affinity rule indicates that VMs cannot co-exist on the same host.
Auto-Enrollment	The ability for the SPR to create a Subscriber profile for an unrecognized subscriber identity, based on a pre-determined message received on one of the provisioning or traffic interfaces. The identity contained in the received message is used to create a default profile in the database.
Basic Pool	Refers to the existing quota pooling capabilities Basic pools support up to 25 members.
Diameter Sh TPS	The number of Diameter transactions per second that are supported on the Sh signaling interface. A transaction is comprised of one Diameter Sh message received plus one message sent plus all of the processing required within the User Data Repository system to handle the request
Enterprise Pool	A new type of pool is introduced. The pool supports the sharing of pool quota across 1500 members.
Exhaustion	Exhaustion occurs when reports indicate that usage of a metered unit has equaled or exceeded the specified quota limit. If a recurring Quota is exhausted, typically the subscriber's sessions are subjected to more restrictive policies until the end of the Plan period or Billing Cycle.
Expiration	Expiration occurs when a periodic Quota reaches the end of the Plan period or Billing Cycle, or when a one-time quota reaches its established End Time or the close of its Validity period (NOTE that the time-based expiration of a Quota is quite different from the exhaustion of a Quota restricting the active session Time of a subscriber's usage.). A periodic Quota is typically Reset at expiration.
Geo-redundant	A node at a geo-diverse location which can assume the processing load for another node(s)
LDAP	Lightweight Directory Access Protocol, In terms of UDR, this is an industry standard application protocol for storing and providing access to subscriber profile information
Non Pool Host UDR	The UDR which hosts pool members for which pool data resides on Pool Host UDR.
Opaque Data	A data type that is incompletely defined in an interface, so that its values can only be manipulated by calling subroutines that have access to the missing information. The concrete representation of the type is hidden from its users.
Partial Pool Member	A pool member in a pool on the Non Pool Host UDR in which the pool does not yet have the Pool Profile from the Pool Host UDR. This may be because the pool has not been created yet on the Pool Host UDR or because it was never received from the Pool Host UDR. Whenever a partial pool member is added the Pool Entity data is requested from the Pool Host UDR.
Pass	A Pass is a one-time override which temporarily replaces or augments the subscriber's default Plan or service, if any. While a Pass is in effect, it may modify the QoS controls, charging parameters, or other configurable rules associated with a subscriber's service. A Pass may: • be valid for a restricted interval

	• start when provisioned, or at a specific time, or upon occurrence of a triggering event within its validity interval • end at a specific time, or after given duration once activated, or upon a particular event • apply continuously, or only during certain time periods, or only under certain conditions (e.g. when roaming) • apply to the subscriber's overall usage, or be more limited (e.g. applying only to specific applications, flows, traffic types, or pre-defined rules) Passes are common options for pre-paid subscribers, who frequently have limited or no data access via their basic Plan, and may purchase Passes to gain access to such services. They can also be used to allow Casual Use plans for pre- or post-paid subscribers to purchase services on an occasional basis which they would not otherwise subscribe for on an ongoing basis.
Plan	A subscriber's Plan is the description of their basic, recurring service. Frequently, the Tier and/or Entitlement fields of the subscriber's Profile data may be used to indicate or derive the Plan type. Plans include enforceable policy characteristics (QoS and Charging parameters and PCC rules) computed automatically or through policy rules. A Plan may have associated Quota controls (see Basic Quota), which in turn may be subject to modification or over-ride through Passes, Top-ups, and Roll-overs (see below).
Pool Host UDR	The UDR which hosts pool data which may have pool members on other UDR systems.
Pool Network	Refers to the network of User Data Repository s across which a quota pool can span.
Provisioning TPS	Provisioning transactions per second, which is comprised of one provisioning message received plus one message sent plus all of the processing required within the User Data Repository system to handle the transaction.
Quota	A Quota specifies restrictions on the amount of data Volume, active session Time, or service-specific Events that a subscriber can consume. A single Quota may express limits on any combination of Volume, Time, or Events. Quotas may be associated with a time period during which activity is measured.
Roll-over	Roll-over is a mechanism by which usage which was not consumed during one Quota period may be applied as a credit in a future period. Roll-over may apply to Basic Quotas associated with a subscriber's Plan, or may affect Passes or (more usually) Top-ups purchased by the subscriber. Roll-overs may be limited as to the amount that can be credited to the future period, or by capping the total amount of (basic and rolled-over) credit that may be available in a given period. They may also have limitations regarding the number of cycles that credits may be rolled into. In other words, Roll-over rules modify the process of resetting a recurring Quota.
SOAP Subscribe Request	UDR will send a SOAP Subscribe request to the Ud Server in order to request that when the indicated subscriber's data is updated on the Ud Server, a SOAP Notify request will be sent to UDR informing it of the data that changed
SOAP Notify Request	If UDR has successfully subscribed to update notifications for the subscriber (via a SOAP Subscribe request) then when the subscriber is updated on the Ud Server, the Ud Server will send UDR a SOAP Notify request indicating which subscriber has been updated, and what data has been changed. A notification can also indicate that a subscriber has been deleted from the Ud Server
Subscribe For Notifications	UDR will subscribe for notifications for a subscriber by sending a SOAP Subscribe request to the Ud Server, indicating the address (IMSI/MSISDN/NAI) of the subscriber. If the response to this request indicates success, then UDR will expect to receive SOAP Notify requests when subscriber data on the Ud Server is updated
Subscription Data Object	An SDO comprises of subscription state information combined with a collection of registers for storing entities. An SDO is accessed using an SDO ID and is stored in the UDR DB. SDOs come in two types: individual or pool. An individual SDO applies to one subscriber. A pool SDO applies to a group of subscribers.
Transparent Data	A data type whose representation is visible to the users.

Threshold	A Threshold is a soft limit at which usage must be reported during the monitoring of a Quota, usually lower than the full limit associated with the Quota. Typically, service parameters are not adjusted when a Threshold is reached, but other actions may be taken, such as notifying the user of their current usage.
Top-up	A Top-up is a modifier which takes effect only upon exhaustion of Basic Quota associated with a subscriber's Plan or default service. Top-ups allow the subscriber to extend their access to services beyond the time or volume limits typically enforced.
Ud Interface	The Ud Interface is an access protocol as defined in 3GPP TS 29.335. It defines a logical connection between a Front-End (FE) and a User Data Repository (UDR). The Ud Interface consist connections using LDAP to perform CRUD operations on subscriber data (Create/Delete/Update/Read), and connections using SOAP for publish/subscribe interface in order to request notifications when subscriber data stored in the UDR changes, and to receive those notifications when the data is changed.
Ud Client	A Ud Client is a Front-End (FE) that uses the Ud Interface to access subscriber data from a User Data Repository (UDR)
Ud Server	A Ud Server is a User Data Repository (UDR) that has a Ud Interface to allow external Front-Ends to access subscriber data via LDAP and SOAP, according to the Ud Interface specification

2 Overview of User Data Repository 12.2 Features

This section provides an overview of the User Data Repository 12.2 release features that may impact OAM interfaces and activities.

2.1 User Data Repository 12.2 New Features

User Data Repository 12.2 introduces the following new Features.

Table 3: Feature Discription

Name	Description	Scope
Pools Spanning UDRs eBug 20738139, 23079591	The PSO feature creates a "pool network", which contains a list of the other User Data Repository systems across which pools are allowed to span. It means that the pool members can resides on an User Data Repository instance other than the one upon which the pool data resides These User Data Repository instances are interconnected and signaling and provisioning traffic passes between them. This feature helps large customers in deploying networks that contain multiple User Data Repository systems as the quota pools can be comprised of subscribers provisioned on different User Data Repository systems within the network. The pool can span between 4 User Data Repositorys. Feature covers following bugs: • Bug 21458914 – Pools that span multiple UDR instances • Bug 23079591 - UDR PSO support for REST and spans of 4 UDRs • Bug 22511299 - PN Table threshold processing changes	Major feature
OAMP Enhancements eBug 20822255, 22148732, 22249379, 23081525, 22307137	The feature bundles together several enhancements that customers have specified for the UDR OAMP interfaces. The feature include enhancements for user credentials for SOAP provisioning requests, new measurements for total subscriber/pool counts, GUI support for create, update and delete subscriber/pool data, delay PNR notification after profile update and Dual-Path Monitoring. Bugs covered in this feature are: • Bug 20822255 – Individual User Credentials for Provisioning Requests • Bug 22148732 – Need an easy way to get Total Subscriber/Pool Number in UDR • Bug 22249379 – UDR GUI Support for Create and Update Subscriber and Pool Data • Bug 23081525 – Delay PNR notification after profile update • Bug 22307137 – UDR Dual-Path Monitoring for COMCOL geo take-over	Major Feature

Ud Client eBug 22860257	The Ud Client feature enables UDR to communicate via a Ud Interface to the Ud Server and fetch subscriber profile data that is then cached to provide a high performance interface to the Oracle Commnucation Polcy Management or possibly, other Oracle or third party applications. UDR will only read data via LDAP; writing subscriber data is not supported in Release 12.2. In release 12.2, the initial use case is known in UDR as "Ud Client,". When an Sh request is received, UDR attempts to read the subscriber from its database. If the subscriber is found, processing of the request continues as normal, but if the subscriber is not found, the data necessary to create the subscriber profile entity is fetched via LDAP. Once the subscriber is created by Ud Client, processing of the request continues as normal. In addition, UDR uses the SOAP Ud interface to subscribe to receive notifications when that subscriber's data changes.	Major Feature

2.2 Hardware Changes

2.2.1 Hardware Supported

Table 4: Hardware Information

Hardware	Comment
HP BL460c Gen8	c-Class
HP BL460c Gen9	c-Class
HP BL460 Gen8	c-Class
HP BL460 Gen9	c-Class
HP DL380 Gen8	Rack Mount
HP DL380 Gen9	Rack Mount
Oracle Server X5-2	Rack Mount
Netra X5-2	Rack Mount
D2200sb	Storage Array
D2220sb	Storage Array
HP 3020, 6125 (1G)	Enclosure Switch
HP 6120XG, 6125XLG	Enclosure Switch
Cisco 4948	Enclosure Switch

Note:

Mixed Sun/HP deployments are not generally supported.
Gen 8 Blade will support the D2200sb and D2220sb Storage Array
Gen9 Blade support the D2220sb Storage Array with HP Smart Array P246br Controller
HP Smart Array P220i Controller won't work with D2220sb Storage Array

2.3 Software Changes

Software change include a new release of the software Platform components, and new User Data Repository release.

2.3.1 Platform Changes

Table 5: Platform Information

Component	Release
TPD (IPM) 64-bit (GA TPD Version)	7.0.3.0.0-86.46.0

TVOE	3.3.0.0.0-88.30.0
PM&C	6.3.0.0.0-63.3.0
COMCOL	6.4p450
AppWorks	6.0.1-60.58.0
EXGSTACK	7.3.0_73.14.0
DPI	7.3.0-73.18.0
Firmware	HP FUP 2.2.10 Oracle FUP 3.1.6

2.3.2 User Data Repository Release 12.2

User Data Repository Release 12.2 inherits all functionality from User Data Repository 12.1

Table 6: User Data Repository Build

Component	Release
User Data Repository Release	12.2.0.0.0-15.12.0

2.4 PSO Feature -Theory of Operation

"Pool Spanning UDRs" (PSOs) is a new feature that allows a subscriber pool quota to be shared by subscribers that are provisioned on separate UDR systems.

Problem: Whenever multiple UDR systems are deployed within a customer's network, subscribers are partitioned across the systems based on either IMSI or MSISDN ranges. Pools can be defined on each of the UDRs, but currently only subscribers that are provisioned on the UDR with the pool are allowed to be added to the pool. This can limit the ability for customers to market pool quota services that might include subscribers from different geographic regions, or that might have different devices that don't all fall within the IMSI ranges associated with a single UDR.

Solution: The feature intends to allow subscribers spanning multiple UDRs to be member of a pool, so that quota pools can be comprised of subscribers that are provisioned on different UDR systems within the network. The solution for Pools Spanning UDRs relies on creating a "pool network", which contains a list of the other UDRs across which pools can span. In this release a pool can span between 4 UDR's. These UDR instances are interconnected and signaling and provisioning traffic will pass between them.

2.4.1 Configuration and Subscriber Provisioning

Each UDR is configured with a "pool network", which contains a list of the other UDRs across which pools can span. This configuration data includes an identifying tag for each UDR, along with other details needed in order to be able to signal information between the systems. The UDR GUI supports the ability to define the ranges of PoolIDs that are associated with each UDR in the network. This data is used in determining whether the UDR is a "Pool Host UDR" or "non-Pool Host UDR" whenever a new pool is created.

Customers will continue to provision pools and associate subscribers with pools using the SOAP / REST existing operations on the UDR. An insert request is used to create the pool, followed by AddPoolMember / DelPoolMember requests to add or remove individual subscribers from the pool.

Whenever a network is comprised of more than one UDR, subscribers are partitioned between the UDRs based on either IMSI or MSISDN range. If a shared quota pool is intended to include subscribers from more than one UDR, then the provisioning OSS shall generate an insert request to create the pool on each UDR that contains pool subscribers. When the UDR processes the insert request, it leverages configuration data to determine whether it is the "Pool Host UDR" (PHO) or the "Non-Pool Host UDR" (NPHO) for the pool. From there, one of the following results shall occur:

- If the UDR is the PHO, then the pool profile will be created as it normally is, including any fields specified for the pool profile. The OSS may associate entity data as it normally would with the pool profile on the PHO, including PoolQuota, PoolState, and Pool DynamicQuota.
- If the UDR is the NPHO, then the pool profile will be created, including any fields specified for the pool profile. However, entity data may not be associated with the pool profile on the NPHO. If any entity data is provided by the OSS, then the entity data will be ignored.

Once the pool has been defined on each UDR, the provisioning OSS will generate AddPoolMember and DelPoolMember requests in order to add or remove individual subscribers from the pool. These requests shall be directed to the UDR that hosts the subscriber that is being added to the pool. AddPoolMember and DelPoolMember requests continue to support the ability to specify multiple subscribers within the request. For a PSO, all subscribers in the request must reside on the UDR that receives the request.

Consider the example shown in Figure 1. In this example, two UDRs are in the "pool network", and identifying information for each is configured on each UDR. This information stipulates that poolID starting with "2" are hosted on UDR1 and UDR2. The subscribers are partitioned based on MSISDN, with "919" subscribers on UDR1 and "617" subscribers on UDR2. A PSO 22233 is created, with UDR1 as the PHO and UDR2 as the NPHO. The respective subscribers from each UDR are added to the pool. The message sequence chart outlines the provisioning requests that are created by the OSS in order to create the PSO and how subscribers from each of the UDRs in the "pool network" are associated with it.

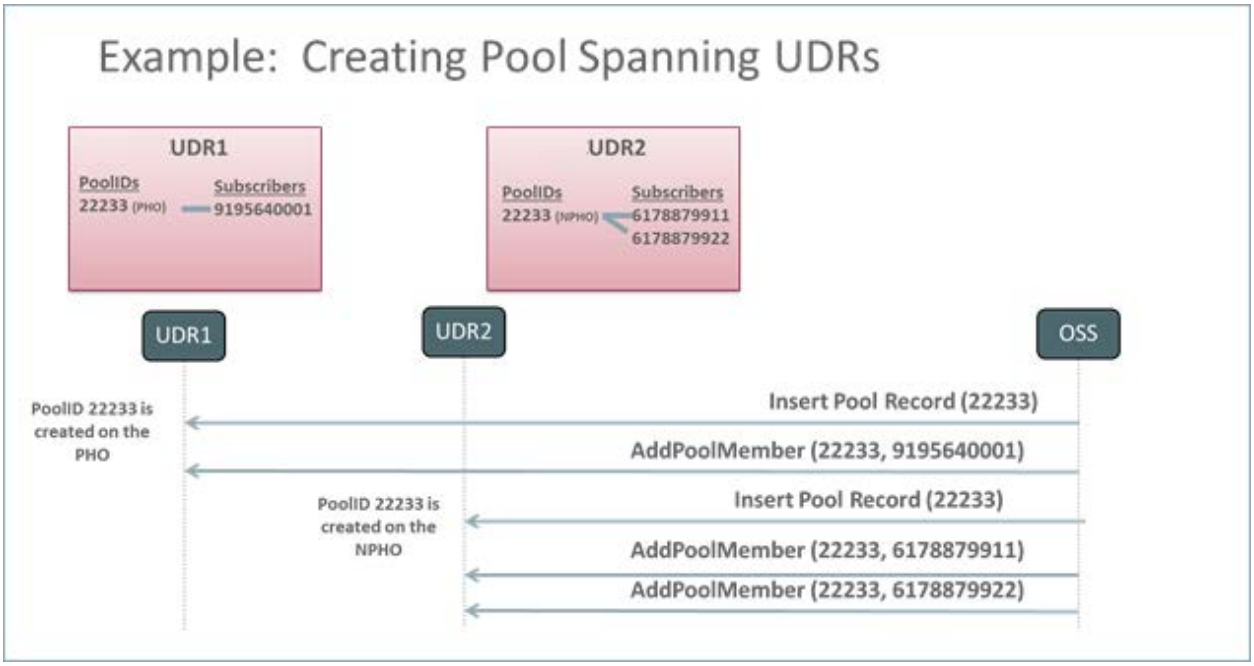


Figure 1: Creating Pool that Spans UDRs

Pool quota management will only occur if the pool has been properly configured on the PHO. Whenever the AddPoolMember request is used to add a subscriber to a pool on the NPHO, the subscriber's data is internally updated to identify the pool to which it belongs. Whenever that particular member (say 6178879911 in the figure above) creates a new session, the UDR hosting the subscriber (say UDR2 in the figure above) will interact with the UDR hosting the pool (UDR1 in the figure above) to ensure that the pool exists on UDR1 and to be sure that any updates to pool quota, state, or dynamic quota on UDR1 are provided to UDR2 for the UDR2 pool members that have active sessions. If any data discrepancies are detected in the data between the UDRs (perhaps the pool hasn't yet been created on UDR1), then UDR2 will manage the subscriber quota as it normally would and ignore the association to the pool.

Other pool provisioning requests can also be used with PSOs. These include:

- "DelPoolMember"-- This request removes the subscriber or list of subscribers from the specified pool. This request must be sent to the UDR that hosts the subscriber. Existing processing logic applies to scenarios where either the pool or one or more subscribers doesn't exist on the UDR that receives the request.

- "GetPoolID" – This request contains the identity of a subscriber, and returns the poolID (if any) associated with the subscriber. This request must be sent to the UDR that hosts the subscriber profile. If the specified subscriber doesn't exist on the UDR that receives the GetPoolID request, then an error is returned.

- "GetPoolMembers" – This request is processed just as it currently is. Whenever an UDR receives this request, it will return all members hosted by the UDR that are associated with the specified pool. It will not include any PSO members that are hosted on other UDRs in the pool network.

- "GetAllPoolMembers" – This is a new provisioning request that can be generated by the OSS in order to get a complete list of all members associated with a pool, including any members from other UDRs in the "pool network" if the pool happens to be a PSO. A "GetAllPoolMembers" request to get all pool members across all UDR instances can be sent to any UDR in the "pool network", and will provide the same result regardless of if it is processed by the PHO or NPHO. If a "GetAllPoolMembers" request is received for a normal pool that doesn't span UDRs, then it will provide results that are consistent with the "GetPoolMembers" request.

The following figures provide examples of each of these commands. These examples assume the successful creation of the pool shown in Figure 1.

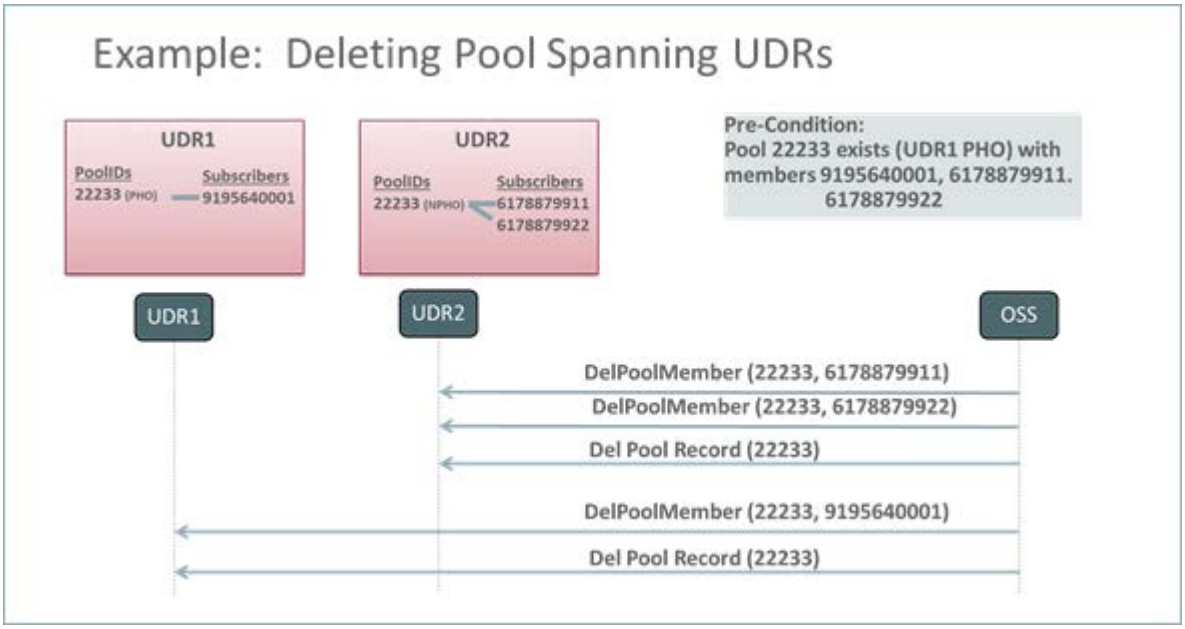


Figure 2: Deleting Pool Spanning UDRs

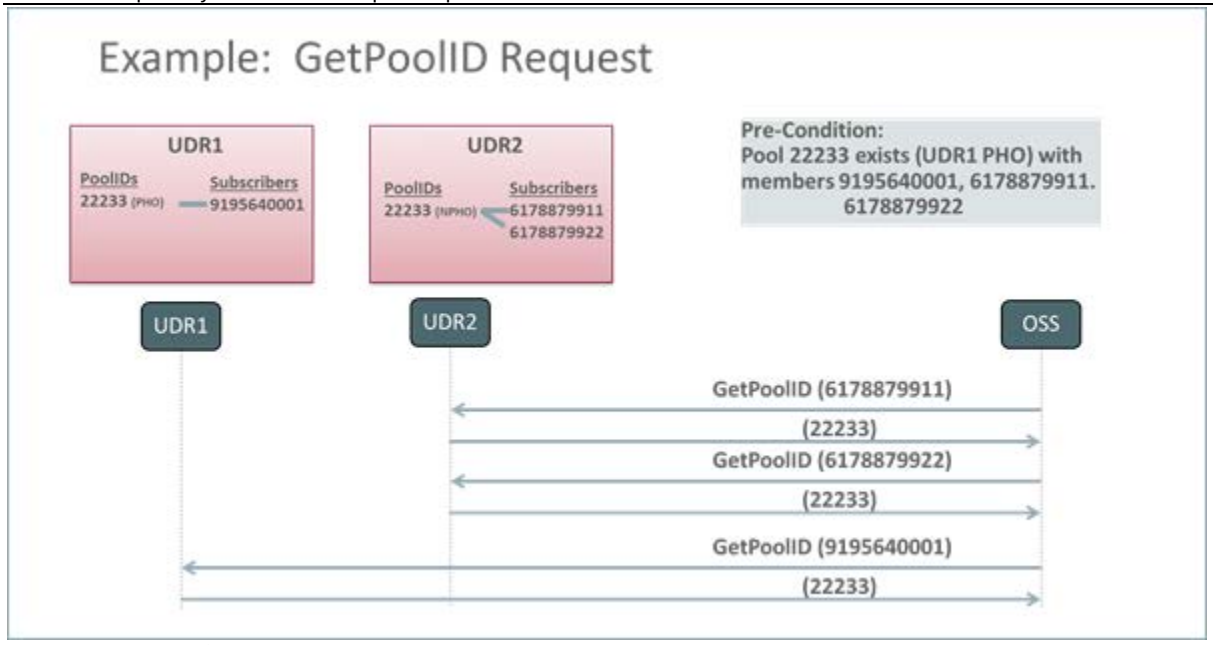


Figure 3: GetPoolID Request

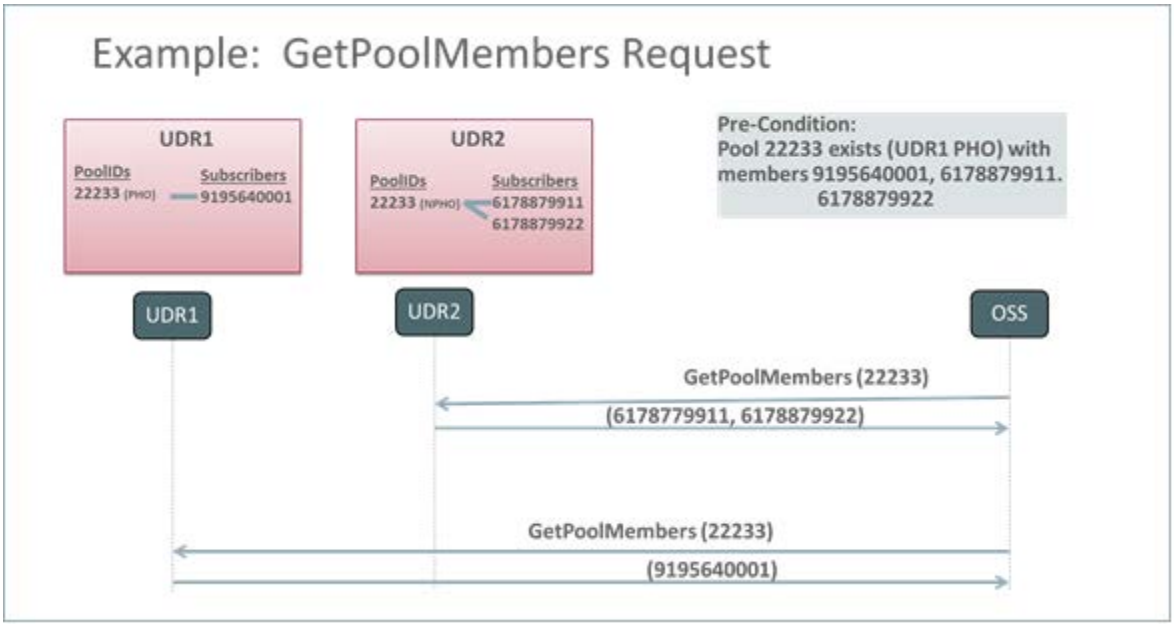


Figure 4: GetPoolMembers Request

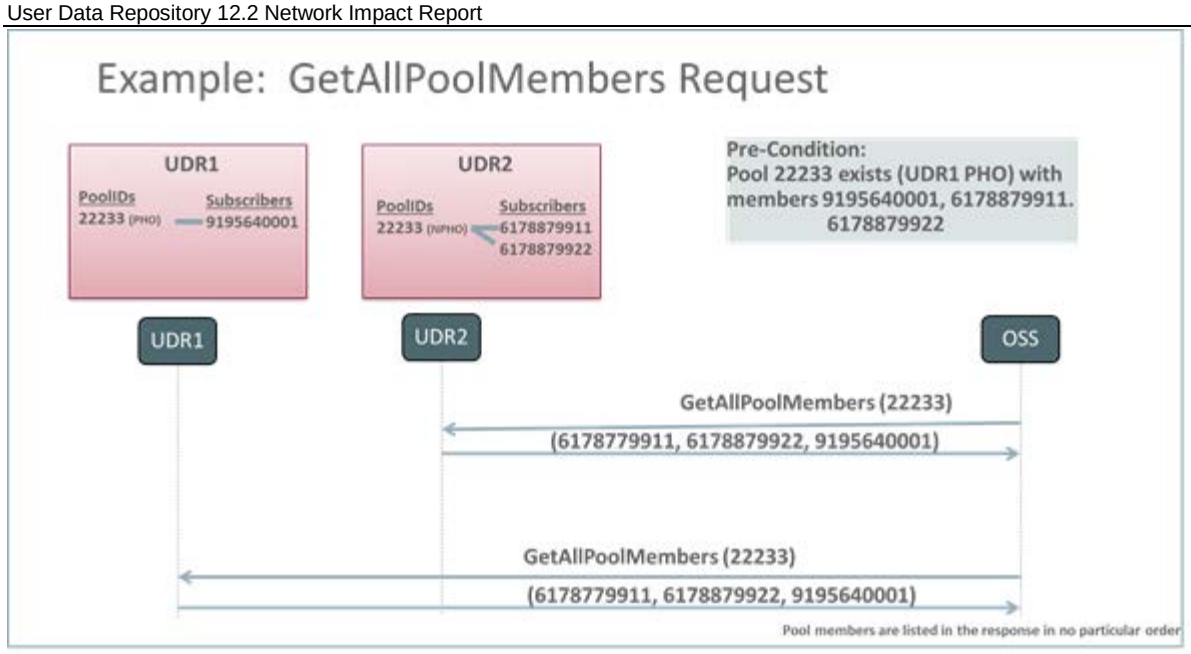


Figure 5: GetAllPoolMembers Request

This feature does not alter in any way the existing behavior associated with pools when all members associated with the pool are on the same UDR as the pool. It is possible, though, to convert an existing pool to a PSO simply by creating a pool profile on the NPHO, and adding new members to the pool on the NPHO. In the following example, assume PoolID 33344 already exists on UDR2 and contains subscribers 6178879911 and 6178879922. With the introduction of this feature, the "pool network" is configured on both UDR1 and UDR2. If the customer now wants to add UDR1 subscriber 9195640001 to the pool, this can be accomplished by creating a pool profile for the PSO on UDR1, followed by an AddPoolMember request to UDR1 in order to add subscriber 9195640001 to the pool.

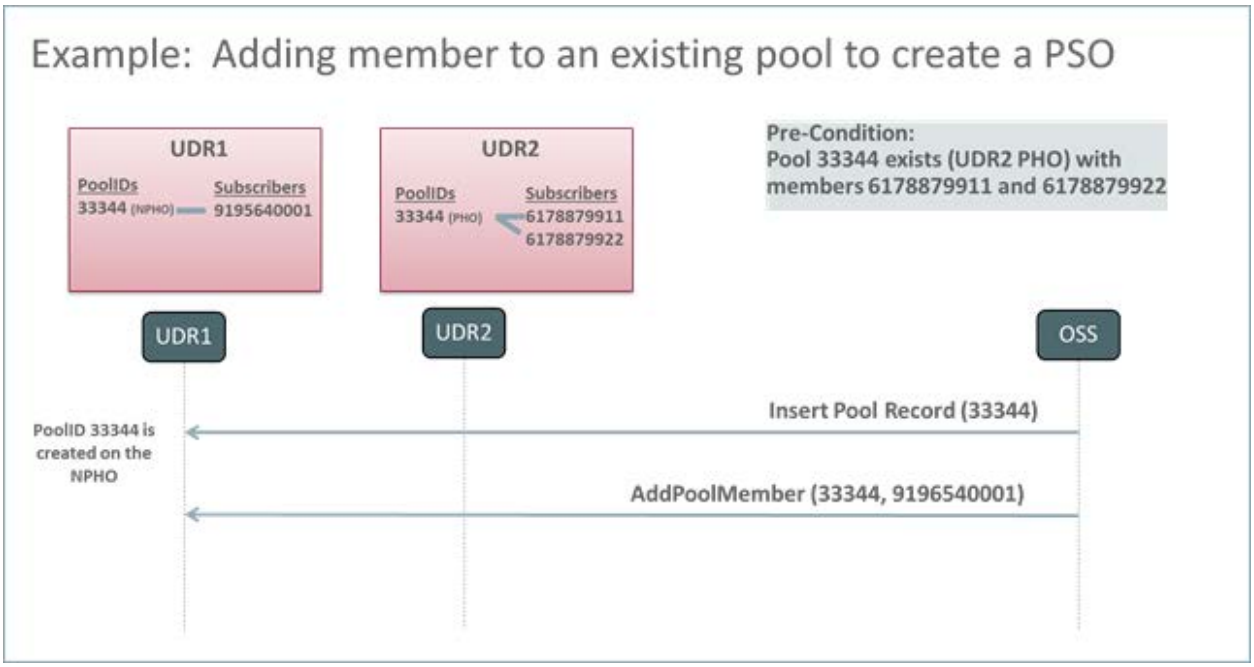


Figure 6: Adding member to existing pool to create PSO

Following the completion of the upgrade to the release that contains this feature, each UDR within the "pool network" will be configured with the identities of the other UDRs in the "pool network", along with the PoolID ranges that are associated with the other UDRs in the "pool network". All UDRs in the "pool network" must be upgraded to the release that contains the PSO feature before any PSOs are provisioned.

2.4.2 Provisioning Summary

Pool requests sent to the Non Pool Host UDR (as determined by the UDR Key Range configuration) will behave as follows:

- CreatePool will create the pool if it does not exist and store the UDR Id that is the pool host UDR and only the pool profile in the Pool SDO.
- AddPoolMember will add the pool member if the pool exists and update the subscriber SDO to indicate that it is a member of a Non Pool Host UDR pool. If the pool profile has been received from the Pool Host UDR the subscriber will treated as pool member at this point. If it has not been received and the subscriber is currently active, a request will be sent to the Pool Host UDR to read all of the pool registers and the pool member will remain a "partial pool member". If the pool profile and other entity data is returned it is stored locally and "add pool member" notifications are generated.

  Note that when a notification is received from the Pool Host UDR that the pool has been deleted, the local copies of the pool registers will be deleted. Any existing pool members will revert to "partial pool members" and "remove pool member" notifications are generated.
- DelPoolMember will remove the member from the pool if the pool exists, and they are currently a member. If the pool profile from the Pool Host UDR exists, then "delete pool member" notifications are generated.
- GetPool will return only the Pool Profile data stored locally on the UDR if the pool exists.

The existing SOAP and REST GetPoolMembers request will return only the pool members that reside on the UDR that is processing the request as is the current behavior. A new provisioning request GetAllPoolMembers is added to retrieve the pool members from both the local and all remote UDR systems.

2.4.3 Sh Interactions

This feature does not require any changes on the Sh interface used between the OCPM MPE and UDR MP for accessing or updating subscriber data. The MPE continues to direct request for a subscriber to the UDR using the data sources configured in the MPE. The following events occur based on the type of request received:

- UDR request is received -- The UDR will return all subscriber data entities requested for the subscriber, including pool data entities if the subscriber has been associated with a pool. This provides consistent behavior with existing Sh interactions, and will be done transparently without regard to the UDR that hosts the pool that is associated with the subscriber.
- SNR (subscribe) request is received -- The UDR will subscribe to all ServiceIndications for the subscriber, including pool service indications if applicable. This will be done transparently without regard to the UDR that hosts the pool that is associated with the subscriber. If the subscriber data is requested as a part of the SNR, then the UDR will return all subscriber data entities requested for the subscriber, including pool data entities if the subscriber has been associated with a pool. This provides consistent behavior with existing Sh interactions, and will be done transparently without regard to the UDR that hosts the pool that is associated with the subscriber.
- PUR request is received -- The UDR will update the subscriber and pool data entities provided in the request. This will be done transparently without regard to the UDR that hosts the pool that is associated with the subscriber. When the PUR is processed, data associated with the pool profile and associated entities will be processed first, followed by data associated with the subscriber profile and associated entities. In the event some entities are not successfully updated, then a diameter UNABLE_TO_COMPLY response will be delivered to the Policy Management.
- SNR (un-subscribe) request is received -- The UDR will un-subscribe to all ServiceIndications for the subscriber, including pool service indications if applicable. If the subscriber data is to be included in the SNR response, then the UDR will return all subscriber data entities requested for the subscriber, including pool data entities if the subscriber has been associated with a pool. This provides consistent behavior with existing Sh interactions, and will be done transparently without regard to the UDR that hosts the pool that is associated with the subscriber.
- PNR request is generated (due to updated data) – The UDR shall generate a PNR for each subscriber that has an active subscription for notifications if any entity associated with that subscriber is updated. This applies to both subscriber entities (profile, Quota, and State), as well as pool entities (profile, PoolQuota, PoolState). In some PSO scenarios, the pool data and subscriber data may be hosted on different UDRs. In this case, if both pool and subscriber data are updated by a single request or <tx> transaction, then the resulting number of PNR messages will be based on whether NotifEff is set. If NotifEff is set, then a single PNR shall be

generated for the subscriber that includes both the pool and subscriber updates. If NotifEff is not set, then a separate PNR will be generated for each updated entity.

Note:

A limitation exists in the case when a non pool host UDR processes a PUR request containing pooled and subscriber data.If the pool data is successfully updated on the pool host UDR, but the local subscriber fails to be updated, then a failed PUR response is returned in a PUR indicating UNABLE_TO_COMPLY. In this case, the AS will not know that the pool data update was successful, and if/when it retries to update pool data next will potentially encounter an "OUT_OF_SYNC" scenario where the sequence numbers for the pooled entities will be wrong. If the AS reads the pool data, and attempts to update the pool data again, this may result in double updating of some values in the pool data.

2.4.4 Summary of Sh Interactions

Below tables describes the possible answer senarious(UDA/SNA/PUA):

Table 7: UDR Responses on NPHO when PHO Pool Profile is not present

Operation	Entity Requested	Expected Response	User-data Returned
UDR	Quota	Success	Quota
UDR	PoolQuota	SubscriberDataAbsent	None
UDR	Quota + PoolQuota	Success	Quota

Table 8: SNR Subscribe Responses on NPHO when PHO Pool Profile is not present

Operation	Entity Requested	Expected Response	User-data Returned
SNR	-	Success	None
SNR	Quota	Success	Quota
SNR	PoolQuota	Success	None
SNR	Quota + PoolQuota	Success	Quota

Table 9: SNR Unsubscribe Responses on NPHO when PHO Pool Profile is not present

Operation	Entity Requested	Expected Response	User-data Returned
SNR	-	Success	None
SNR	Quota	Success	Quota
SNR	PoolQuota	Success	None
SNR	Quota + PoolQuota	Success	Quota

Table 10: PUR Responses on NPHO when PHO Pool Profile is not present

Operation	Entity Requested	Expected Response
PUR	Quota	Success
PUR	PoolQuota/Pool Profile	UnableToComply
PUR	Quota + PoolQuota	UnableToComply

2.4.5 CLI Interfaces Enhancements to Support PSO

2.4.5.1 O2O Migration Enhancement

The O2O migration command (o2omt) is enhanced to provide support for Pools Spanning UDRs.

The o2omt command will migrate non-pooled subscribers as before if the PSO feature is enabled as well as pools and their members that fall into the migration range.

If the PSO feature is enabled the –pool option will be ignored.

A new option **–pso** is added to create new pools with members as Pool Host UDR pools or as Non Pool Host UDR pools on the target. Only the IMSI range is supported currently and the pool id range is assumed to be the same as the IMSI range for the scope of 12.2 release.

This behavior is summarized in the table below.

Table 11: Migration Support options for PSO feature

PSO Not Enabled			
Options	Subscribers	Pools	Pool Members
--imsi/msisdn=x-y | all	Yes	No	No
--imsi/msisdn=x-y --pool	No	Yes	Yes (All in pool)
PSO Enabled			
--imsi/msisdn=x-y | all	Yes	No	No
--imsi=x-y --pso	No	Yes (with members in range x-y)	Yes (All in range)

Note:

Once the migration is completed subsequent changes to the initial configuration of the Key Range Table are not supported. This is because the migration tool can only migrate pools and subscribers to another UDR and create the pool as a PHO or NPHO pool as appropriate. Subsequent changes would require conversion of pools to or from a PHO pool on each UDR as well as the subsequent migration of subscribers. This functionality is not covered in Release 12.2.

2.4.5.2 Bulk Import Enhancement

Bulk Import interface now allows the <createPool> and <restorePool> commands to support PSO Pools

- Create Pool command

  If the PSO feature is enabled and the pool id falls in a range that does not belong to the UDR, then the pool is created as a Non Pool Host UDR pool, only the Pool Profile entity are stored and all other entity data is ignored

  Note: While creating/updating a pool profile on a Non Pool Host UDR, the "Type" field is not allowed , the command fails with error 'OperationNotAllowed'

- Restore Pool command

  The RestorePool command is enhanced to support an ignoreExists boolean attribute. If this attribute is specified as true on the command (<restorePool ignoreExists=true>) then the processing of adding subsribers to the pool will continue as usual rather than returning an error. The default behavior if not specified will be false

  Note: While creating/updating a pool profile on a Non Pool Host UDR, the "Type" field is not allowed , the command fails with error 'OperationNotAllowed'

- Add Pool Member

  Whenever the AddPoolMember request is performed on the NPHO, UDR validates the total number of members in the pool only on the local instance and enforces that the threshold is not exceeded only if

  - The pool profile has been received from the pool host UDR and it indicates it is a Basic pool.
  - An error "MAX_MEMBERS_BASIC_POOL - Basic Pool Member List Maximum Limit Reached" is returned on fail validation.
  - The default value for the threshold is same as 25 as defined in R12.1.

2.4.5.3 Export Tool Enhancement

If the PSO feature is enabled and the pool id falls in a range that does not belong to the UDR, any data exported for the pool will only include the Pool Profile as provisioned/maintained on the non pool host UDR (i.e. not merged with any Pool Profile from the pool host UDR). No other pooled entities will be exported.

2.4.5.4 Scheduled Quota Reset Enhancement

If the PSO feature is enabled and the pool id falls in a range that does not belong to the UDR, then any scheduled quota reset task for the pool will be skipped and the pool quota if exists will not be reset.

2.4.6 Measurement and KPI addition for PSO Feature

A new measurement group "PSO Performance" is created. This measurement group consists of counts for the ComAgent event traffic between the members of the Pool Network. It is similar in nature and function to the existing "UDRBE Performance" measurement group which consists of counts for the ComAgent event traffic between the UDRBE and MPs.

An additional set of exception measurements are added to the "UDRBE Exception" measurement group for occurrences of event timeouts for Inter-NO event traffic.

An additional set of measurements are also added to the "UDRBE Performance" measurement group for the failure of an event request from an MP due to a PSO failure.

A new set of KPIs are added for the Inter-NO ComAgent traffic rate. These KPIs are used to gauge the amount of traffic generated by the PSO feature and affects the overall available TPS for the UDR system that is a member of a Pool network.

2.4.7 Measurements Summary for General Signaling

Below tables describes the general signaling senarious and measurements pegged for them.

Table 12: PSO Read Response Measurements

PSO Read Response/ Peg Condition	PSO Measurement	Sh Response
Success	*RxUdrBePsoReadSuccess*	Based on Read Response of the Subscriber data
Pool Not Found	*RxUdrBePsoReadUnkPool*	Based on Read Response of the Subscriber data
SDO Not Found	*RxUdrBePsoReadFailed*	Based on Read Response of the Subscriber data
Subscriber Data Absent	*RxUdrBePsoReadFailed*	UnableToComply
XML Parsing Error	*RxUdrBePsoReadFailed*	UnableToComply
Programming Error	*RxUdrBePsoReadFailed*	UnableToComply
Unable To Comply	*RxUdrBePsoReadFailed*	UnableToComply
DB Error	*RxUdrBePsoReadFailed*	DataCannotBeRead
Database Too Busy	*RxUdrBePsoReadFailed*	UnableToComply
ComAgent Timeout	*RxUdrBePsoReadTimeOut*	UnableToComply

Table 13: PSO Read Response Measurements for Subscribe

PSO Read Response	PSO Measurement	Sh Response
Success	*RxUdrSmPsoReadSuccess*	Based on Read Response of the Subscriber data
Pool Not Found	*RxUdrSmPsoReadUnkPool*	Based on Read Response of the Subscriber data
SDO Not Found	*RxUdrSmPsoReadFailed*	Based on Read Response of the Subscriber data
Subscriber Data Absent	*RxUdrSmPsoReadFailed*	UnableToComply
XML Parsing Error	*RxUdrSmPsoReadFailed*	UnableToComply
Programming Error	*RxUdrSmPsoReadFailed*	UnableToComply
Unable To Comply	*RxUdrSmPsoReadFailed*	UnableToComply
DB Error	*RxUdrSmPsoReadFailed*	DataCannotBeRead
Database Too Busy	*RxUdrSmPsoReadFailed*	UnableToComply
ComAgent Timeout	*RxUdrSmPsoReadTimeOut*	UnableToComply

Table 14: PSO Read Response Measurements for Unsubscribe

PSO Read Response/ Peg Condition	PSO Measurement	Sh Response
Success	*RxUdrSmPsoReadSuccess*	Based on Read Response of

		Subscriber Data
Pool Not Found	*RxUdrSmPsoReadUnkPool*	Based on Read Response of Subscriber Data
SDO Not Found	*RxUdrSmPsoReadFailed*	Based on Read Response of Subscriber Data
Subscriber Data Absent	*RxUdrSmPsoReadFailed*	UnableToComply
XML Parsing Error	*RxUdrSmPsoReadFailed*	UnableToComply
Programming Error	*RxUdrSmPsoReadFailed*	UnableToComply
Unable To Comply	*RxUdrSmPsoReadFailed*	UnableToComply
DB Error	*RxUdrSmPsoReadFailed*	DataCannotBeRead
Database Too Busy	*RxUdrSmPsoReadFailed*	UnableToComply
ComAgent Timeout	*RxUdrSmPsoReadTimeOut*	UnableToComply

Table 15: PSO Update Request Measurements

PSO Update Response/ Peg Condition	PSO Measurement	Sh Response
Success	*RxUdrBePsoUpdateSuccess*	Based on Update Response of the Subscriber data
Pool Not Found	*RxUdrBePsoUpdateUnkPool*	Based on Update Response of Subscriber data
SDO Not Found	*RxUdrBePsoUpdateFailed*	Based on Update Response of subscriber data
Entity Not Found	*RxUdrBePsoUpdateInvalidEntity*	SubsDataAbsent
Wrong Sequence Number	*RxUdrBePsoUpdateOutOfSync*	DataOutOfSync
Entity Exists (insert request)	*RxUdrBePsoUpdateOutOfSync*	DataOutOfSync
Invalid Delete Request	*RxUdrBePsoUpdateOutOfSync*	DataOutOfSync
XML Parsing Error	*RxUdrBePsoUpdateFailed*	UnableToComply
Programming Error	*RxUdrBePsoUpdateFailed*	UnableToComply
Unable To Comply	*RxUdrBePsoUpdateFailed*	UnableToComply
DB Error	*RxUdrBePsoUpdateFailed*	DataCannotBeRead
Database Too Busy	*RxUdrBePsoUpdateTooBusy*	UnableToComply
ComAgent Time Out	*RxUdrBePsoUpdateTimeOut*	UnableToComply

Table 16: PSO Read Result Measurements

PSO Read Response/ Peg Condition	PSO Measurement
Success	*TxUdrBePsoReadSuccess*
Pool Not Found	*TxUdrBePsoReadUnkPool*
SDO Not Found	*TxUdrBePsoReadFailed*
Subscriber Data Absent	*TxUdrBePsoReadFailed*
XML Parsing Error	*TxUdrBePsoReadFailed*
Programming Error	*TxUdrBePsoReadFailed*
Unable To Comply	*TxUdrBePsoReadFailed*
DB Error	*TxUdrBePsoReadFailed*
Database Too Busy	*TxUdrBePsoReadTooBusy*

Table 17: PSO Update Response Measurements

PSO Update Response/ Peg Condition	PSO Measurement
Success	*TxUdrBePsoUpdateSuccess*
Pool Not Found	*TxUdrBePsoUpdateUnkPool*
SDO Not Found	*TxUdrBePsoUpdateFailed*

Entity Not Found	*TxUdrBePsoUpdateInvalidEntity*
Wrong Sequence Number	*TxUdrBePsoUpdateOutOfSync*
Entity Exists (insert request)	*TxUdrBePsoUpdateOutOfSync*
Invalid Delete Request	*TxUdrBePsoUpdateOutOfSync*
XML Parsing Error	*TxUdrBePsoUpdateFailed*
Programming Error	*TxUdrBePsoUpdateFailed*
Unable To Comply	*TxUdrBePsoUpdateFailed*
DB Error	*TxUdrBePsoUpdateFailed*
Database Too Busy	*TxUdrBePsoUpdateTooBusy*

Table 18: PSO Notify Response Measurements

PSO Notify Response/ Peg Condition	PSO Measurement
Success	*RxUdrBePsoNotifySuccess*
No Members Exist	*RxUdrBePsoNotifyNoMembers*
ComAgent Time Out	*RxUdrBePsoNotifyTimeOut*
Pool Not Found	*RxUdrBePsoNotifyPoolNotExist*
Failed Messages	*RxUdrBePsoNotifyFailed*

Table 19: PSO Notify Response Measurements

PSO Notify Response/ Peg Condition	PSO Measurement
Success	*TxUdrBePsoNotifySuccess*
No Members Exist	*TxUdrBePsoNotifyNoMembers*
Pool Not Found	*TxUdrBePsoNotifyPoolNotExist*
Failed Messages	*TxUdrBePsoNotifyFailed*

2.4.8 PSO Support for Enterprise Pool

A PSO can be provisioned as an enterprise pool by setting the type field as 'enterprise' in the pool profile. A PSO that is provisioned as an Enterprise pool on the PHO will be considered as an Enterprise pool on the NPHO also.

Note that is the "Type" field in the Pool Profile on the NPHO is not required to be explicitly provisioned.

Support for Enterprise type pools is added for PSO as described in the table below.

Table 20: PSO support for Enterprize pool

Pool on PHO	Pool on NPHO	Notes
Pool not provisioned	Pool shall be treated as Basic	There shall be no limitation on the number of subscribers that can be added to a pool on NPHO. A NPHO Pool shall be allowed to contain > 25 members
Pool provisioned as Basic	Pool shall be treated as Basic	A pool on NPHO shall be allowed to contain <= 25 members
Pool provisioned as Enterprise	Pool shall be treated as Enterprise	A pool on each UDR shall be allowed to contain <= 1500 members
Pool Deleted when provisioned as Basic	Pool shall be treated as Basic	There shall be no limitation on the number of subscribers that can be added to a pool on NPHO. A NPHO Pool shall be allowed to contain > 25 members. This scenario is similar to the case where PHO Pool is not provisioned.
Pool Deleted when provisioned as Enterprise	Pool shall be treated as Enterprise	Adding the Pool back as a Basic or Enterprise is not supported until the Pool is completely removed from NPHO. However, this is not enforced in the software
Pool updated from Basic to Enterprise via Provisioning	Pool shall be treated as Enterprise	

Pool updated from Enterprise to Basic via Provisioning	Pool treated as Basic	Validation on the number of subscribers in a pool shall be done only on PHO. A pool on NPHO shall be converted to Basic without performing a check on the number of existing members. However no new members shall be allowed to be added if the member count has exceeded the threshold.
NA	Provisioning PSO Pool profile with 'type' field'	The request shall be rejected with error "Operation Not Allowed"
Any pool profile update with 'type' field via Sh PUR message	NA	PUR shall be rejected with error "Unable To Comply"

2.4.9 ComAgent Configuration for Communication between NOAMs

In the following example steps to configure ComAgent for communication between NOAMs are explaned with diagrams

Example:

IP's used in the diagrams are for explanation purpose only, please use IP's according to customer's network when configuring in the customer lab

1. Configure a UDR PSO network with UDR1 and UDR2

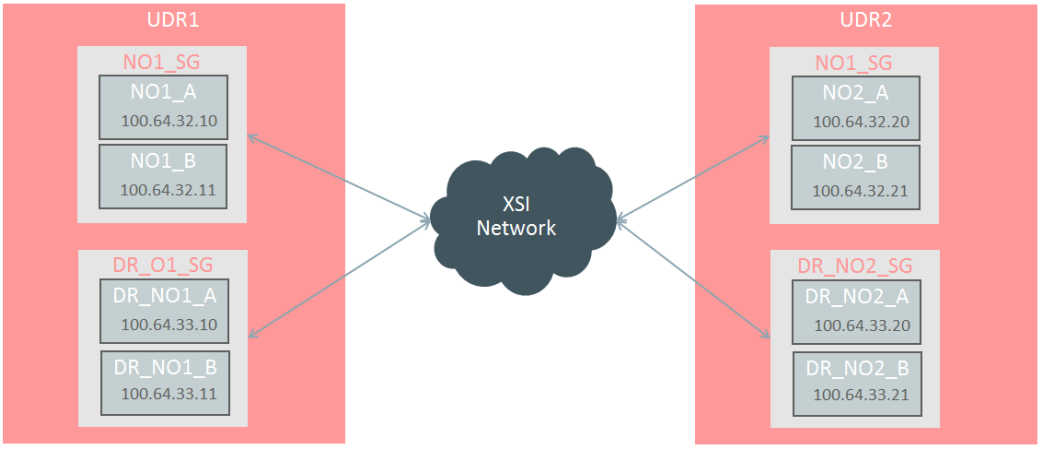


Figure 7: UDR PSO network

2. Configure UDR 1 as a HA Service Provider for each NO in UDR2

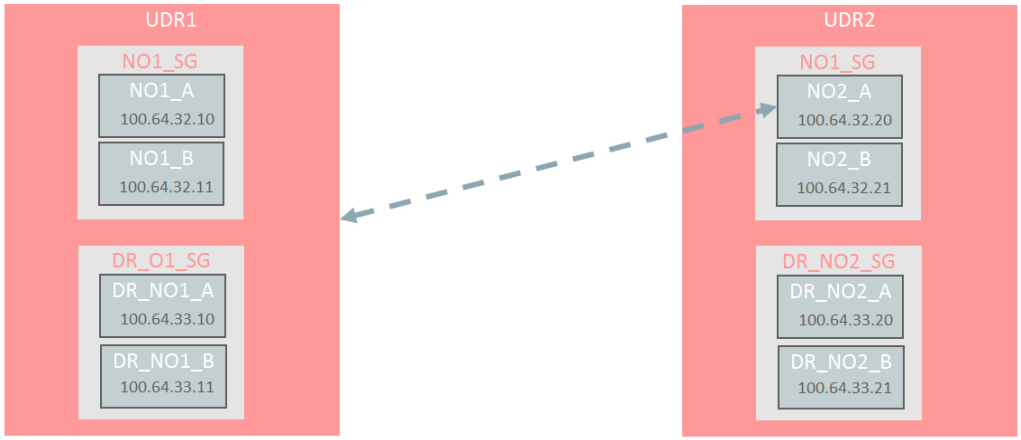


Figure 8: UDR 1 as a HA Service Provider

3. Configure NO2_A as a remote server on UDR1, UDR1 will act as the client host.

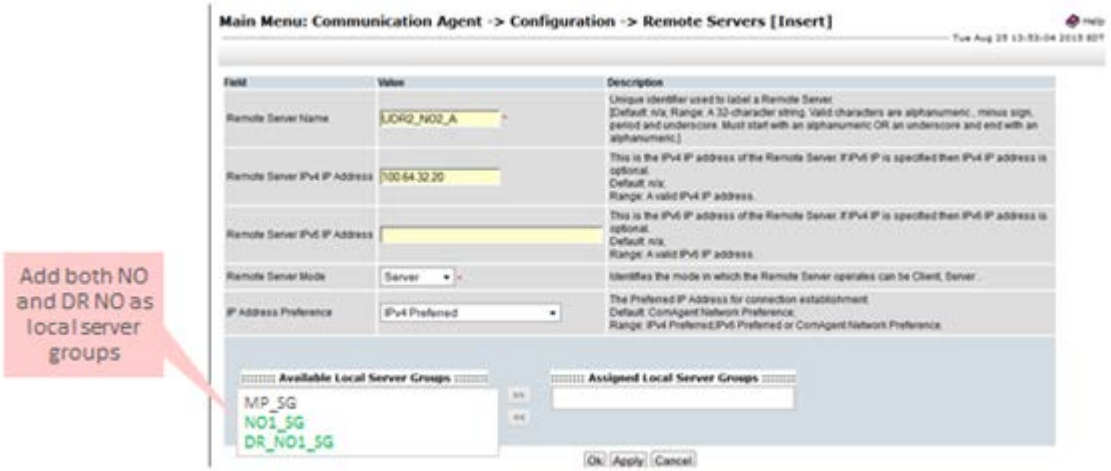


Figure 9: NO2_A as a remote server

4. Configure the remaining NOs in UDR2 as HA remote servers in UDR1

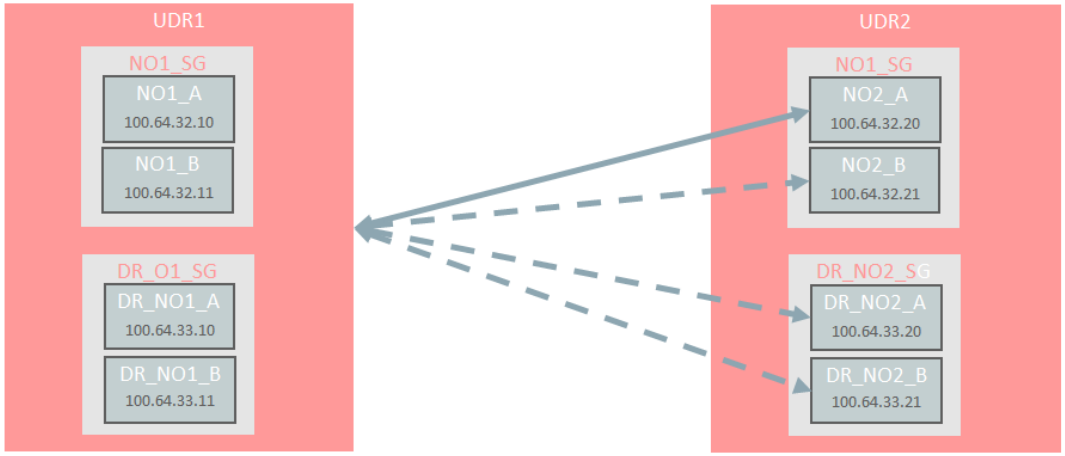


Figure 10: Configure NOs of UDR2 as HA remote server in UDR1

5. Now UDR2 can send PSO events to UDR1

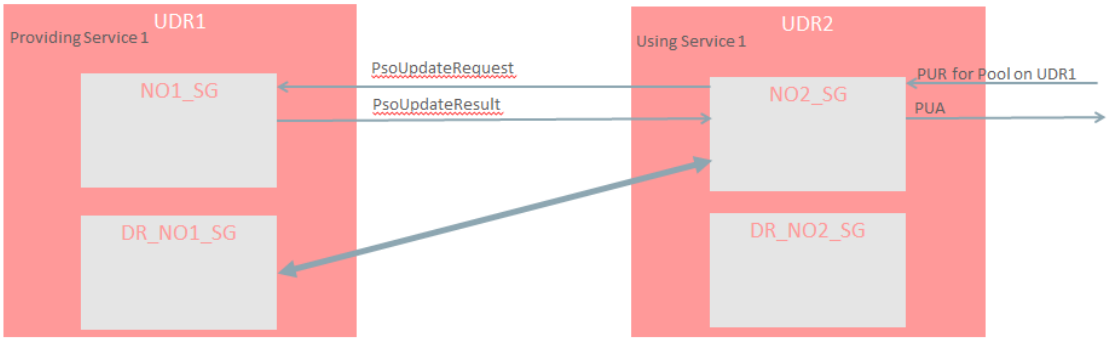


Figure 11: Send PSO events

6. Repeat the process for UDR2

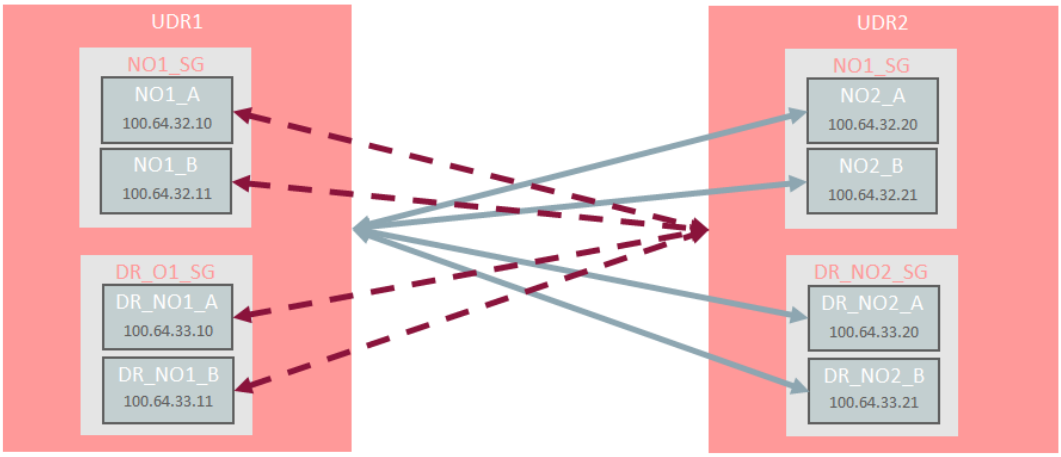


Figure 12: Configure NOs of UDR1 as HA remote server in UDR2

7. Configure UDR 1 as a remote server on UDR2, UDR2 will act as the client host.

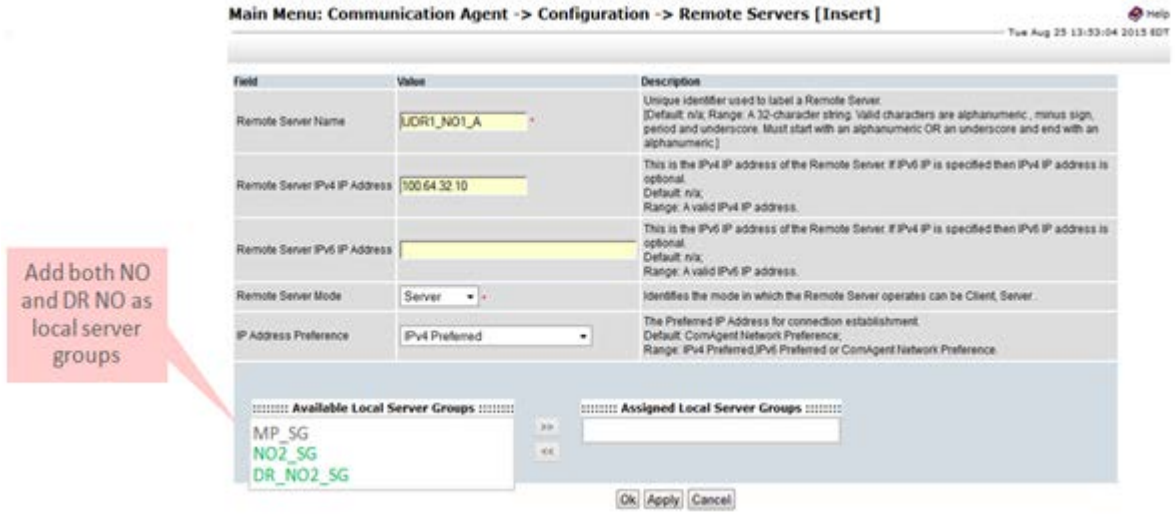


Figure 13: UDR 1 as a remote server on UDR2

8. Now UDR1 can send PSO events to UDR2

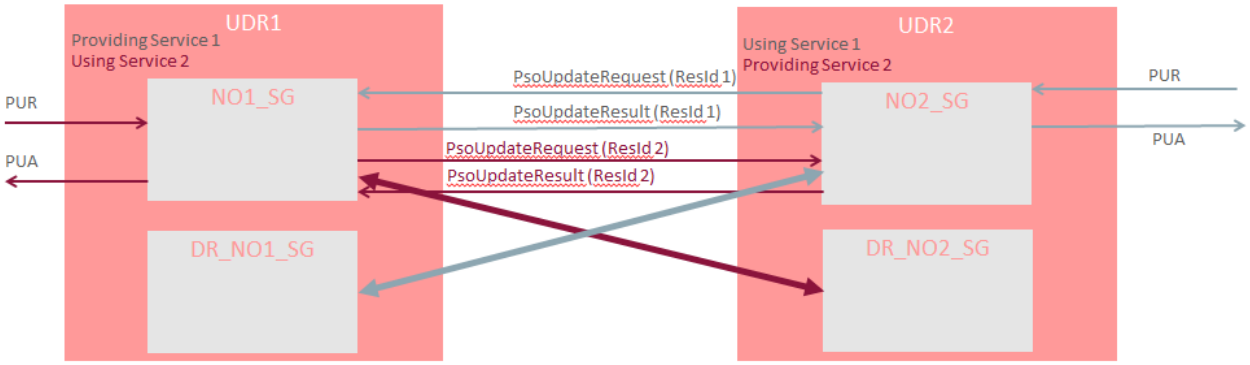


Figure 14: Send PSO events

2.4.10 PN Table threshold processing changes (Bug 22511299)

Notification Requests are held in an internal table called "PN Table". PN Table utilization alarm processing is improved in release 12.2.

PN Table utilization conveys to the users using "Notification Table Utilization" alarm

The alarm's set conditions(threshold) are:

- Severity Minor: Notification Table utilization becomes over 60%
- Severity Major: Notification Table utilization becomes over 80%
- Severity Critical: Notification Table utilization becomes over 95%

The alarm's clear conditions are:

- Severity Minor: Notification Table utilization drops below 50%
- Severity Major: Notification Table utilization drops below 70%
- Severity Critical: Notification Table utilization drops below 90%

Or if the UDR Back End Process is stopped.

2.5 OAMP Enhancements

The feature bundles together several enhancements that customers have specified for the UDR OAMP interfaces. The feature includes enhancements to:

- Validate the username and password received in the header of SOAP requests
- Add measurements for UDR Total Subscriber/Pool Counts
- GUI Support for Create/Update/Delete Subscriber and Pool Data
- Delay PNR notification after profile update
- UDR Dual-Path Monitoring for COMCOL geo take-over

2.5.1 Individual User Credentials for Provisioning Requests

UDR introduces authentication of username/password received in SOAP requests.

When the feature is enabled

- UDR validates the username/password received in the header of the SOAP request to validate the identity of the user who generated the request.
- Any requests that does not match valid user is rejected.
- The username and password credentials are defined in the GUI user screen.
- A user's password is allowed to be updated and reset.
- The provisioning command log captures the username associated with each SOAP request without displaying the password.

Note: Usernames/Passwords should not contain extra spaces, additional characters, new line char, etc in SOAP Header XML

Example :SOAP Header

```
<soapenv:Header>
 <ns1:UserName
       soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next"
       soapenv:mustUnderstand="1"
       xsi:type="soapenc:string"
       xmlns:ns1="http://www.oracle.com/udr/"
    xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/">[Add UserName here]</ns1:UserName>
 <ns1:Passwd
       soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next"
       soapenv:mustUnderstand="1"
       xsi:type="soapenc:string"
       xmlns:ns2="http://www.oracle.com/udr/"
       xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/">[Add Password here]</ns1:Passwd>
</soapenv:Header>
```

Any SOAP request that does not matches username/password validation is rejected with the following error:

```
<req name="operation" resonly="y">
```

<res error="70054" affected="0"/>
</req>

2.5.2 Measurement for UDR Total Subscriber/Pool Count

UDR introduces new measurements to display the total number of Subscribers and the total number of Pools.

The subscriber/pool counts are currently available on the Main Menu:UDR -> Maintenance -> Subscriber GUI, but this measurement is available in reports and can be exported for archival purposes.

The figure below shows the current maintenance screen that displays the subscriber/pool counts.

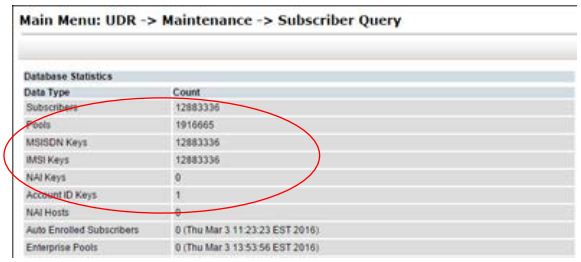


Figure 15: Maintenance Screen that displays the Total Subscriber Count

The total Subscriber/Pool value measurements will be calculated in the same manner as the number that is displayed in the UDR mainteniance GUI

Once the new values are calculated, they can be reflected in the measurement output until the next calculation is performed, the calculation can be performed on at least a 30 minute interval.

Note: UDR Total Subscriber/Pool Count measurements will display 0 for the first 30 minutes after an installation and after that values is reported.

2.5.3 GUI Support for Create/Update/Delete Subscriber and Pool Data

UDR Configuration GUI is enhanced to allow support for creating/updating/deleting Subscriber and Pool Data.

The GUI will now support an XML provisioning request to create, update or delete a subscriber or pool profile or any associated entity data.

The response to the provisioning request is also visible in the GUI and the output is allowed to be cut/copy/paste.

All provisioning requests that are processed via this interface are logged in the provisioning command log.

Existing REST interface KPIs are pegged for create, update, delete and retrieve operations performed on this interface.

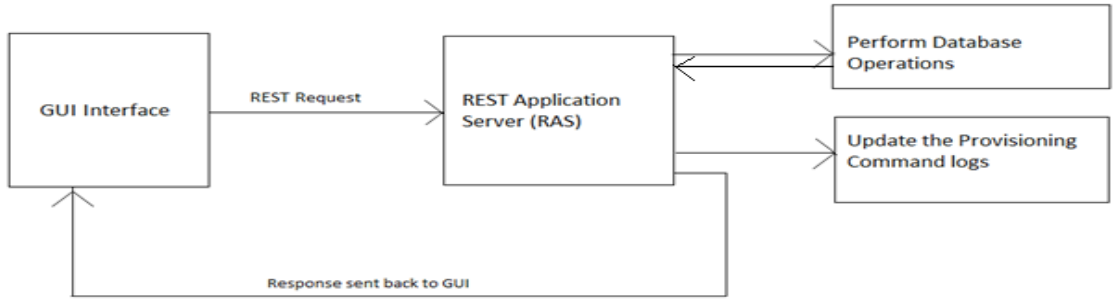


Figure 16: GUI Handling of Provisioning Requests

2.5.4 Delay PNR Notification after Profile Update

The feature provides the flexibility to specify a period of time to delay the PNR messages before UDR generates them after a subscriber profile entity update.

A delay period can be configured in the UDRBE options table, a delay period can be set from 0 to 10 seconds.The default value is no delay (0 seconds).

The customer is allowed to modify the value of this parameter on a running production system without any impact to functionality.

Note: When the feature is enabled, all PNRs are delayed and this is intended for Profile Updates only. The feature is not expected to be used for quota management or deployments that may generate PNRs due to signaling.

2.5.5 DUAL- Path Monitoring for COMCOL Geo Take-Over

The COMCOL database instances at the disaster-recovery (or geo-redundant) UDR site continually monitor the availability of the database instances at the primary site, in order to determine if an automatic failover should occur due to loss of the active site servers.
To prevent a "split brain" situation, the feature leverages a new platform capability, in which COMCOL is configured with a separate path through a different network (XSI) to perform monitoring with the primary site.
The COMCOL instance at the geo-redundant site will only assume activity if communication is lost with the active site on both of these networks.

2.6 Ud Client Feature

The Ud Client feature enables UDR to communicate via a Ud Interface to the Ud Server and fetch subscriber profile data that is then cached to provide a high performance interface to the Policy Management or possibly, other Oracle or third party applications.

Problem: The Oracle Communications Policy Management solution needs to be able to interface with an embedded third-party subscriber database and still provide support for all quota management use cases. Oracle Communications UDR shall incorporate a Ud interface in order to preserve all existing quota management capabilities. UDR shall provide the schema mapping so to align the third-party profile with the existing schema, which facilitates transparent interactions with Policy Management.

Solution: The solution for the Ud Client relies on having an LDAP and a SOAP interface to communicate with the Ud Server and retrieve subscriber profile data to populate the UDR subscriber Profile. Ud Client is essentially a gateway into a Ud Server where subscriber data is stored and mastered. It allows UDR access to externally stored subscriber data so that it can provide it to other network elements such as the Policy Management. Operations requiring this data are transparent; the data is presented as if it were stored and managed by the UDR.

As mentioned, Ud Client has two interfaces: LDAP and SOAP. LDAP is used for reading subscriber profile data, and SOAP is used for the publish/subscribe interface to be notified when requested subscriber data is changed, much on the same way as SNR/PNR is used on the Sh interface.

Note: Provisioning of a Ud-Created subscriber to be a pool member, regardless of whether the pool is basic, enterprise, or a PSO pool (and all valid combinations) is not supported in Release 12.2.

2.6.1 How Ud Client Works

When an Sh request is received, UDR attempts to read the subscriber from its database. If the subscriber is found, processing of the request continues as normal, but if the subscriber is not found, the data necessary to create the subscriber Profile entity is fetched via LDAP. Once the subscriber is created by Ud Client, processing of the request continues as normal. In addition, UDR uses the SOAP Ud interface to subscribe to receive notifications when that subscriber's data changes. Figure 17 illustrates this process.

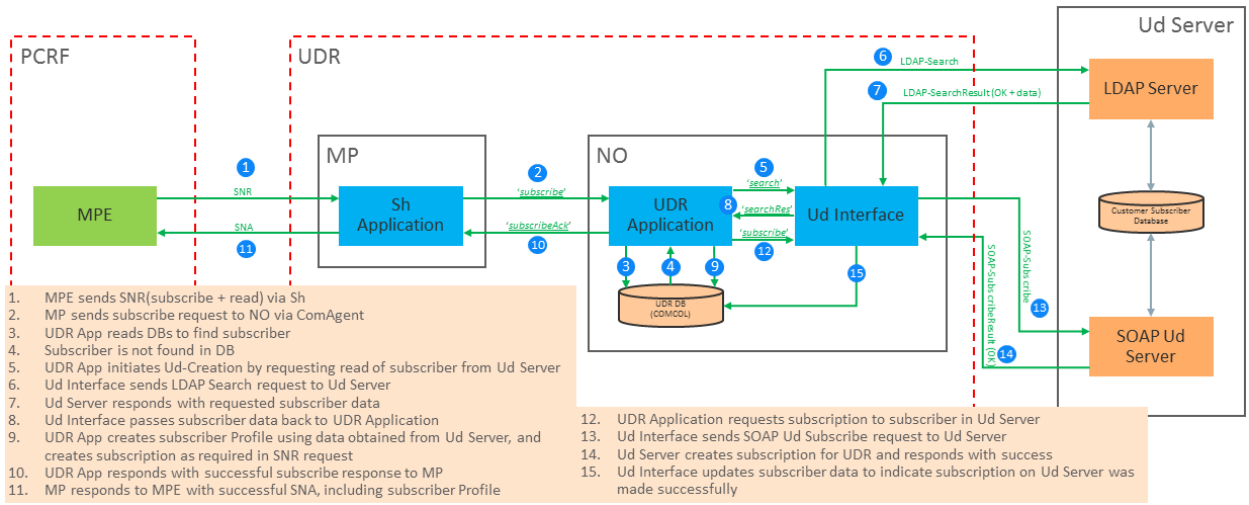


Figure 17: How Ud Client works

No Quota, State, or DynamicQuota is retrieved since the Policy Management is expected to populate it. UDR will only read data via LDAP; writing subscriber data is not supported. Subscriber data stored in the Ud Server is updated there directly. Figure 18 contains a sequence diagram with an example of a successful Ud Client create and subscribe.

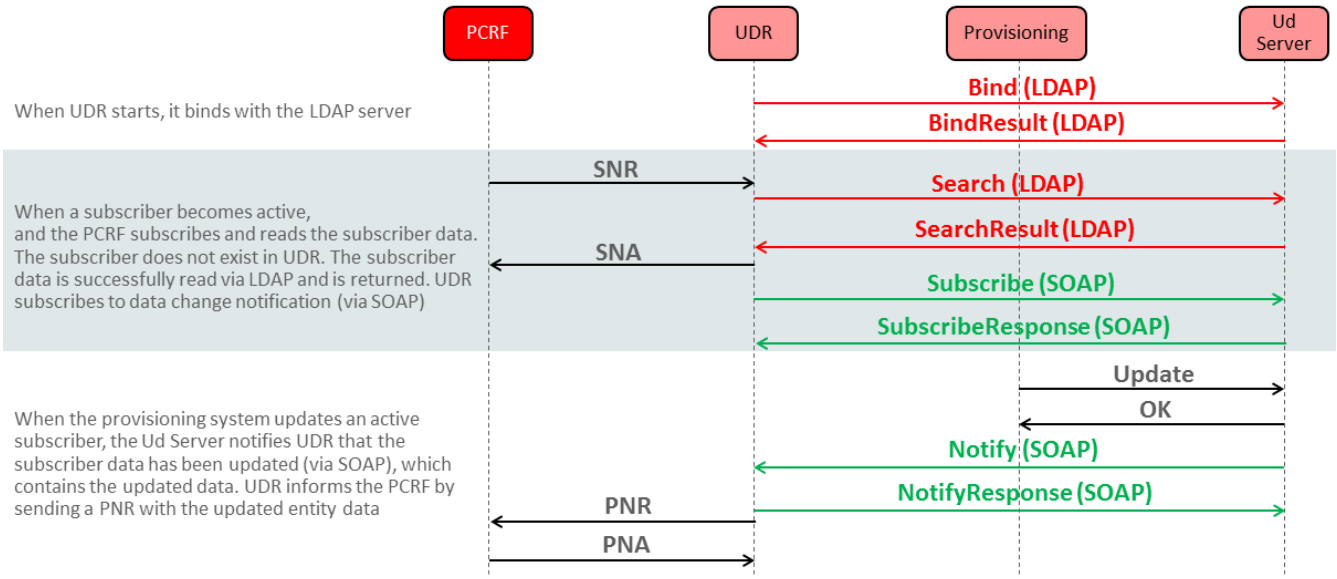


Figure 18: Ud Client Successful Create/Subscribe

Figure 19 contains a sequence diagram illustrating examples of Ud Client failures due to Unknown Subscriber and timeout.

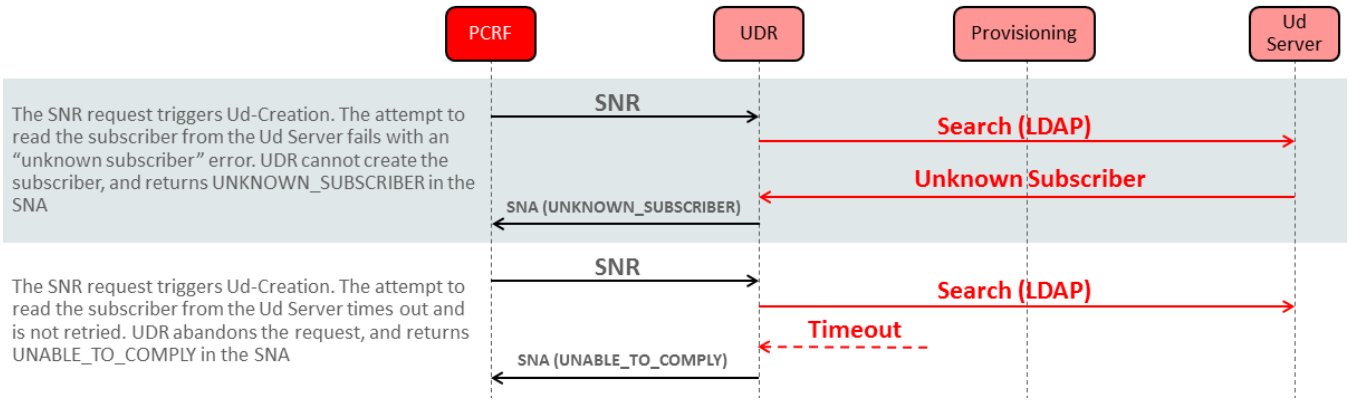


Figure 19: LDAP Search Failure/Timeout

2.6.2 Notification of Subscriber Data Change

The Ud Server will inform UDR via SOAP when subscriber data has changed. When a SOAP Notify for a subscriber is received, UDR compares each LDAP attribute to the existing value stored in the corresponding subscriber profile field. If any attribute has changed, the subscriber profile is updated and PNRs produced as required. Figure 20 illustrates this notification process.

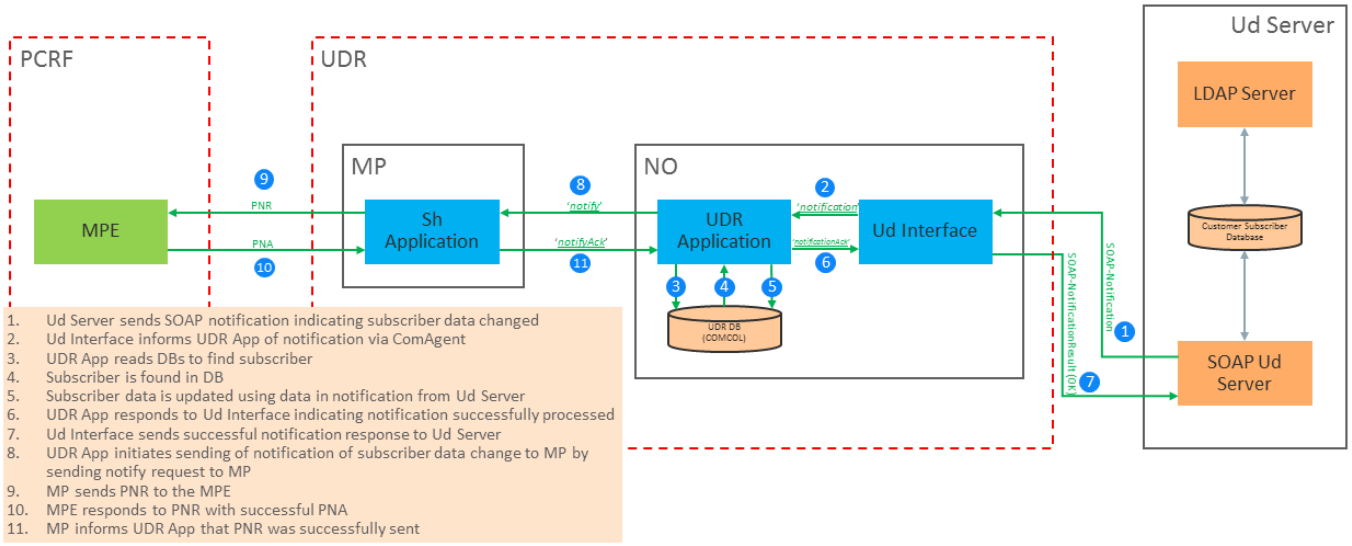


Figure 20: Notification of Subscriber Data Change

2.6.3 Periodic Re-Search Functionality

UDR contains an option to periodically re-search for a subscriber via LDAP and to re-read the subscriber data to determine if it has become stale. This is done based on a configured re-search time period.

- A re-search is triggered on Sh traffic activity if the subscriber data is deemed older than the configured period.
- If the subscriber data has changed on the Ud Server, the UDR subscriber is updated, and PNRs are produced as required.
- If a search request fails with an error indicating "unknown subscriber," the subscriber is deleted from UDR.
- The LDAP Search request will be initiated only after processing the Sh request that triggered it.
- The rate at which the LDAP Search re-search requests are sent is throttled at a configured rate in order to not overload the Ud Server.

2.6.4 Periodic Re-Subscribe Functionality

UDR contains an option to periodically re-subscribe via SOAP for subscriber data change notifications. This is done based on a configured re-subscribe time period

- The rate at which the SOAP Subscribe re-subscribe requests are sent is throttled at a configured rate in order to not overload the Ud Server.
- If a subscribe request fails with an error indicating "unknown subscriber," the subscriber is deleted from UDR.
- If an initial SOAP subscribe fails at the time the Ud subscriber is created, another subscribe request will be trigger at the first audit.
- Independently of periodic re-subscribe, UDR retries sending the SOAP Subscribe request upon subscriber activity via Sh if the initial SOAP Subscribe failed. This is required because Periodic Re-Subscribe may not be enabled and because the configured time period may be too long for an active subscriber.

Figure 21 illustrates Ud Client Periodic Re-Subscribe and Periodic Re-Search.

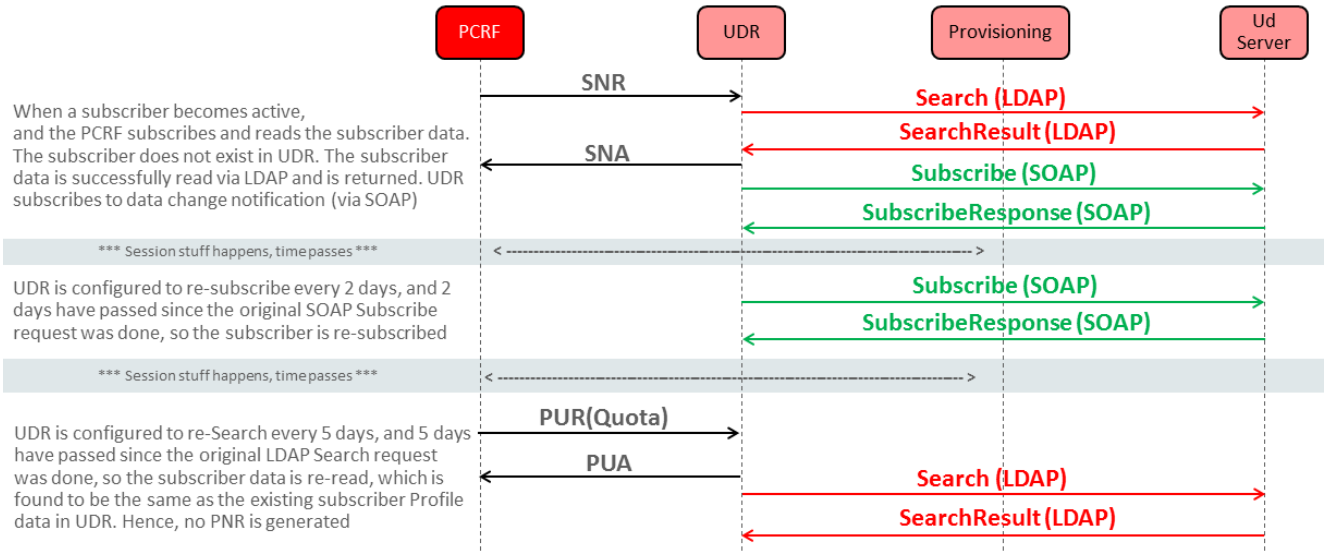


Figure 21. Periodic Re-Subscribe and Re-Search

Figure 22 illustrates Ud Client Periodic Re-Search when data returned is different from the one stored on the UDR.

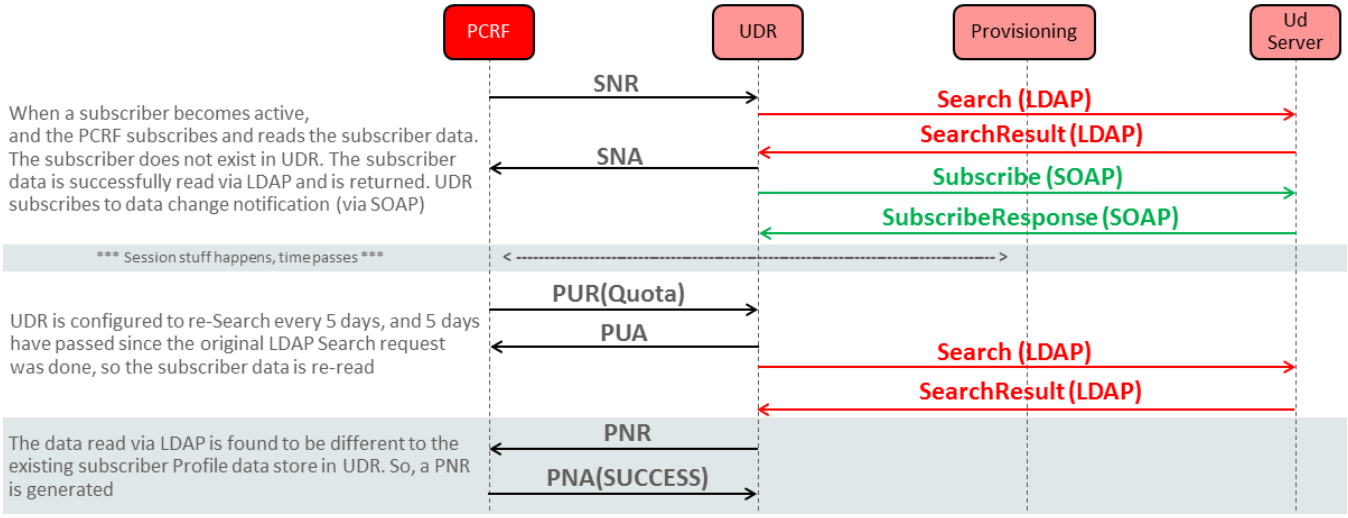


Figure 22. Periodic Re-Search (Data Changed)

2.6.5 SOAP Unsubscribe Request

A SOAP request to unsubscribe from subscriber change notifications is only sent by UDR when the subscriber is deleted in UDR via a local provisioning request (SOAP, REST, or iXML).

2.6.5.1 Disabling SOAP Interface

It is possible to completely disable UDR's Ud SOAP interface for cases when UDR is connected to just an LDAP database with no Ud SOAP publish/subscribe interface. If SOAP interface is disabled, UDR does not attempt to subscribe for data change notifications, and it does not expect to receive data change notifications.

2.6.5.2 Disabling SOAP Subscribe Requests

It is also possible to enable the SOAP interface but disable the sending of SOAP Subscribe requests. If permanent subscriptions can be configured on the Ud Server to send SOAP Notifications hence UDR doesn't need to subscribe. UDR will enable the SOAP connections and expect to receive notifications.

2.6.6 Subscriber Deletion

There are three cases where an Ud subscriber is deleted from the UDR database:

- If a response from an LDAP Search or SOAP Subscribe request indicates that a subscriber doesn't exist
- If a SOAP notify message is received indicating that a subscriber has been deleted
- If the subscriber is explicitly deleted on UDR via a provisioning interface.

If an Ud subscriber is deleted via provisioning and a successful SOAP Subscribe request has been made, a SOAP request is made to unsubscribe for change notifications. Finally, if a notification is received for which UDR has no subscription, UDR returns an error indicating that it doesn't want to receive further notifications for this subscriber.

2.6.7 Simultaneous Access

Simultaneous access is an indication of a race condition.

If a Ud Client attempt to create a subscriber fails because the subscriber already exists, simultaneous access has occurred.

- The data received via the LDAP Read request, if different, is used to update the subscriber as it is assumed to be more recent.
- If the subscriber is updated, notifications are generated as appropriate, and the data used for the update is used for any required UDR response.
- If the failed Ud Client create was triggered by a PUR attempting to create a non-profile entity which already exists, the PUR fails with an OUT_OF_SYNCH error.
- However, if the PUR for the failed create attempts to create entities, which all do not exist, the Profile and entity data supplied are written and success is returned.

No SOAP Subscribe request is made for the second Simultaneous Access because one has already been initiated by the first request.

2.6.8 SOAP Interface Enhancement for UD Client

SOAP interface is used to send SOAP Subscribe requests and to receive SOAP Notify messages to and from the Ud Server.

2.6.8.1 SOAP Subscribe Request

The SOAP Subscribe request is sent from the UDR to the Ud Server to request for it to notify UDR when data for a particular subscriber changes; this is known as "subscribing" for notifications.

The result of a SOAP Subscribe request is indicated by an HTTP response code, which is mapped to Success, Unknown Subscriber, or Failed.

Figure 23 shows the XML schema of a SOAP Subscribe request.

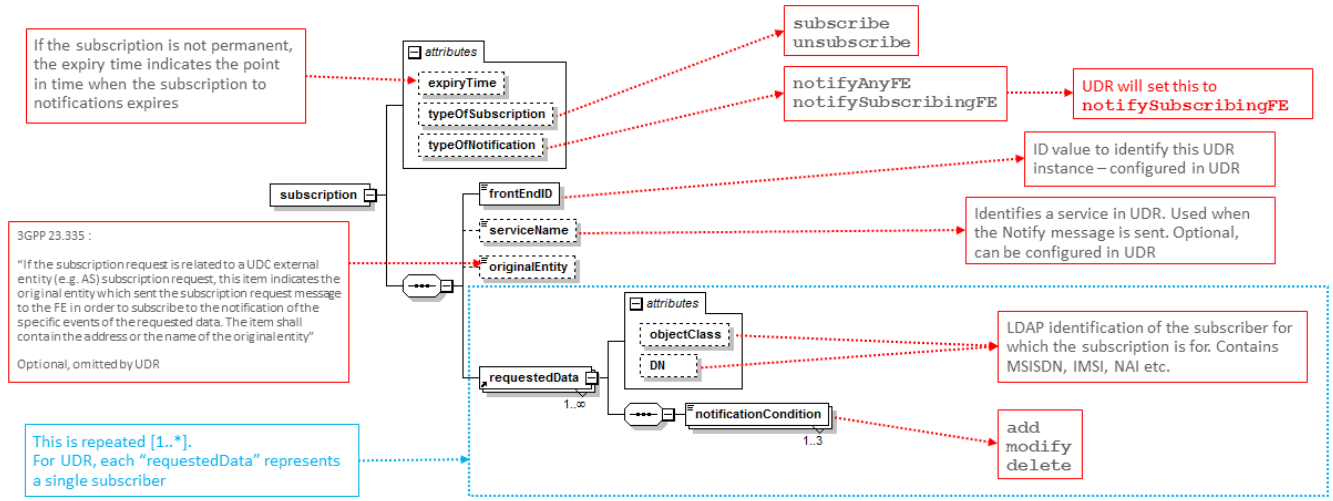


Figure 23. SOAP Subscribe Request

Figure 24 provides an example of a SOAP Subscribe request.

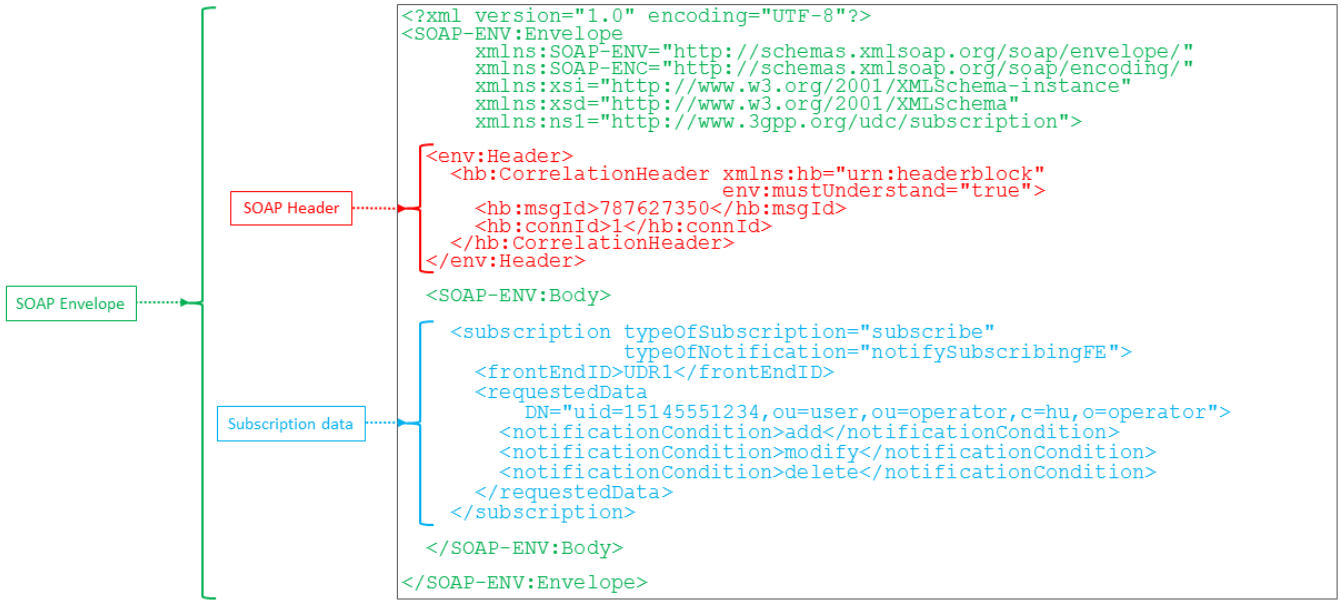


Figure 24. SOAP Subscribe Request Example

2.6.8.2 Notify Message

The Notify messages include the subscriber data that has been changed. UDR uses the provided data to update the subscriber Profile.

The result of a SOAP Notify message is indicated by an HTTP response code, which is mapped to

- Success – 200
- Unknown Subscriber - 404
- Busy - 503
- Invalid Request - 400
- Too Much Data – 413
- Invalid Key – 400
- Failed - 500

Figure 25 shows the XML schema for a SOAP Notify message.

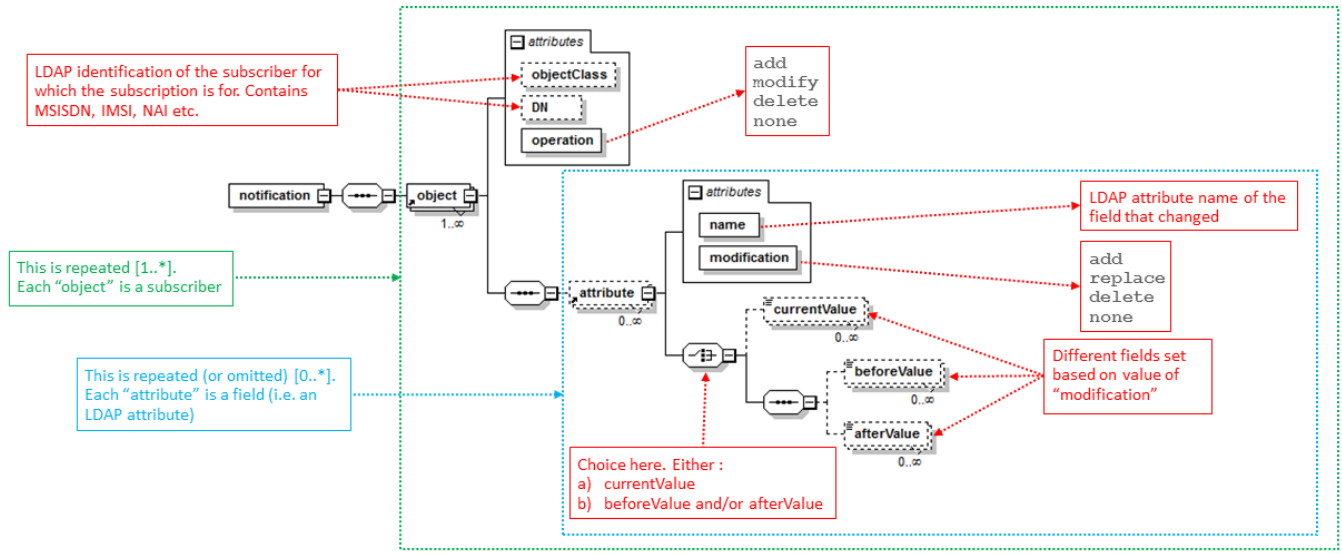


Figure 25. SOAP Notify Message

Figure 26 provides an example of a SOAP Notify message.

Figure 26: SOAP Notify Message Example

2.6.9 SOAP Notify behavior for Invalid Messages

SNO	Scenario	Behavior	Connection Status
1	SOAP Notify Request contains SOAP-Header without Correlation Header	Measurements pegged: RxUdNotifyRequestInvalidRequest RxUdNotifyRequestReceived RxUdNotifyRequestDiscarded Request is discarded; no response sent	Connection processes subsequent requests
2	SOAP Notify Request does not contain SOAP-Header	Measurements pegged: RxUdNotifyRequestInvalidRequest RxUdNotifyRequestReceived RxUdNotifyRequestDiscarded Request is discarded; no response sent	Connection processes subsequent requests
3	SOAP Notify Request contains SOAP Envelope with Correlation Header with no connId and msgId tags	connId is treated as 0. msgId is treated as 0. Request processed as valid and msdgId(0) and connId(0) sent in response	Connection processes subsequent requests
4	SOAP Notify Request contains SOAP Envelope with Correlation Header. Correlation Header contains connIdAbc tag instead of connId and msgId tag with numeric value	connId is treated as not present. Request is processed as valid and only msdgId received is sent in response	Connection processes subsequent requests
5	SOAP Notify Request contains SOAP Envelope with Correlation Header. Correlation Header contains connId and msgId with numeric values	Request is processed as valid. msdgId and connId received are sent in response	Connection processes subsequent requests
6	SOAP Notify Request contains SOAP Envelope with Correlation Header. Correlation Header contains 2 instances of connId and msgId each with numeric values	Request is processed as valid. msdgId and connId received are sent in response. Value of first instance of msgId and connId is used.	Connection processes subsequent requests
7	SOAP Notify Request contains SOAP Envelope with Correlation Header. Correlation Header contains connId and msgId with numeric values	Request is processed as valid. msdgId and connId received are sent in response.	Connection processes subsequent requests
8	SOAP Notify Request contains SOAP Envelope with Correlation Header. Correlation Header contains connId and msgId with numeric values. SOAP Body does not contain ns1:notification	Measurement pegged: RxUdNotifyRequestInvalidRequest RxUdNotifyRequestReceived TxUdNotifyResponseSent RxUdNotifyResponseInvalidRequest Response with http status 400 sent	Connection processes subsequent requests
9	SOAP Notify Request contains SOAP Envelope with Correlation Header. Correlation Header contains connId with	Measurement pegged: RxUdNotifyRequestInvalidRequest RxUdNotifyRequestReceived	Connection is reset

SNO	Scenario	Behavior	Connection Status
	character value and msgId with numeric value	RxUdNotifyResponseSent RxUdNotifyResponseFailed SOAP Fault is returned with http status 500 SOAP fault text: Validation constraint violation: data type mismatch in element ns1:connId	
10	SOAP Notify Request contains SOAP Envelope with Correlation Header. Correlation Header contains connId with numeric value and msgId with character value	Measurement pegged: RxUdNotifyRequestInvalidRequest RxUdNotifyRequestReceived RxUdNotifyResponseSent RxUdNotifyResponseFailed SOAP Fault is returned with http status 500 SOAP fault text: Validation constraint violation: data type mismatch in element ns1:msgId	Connection is reset
11	SOAP Notify Request contains SOAP Envelope with Correlation Header. Correlation Header contains connId and msgId with numeric values. SOAP Body contains ns1:notification element. ns1:attribute element contains an invalid value for attribute modification	Measurement pegged: RxUdNotifyRequestInvalidRequest RxUdNotifyRequestReceived RxUdNotifyResponseSent RxUdNotifyResponseFailed SOAP Fault is returned with http status 500 SOAP fault text: Validation constraint violation: data type mismatch in element 'ns1:attribute'	Connection is reset

2.6.10 SOAP Subscribe behavior for Invalid Messages

SNO	Scenario	Behavior	Connection Status
1	SOAP Subscribe response received with HTTP Status Code 200. SOAP Header does not contain Correlation Header	Measurements pegged: EvUdSubscribeRequestTimedOut RxUdSubscribeResInvldCorrelation Header RxUdSubscribeResponseReceived	Connection processes subsequent requests
2	SOAP Subscribe response received with HTTP Status Code 200. SOAP Header contains Correlation Header with no connId and msgId elements.	Measurements pegged: EvUdSubscribeRequestTimedOut RxUdSubscribeResInvldCorrelation Header RxUdSubscribeResponseReceived	Connection processes subsequent requests
3	SOAP Subscribe response received with HTTP Status Code 200. SOAP Header contains Correlation Header	Measurements pegged: EvUdSubscribeRequestTimedOut RxUdSubscribeResInvldCorrelation	Connection processes subsequent requests

SNO	Scenario	Behavior	Connection Status
	with connIdAbc (instead of connId) and msgId elements.	Header RxUdSubscribeResponseReceived	
4	SOAP Subscribe response received with HTTP Status Code 200. SOAP Header contains Correlation Header with connId and msgIdAbc (instead of msgId) elements.	Measurements pegged: EvUdSubscribeRequestTimedOut RxUdSubscribeResInvldCorrelation Header RxUdSubscribeResponseReceived	Connection processes subsequent requests
5	SOAP Subscribe response received with HTTP Status Code 200. SOAP Header contains Correlation Header with connId with random numeric valueand msgId with numeric value as sent in request.	Measurements pegged: EvUdSubscribeRequestTimedOut RxUdSubscribeResInvldCorrelation Header RxUdSubscribeResponseReceived	Connection processes subsequent requests
6	SOAP Subscribe response received with HTTP Status Code 200. SOAP Header contains Correlation Header with two instances of connId and msgId with values same as sent in request.	Request is processed as successful	Connection processes subsequent requests
7	SOAP Subscribe response received with HTTP Status Code 200. SOAP Header contains Correlation Header with one instances of connId and msgId with values same as sent in request.	Request is processed as successful	Connection processes subsequent requests
8	SOAP Subscribe response received with HTTP Status Code 200. SOAP Header contains Correlation Header with connId containing character value and msgId containing the value same as sent in request.	Measurements pegged: EvUdSubscribeRequestTimedOut RxUdSubscribeResInvldCorrelation Header RxUdSubscribeResponseReceived SOAP Fault is returned with http status 500 SOAP fault text: Validation constraint violation: data type mismatch in element ns1:connId	Connection is reset
9	SOAP Subscribe response received with HTTP Status Code 200. SOAP Header contains Correlation Header with msgId containing character value and connId containing the value same as sent in request.	Measurements pegged: EvUdSubscribeRequestTimedOut RxUdSubscribeResInvldCorrelation Header RxUdSubscribeResponseReceived SOAP Fault is returned with http status 500 SOAP fault text: Validation constraint violation: data type mismatch in element ns1:connId	Connection is reset
10	SOAP Subscribe response received with HTTP Status Code 200 without SOAP Envelope	Measurements pegged: EvUdSubscribeRequestTimedOut RxUdSubscribeResInvldCorrelation Header	Connection is reset

SNO	Scenario	Behavior	Connection Status
		RxUdSubscribeResponseReceived	
11	SOAP Subscribe response received with HTTP Status Code 403 with valid SOAP Header	Measurements pegged: RxUdSubscribeResponseReceived RxUdSubscribeResponseUnknownSubscriber	Connection is reset
12	SOAP Subscribe response received with HTTP Status Code 503 with valid SOAP Header	Measurements pegged: RxUdSubscribeResponseReceived EvUdSOAPConnectionBusy	Connection is reset
13	SOAP Subscribe response received with HTTP Status Code 500 with valid SOAP Header	Measurements pegged: RxUdSubscribeResponseReceived RxUdSubscribeResponseFailed	Connection processes subsequent requests

2.6.11 UDR to UDR Migration Support for Ud Client

The migration command (o2omt) is enhanced to provide support for Ud-Created subscribers.

- The o2omt command will migrate Ud-Created subscribers that fall into the migration range specified.
- The o2omt command supports migration of Ud-Created subscribers in the range specified by either the --imsi or --msisdn options.
- Ud-Created subscribers in the specified range on the source system will be added to the remote system. Upon successful migration of a Ud-Created subscriber, the subscriber will be deleted from the source system
- The o2omt command will migrate Ud-Created subscribers regardless of if the Ud Client feature is enabled or not.
- On completion of a migration, the summary report of migration counts will include a separate count of Ud-Created subscribers migrated to the target system

2.6.12 Measurement Addition

Following measurement groups are created:

- Ud Client Performance -- consists of counts for the Ud Client application.
- Ud Client LDAP Interface --consists of counts for the Ud Client LDAP requests/responses sent between UDR and the Ud Server.
- Ud Client SOAP Interface -- consists of counts for the Ud Client SOAP requests/responses sent between UDR and the Ud Server.
- Ud Client Exception -- consists of counts or timeouts and errors in the Ud Client application, and for the LDAP and SOAP requests/responses sent between UDR and the Ud Server.

2.6.13 Points to be noted for UD Client Feature

Note the following points:

- The Ud client interface on the NOAMP can be configured into either the XSI or XMI network, depending on accessibility and connectivity to the centralized database that hosts the Ud server interface.
- UDR will only connect to a single Ud Server instance. UDR can maintain multiple connections via up to 3 different connection paths (via WAN or LAN), but it is assumed that this is the same logical Ud Server instance
- UDR will only make a single LDAP Search request to obtain all required subscriber data.
- A SOAP Notify request is only expected to contain one "object" per subscriber. Multiple objects are allowed and will be processed, but multiple PNRs may be produced, one per "object" successfully processed that resulted in a subscriber update
- When receiving SOAP Notify requests from a Ud Server, UDR expects to receive the requests on existing connections that UDR has created to the Ud Server for the purpose of sending SOAP Subscribe requests,Thus, UDR will NOT create a SOAP server on a specific port etc. and listen for incoming connections from the Ud Server

- Provisioning of a Ud-Created subscriber to be a pool member, regardless of whether the pool is basic, enterprise, or a PSO pool (and all valid combinations) is not in the Release 12.2
- Due to the way that UDR keys will be mapped to LDAP attributes, it will not be possible to use an "overloaded" LDAP attribute field as a key if it is used for multiple keys.
    - For example, if a "uid" attribute will contain MSISDN and IMSI and NAI values, it would be necessary to map all UDR to LDAP attribute key mappings such as MSISDN -> uid, IMSI -> uid, and NAI -> uid.
    - When the LDAP attributes are returned, multiple instances of uid would be returned such as :
      uid=19195551234
      uid=320370123456789
      uid=john.doe@operator.com
    - Having an overloaded LDAP attribute would result (for example) in attempting to set an MSISDN value of "john.doe@operator.com", which is an invalid MSISDN key value.
    - If different returned LDAP attributes were instead assigned to keys from different LDAP attributes (such as returned LDAP called "msisdn" mapping to the UDR MSISDN field) then this would not be an issue, this would be simply achieved by configuring "Search DN" containing the attribute name used for the search, and only using the configured "Ud Attribute" for mapping the returned value.
    - *If an LDAP attribute field (such as "uid") is not overloaded then there are no issues. For example if "uid" only ever contained an MSISDN, and IMSI and NAI are in separate attributes.*
- UDR can perform the re-subscribe audit for subscribers within 24 hours, but UDR may not be able to re-subscribe to all subscribers within 24 hours.
    - The number of subscribers that can be re-subscribed is a function based on the throttled number of SOAP Subscribe request TPS rate, and the percentage of those allowed for re-subscribe attempts.
    - For example, if the SOAP Subscribe rate is 500 TPS, and of that 65% can be used for re-subscribe attempts, then in a 24 hour period UDR can only re-subscribe to ((500 * 0.65) * 86400) = 28,080,000 subscribers.
- UDR uses gSOAP library for SOAP interface implementation. gSOAP library treats some errors on the SOAP connection as faults. It renders the connection context unusable for subsequent messages when a fault occurs. Due to this behavior of gSOAP library, some of the SOAP Notify Requests or SOAP Subscribe Responses may cause connection termination. In scenarios when fault is generated by gSOAP library, the application does not control the response sent. Some of the Invalid correlation header failures are not detected by gSOAP library and the application receives the header with connId(0) and msgId(0) in such case. The application cannot differentiate such messages and processes them as normal messages

3 User Data Repository 12.2 GUI Functions

3.1 GUI Main Menu

The GUI main menu is updated to include new sections for

- Pool Spanning User Data Repository under the configuration section of the UDR, The new section is "Main Menu: UDR -> Configuration -> Pool Spanning"
- The UDR menu is updated to move the existing Subscriber Query Screen to Main Menu -> UDR -> Configuration -> Subscriber Query and Provisioning.
- Ud Client under the configuration section of the UDR,. The new section is "Main Menu: UDR -> Configuration -> Ud Client"

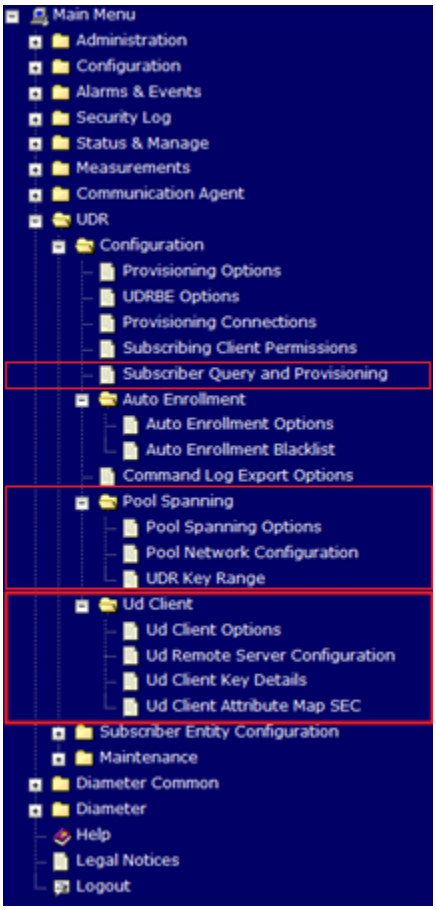


Figure 27: GUI main menu

The GUI main menu is also updated to include a new section for the Ud Client under the maintenance section of the UDR menu as shown below. The new section is "Main Menu: UDR -> Maintenance -> Ud Client".

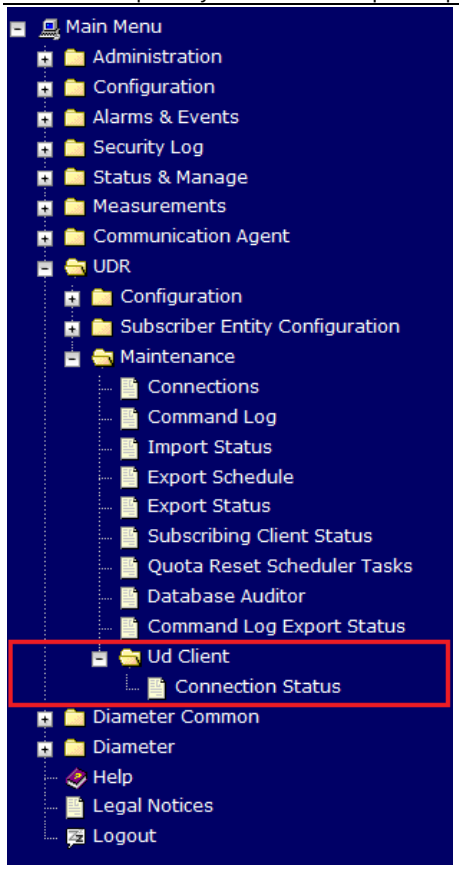


Figure 28. GUI UDR Maintenance Menu

3.2 User Data Repository Permissions

The Access Control for User Data Repository screens is updated as below. The permissions can be granted or removed on *Main Menu: Administration* → *Access Control* → *Groups* GUI screen. The administrative group "admin" (to which the super user *guiadmin* belongs) shall have access to all User Data Repository GUI permissions by default.

The following items in the UDR Configuration Permissions section are new:

1. Pool Spanning Options
2. Pool Network Configuration
3. UDR Key Range
4. Ud Client Options
5. Ud Remote Server Configuration
6. Ud Client Key Details
7. Ud Client Attribute Map SEC
8. Subscriber Query and Provisioning
9. Create Profile / Add Entity

Resource	View	Insert	Edit	Delete	Manage
UDR Configuration Permissions	☐	☐	☐	☐	☐
Ud Client Options	☑		☑		
Provisioning Options	☑		☑		
Ud Remote Server Configuration	☑		☑		
UDRBE Options	☑		☑		
Ud Client Key Details	☑		☑		
Provisioning Connections	☑	☑		☑	
Subscribing Client Permissions	☑	☑		☑	
Subscriber Query and Provisioning	☑	☑	☑	☑	
Create Profile / Add Entity	☑	☑			
Ud Client Attribute Map SEC	☑	☑	☑	☑	
Auto Enrollment Options	☑		☑		
Auto Enrollment Blacklist	☑	☑		☑	
Command Log Export Options	☑		☑		
Pool Spanning Options	☑		☑		
Pool Network Configuration	☑	☑		☑	
UDR Key Range	☑	☑		☑	

Figure 29: User Data Repository Permissions

The following item in the UDR Maintenance Permissions section is new:

1. Ud Client Connection Status

Resource	View	Insert	Edit	Delete	Manage
UDR Maintenance Permissions	☐	☐	☐	☐	☐
Subscriber Query	☑				
Connections	☑				
Command Log	☑			☑	
Import Status	☑			☑	
Export Schedule	☑	☑	☑	☑	
Export Status	☑				
Subscribing Client Availability	☑				
Quota Reset Scheduler Tasks	☑	☑	☑	☑	☑
Db Auditor	☑				☑
Command Log Export Status	☑				
Ud Client Connection Status	☑				☑

Figure 30. UDR Maintenance Permissions

3.3 Pool Spanning

The following tabs are added in section "Main Menu: UDR -> Configuration -> Pool Spanning"

1. Pool Spanning Options
2. Pool Network Configuration
3. UDR Key Range

3.3.1 Pool Spanning Options

The Pool Spanning Options screen is added to configure the Pool Spanning UDRs feature. The Pool Spanning Options display screen is used to configure values for the options and apply or cancel the changes.

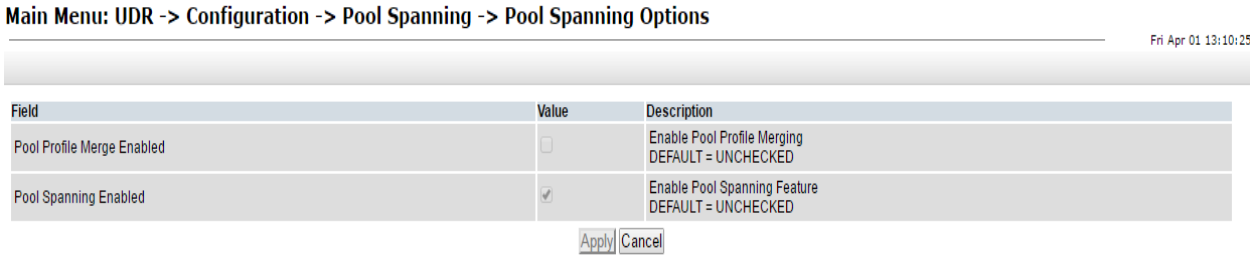


Figure 31: Pool Spanning Options

Table 21: Pool Spanning Options

Purpose	To allow an operator to view options for the Pools Spanning UDRs feature.
Required Permissions	*UDR Configuration Permissions* → *Pool Spanning Options* permissions group that is defined on the *Main Menu: Administration* → *Access Control* → *Groups* GUI screen
Tooltips	**Field Name** / **Description** / **Possible Value** Pool Spanning Enabled / Defines whether the Pool Spanning feature is enabled on the system. / Unchecked, Checked Pool Profile Merge Enabled / Defines whether the Pool Profile is merged on the Non Pool Host UDR when returning the Pool Profile via Sh. / Unchecked, Checked
Nuances	• The feature can be completely configured prior to enabling it however pools will not be created on UDR systems other than as Pool Host UDR pools until the feature is enabled. If disabled existing Non Pool Host UDR pools will act as regular pools. • The Apply button is always disabled as the options on this screen are currently read-only.
Security Log Entries	Successful Display

3.3.2 Pool Network Configuration

The Pool Network Configuration screen is added to configure the UDRs that are in the pool network. Each UDR is capable of being both a Pool Host UDR and a Non Pool Host UDR at the same time. The Pool Network Configuration display screen has the options to add or delete an entry.

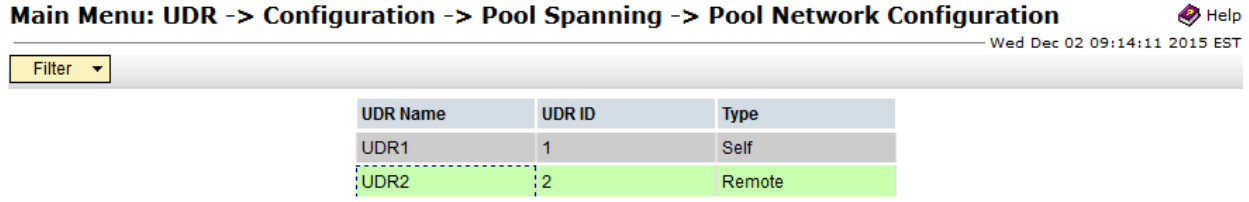


Figure 32: Pool Network Configuration

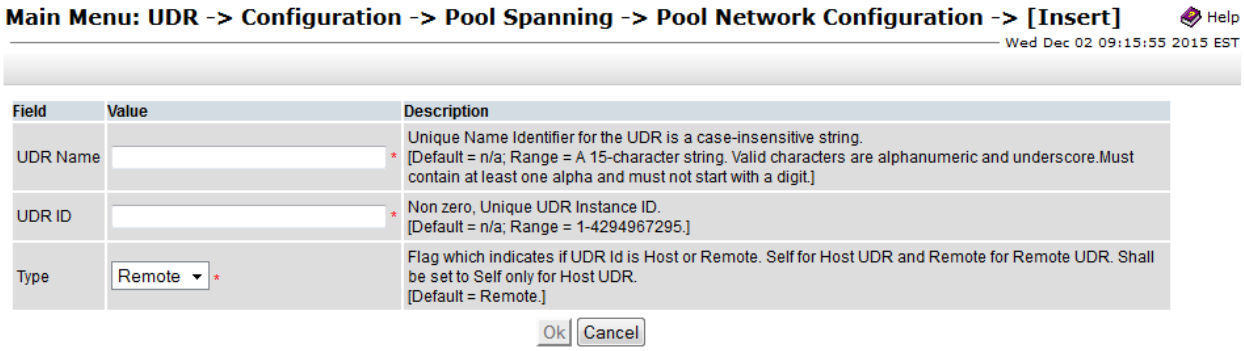


Figure 33: Pool Network Configuration - Insert

Table 22: Pool Network Configuration options

<table>
<tr><td>Purpose</td><td>To allow an operator to view the Pool Network Configuration for the UDR. Each UDR in the pool network must have the same UDR ID value configured for each UDR. The UDR that is displaying the screen will have a Type of “Self”. All other UDRs have a value of “Remote”.</td></tr>
<tr><td>Required Permissions</td><td>UDR Configuration Permissions → Pool Network Configuration permissions group that is defined on the Main Menu: Administration → Access Control → Groups GUI screen</td></tr>
<tr><td>Tooltips</td><td>
<table>
<tr><th>Field Name</th><th>Description</th><th>Possible Value</th><th>Default Value</th></tr>
<tr><td>UDR Name</td><td>The name assigned to represent the UDR instance with the given ID.</td><td>A 15-character string. Valid characters are alphanumeric and underscore. Must contain at least one alpha and must not start with a digit.</td><td>None</td></tr>
<tr><td>UDR ID</td><td>A unique non-zero UDR instance id.</td><td>1-4294967295.</td><td>None</td></tr>
<tr><td>Type</td><td>Flag which indicates if UDR Id is Host or Remote. Self for Host UDR and Remote for Remote UDR. Shall be set to Self only for Host UDR.</td><td>Self or Remote</td><td>Remote</td></tr>
</table>
</td></tr>
<tr><td>Nuances</td><td>• The UDR ID for each UDR instance in the pool network must be configured to be the same value on every UDR in the pool network. This cannot be validated however the pool network will not function properly if it is not configured correctly.
• The OK button is disabled until a value is modified.</td></tr>
<tr><td>Security Log Entries</td><td>Successful Display
Successful Add
Failed Add
Successful Delete</td></tr>
<tr><td>Error/Status Message Trigger Condition</td><td>[Error Code 13104] – Missing required field ‘x’.
The value for field x is required.</td></tr>
<tr><td>Error/Status Message Trigger Condition</td><td>[Error Code 13105] – A key value for this insert is not unique’.
The value specified for the field should be unique.</td></tr>
</table>

Error/Status Message Trigger Condition	*[Error Code 13116] - Invalid value for field [UDR Name]* Valid Value of UDR Name is an alphanumeric string of length 15 and must not contain any special characters other than underscore. There is no default value for this field.
Error/Status Message Trigger Condition	*[Error Code 13116] - Invalid value for field [UDR ID]* Valid Value of UDR ID is a numeric value and must be non-zero value. There is no default value for this field.
Error/Status Message Trigger Condition	*[Error Code 13164] - UDR ID is being used in UDR Key Range.* A UDR ID, present in Pool Network Configuration, which is being used either in UDR Key Range GUI should not be deleted.
Error/Status Message Trigger Condition	*Insert Successful* The configuration is inserted successfully.
Error/Status Message Trigger Condition	*Delete successful* The UDR ID is deleted successfully.

3.3.3 UDR Key Range

The UDR Key Range screen allows the user to configure which PoolID ranges are hosted by each UDR in the remote pool network. The UDR Key Range screen has options to add or delete an entry.

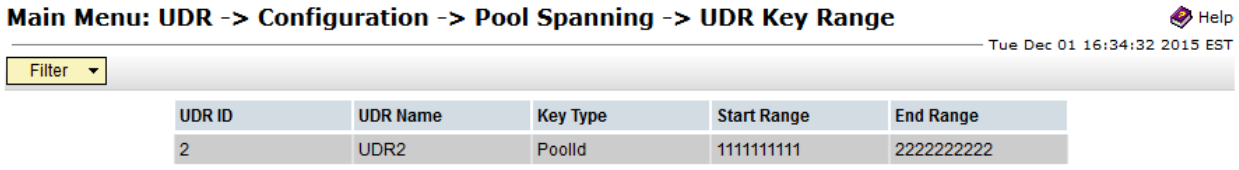


Figure 34: UDR Key Range

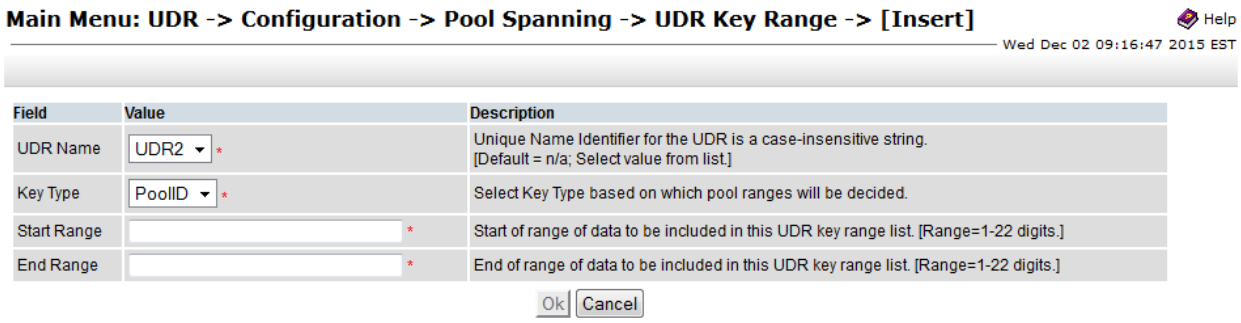


Figure 35: UDR Key Range - Insert

Table 23: UDR Key Range options

Purpose	To allow an operator to view key ranges configured for each remote UDR.
Required Permissions	*UDR Configuration Permissions* → *Remote UDR Connections* permissions group that is defined on the *Main Menu: Administration* → *Access Control* → *Groups* GUI screen

Tooltips

Field Name	Description	Possible Value	Default Value
UDR Name	The name assigned to represent the UDR instance with the given ID.	N/A Select value from list populated by UDR Names entered in Pool Network Configuration screen.	None
UDR ID	A unique non-zero UDR instance id.	N/A Populated automatically from Pool Network Configuration according to UDR Name selected.	None
Key Type	Select of Key Type based on which key range will be decided. **Note**: Currently only PoolID is supported	PoolID	PoolID
Start Range	Start of range of data to be included in this UDR key range list.	1-22 digits	None
End Range	Start of range of data to be included in this UDR key range list.	1-22 digits	None

Nuances	• There is no validation done to prevent overlapping key ranges • The UDR Name for the Local UDR shall not be allowed to be configured from the pull down list. • The end range must be greater than or equal to the start range. • The OK button is disabled until a value is modified.
Security Log Entries	Successful Display Successful Add Failed Add Successful Delete
Error/Status Message Trigger Condition	*[Error Code 13104] – Missing required field 'x'.* The value for field x is required.
Error/Status Message Trigger Condition	*[Error Code 13105] – A key value for this insert is not unique'.* The value specified for the field should be unique.
Error/Status Message Trigger Condition	*[Error Code 13163] - Invalid value: {x} must be between 1 and 22 digits.* Valid Value of Start Range/End Range is a numeric string of length from 1 to 22 and must not contain any special characters. There is no default value for this field.
Error/Status Message Trigger Condition	*[Error Code 13125] - StartRange must contain only digits.* Valid Value of Start Range is a numeric value. There is no default value for this field.
Error/Status Message Trigger Condition	*[Error Code 13126] - EndRange must contain only digits.* Valid Value of End Range is a numeric value. There is no default value for this field.
Error/Status Message Trigger Condition	*[Error Code 13152] - Invalid value: End Range cannot be less than the Start Range.* End Range cannot be less than Start Range.
Error/Status Message Trigger Condition	*[Error Code 13165] – Range of PoolID is either superset or subset of existing one.* Overlapping of Pool ID ranges across UDR Ids should not be allowed.
Error/Status Message Trigger Condition	*[Error Code 13116] - Invalid value for field [{x}]* The value specified for field x is invalid.
Error/Status Message Trigger Condition	*Insert Successful* The fields were inserted successfully.
Error/Status Message Trigger Condition	*Delete successful* The UDR Range is deleted successfully.

3.3.4 Summary of PSO configuration

Pool Spanning functionality can be configured and enabled as explained in steps below:

1. Install and configure R12.2 on UDR1 and UDR2.
2. Configure ComAgent on UDR1 and UDR2 as described in Section 2.4.9 - ComAgent Configuration for Communication between NOAMs
3. Configure Pool Network Table on UDR1 and UDR2 as described in Section 3.3.2 - Pool Network Configuration.
4. Add entries in the UDR Key Range table on UDR1 and UDR2 for the pool id ranges as described in Section 3.3.3 - UDR Key Range Configuration.
5. Execute the following command on Active NO as a root user only for systems Upgraded from R12.1 to R12.2 (this step is not required for a system upgraded from R10.2 or a fresh installation of R12.2)

   iset -fflags=0 Subscription where "flags!=0"

   This command may take upto 3 hours to complete for a 30M Database. Proceed to step 6 only after completion of Step 5
6. Activate PSO on Active NO as a root user on a R12.2 system

   iset -fvalue=TRUE CommonOptions where "var='PSO_Enabled'"

   iset -fvalue=TRUE CommonOptions where "var='PoolProfileMergeEnabled'"

Note: Once the PSO feature has been activated it cannot be de-activated.

3.4 OAMP Enhancements

3.4.1 Individual User Credentials for Provisioning Requests

3.4.1.1 Provisioning Options Screen

The Provisioning Options screen have an option 'SOAP Username/Password Authentication' and it is disabled by default.
If the option is checked/enabled, the provisioning interface will validate the username/password received in the header of a SOAP request.
If disabled, the username/password will continue to be ignored in a SOAP request for backwards compatibility.

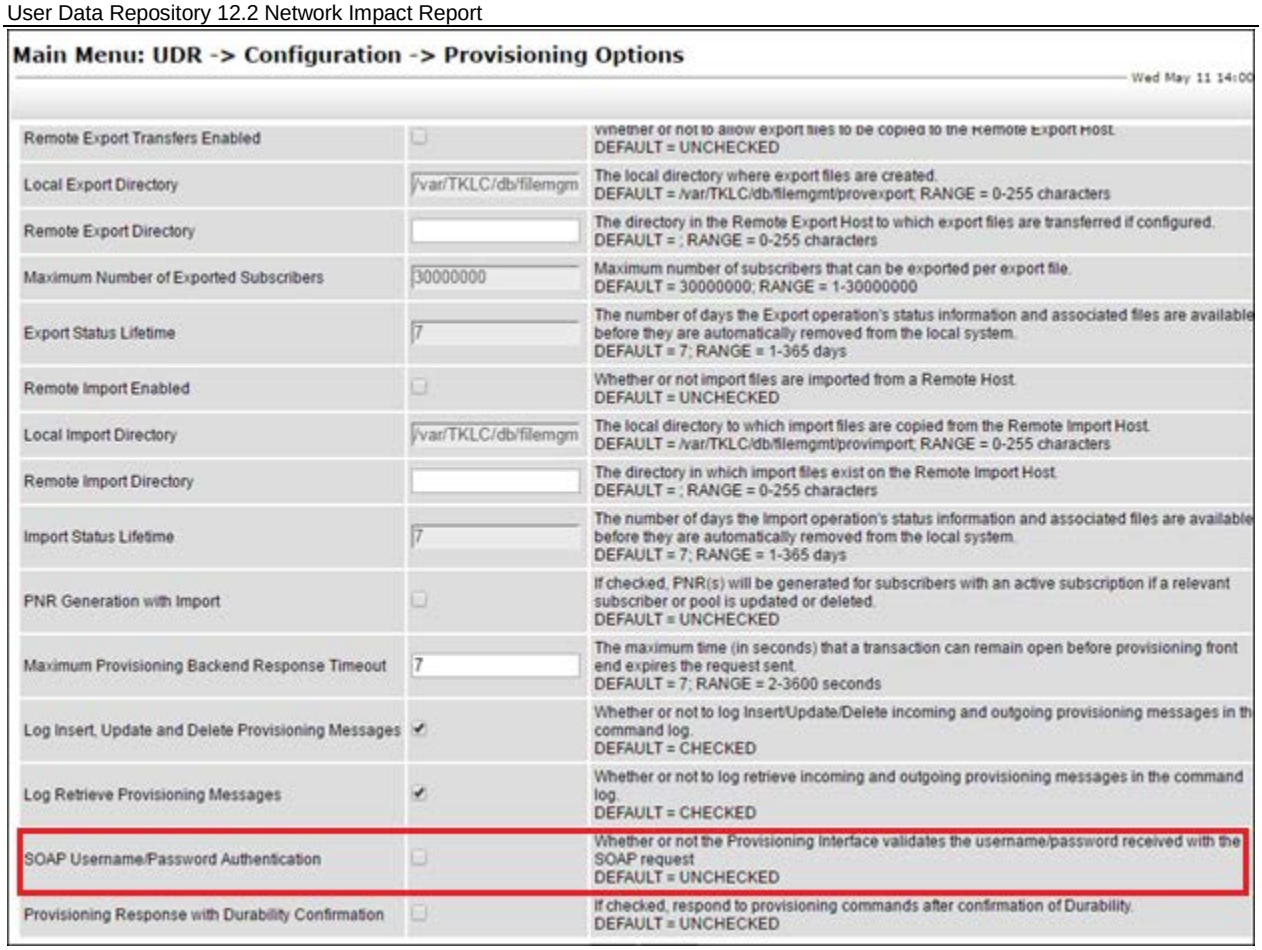


Figure 36. Provisioning Options Screen

3.4.1.2 GUI User Screen

It is recommended to first create a new group , example: SOAPUsers

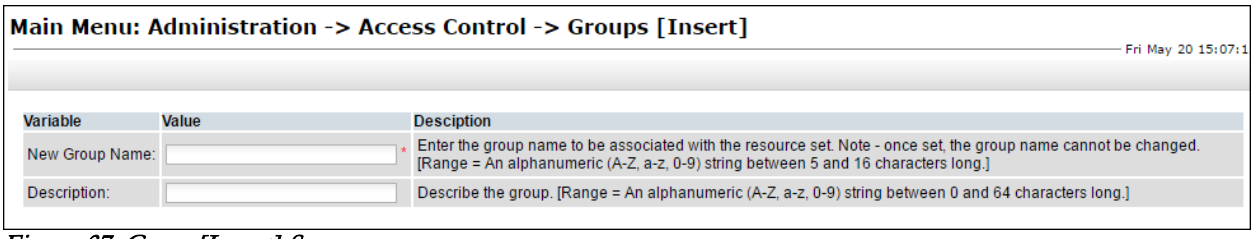


Figure 37: Group[Insert] Screen

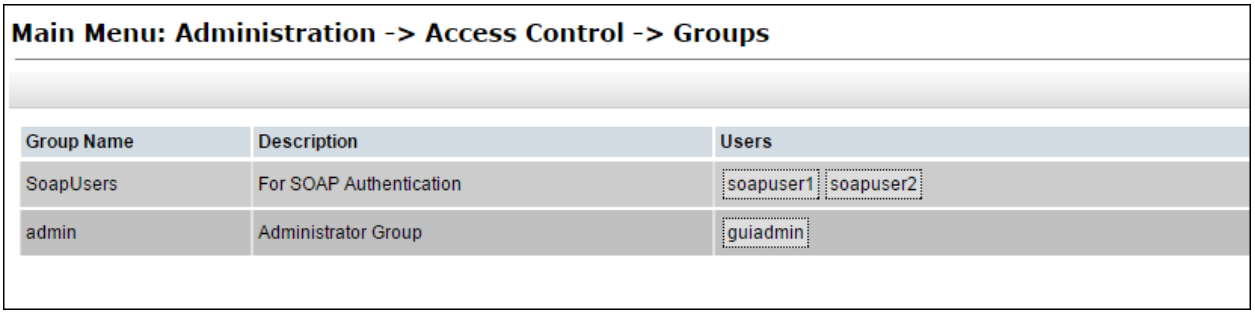


Figure 38. Group Screen

- The username needs to be a lowercase alphanumeric (a-z,0-9) string between 5 and 16 characters long.

- When creating the user, it's recommended to give "MMI Access" only, otherwise a user can login with the SOAP credentials.
- Unchecking "Allow GUI Access" while inserting the user will prevent SOAP user credentials used for logging into the GUI

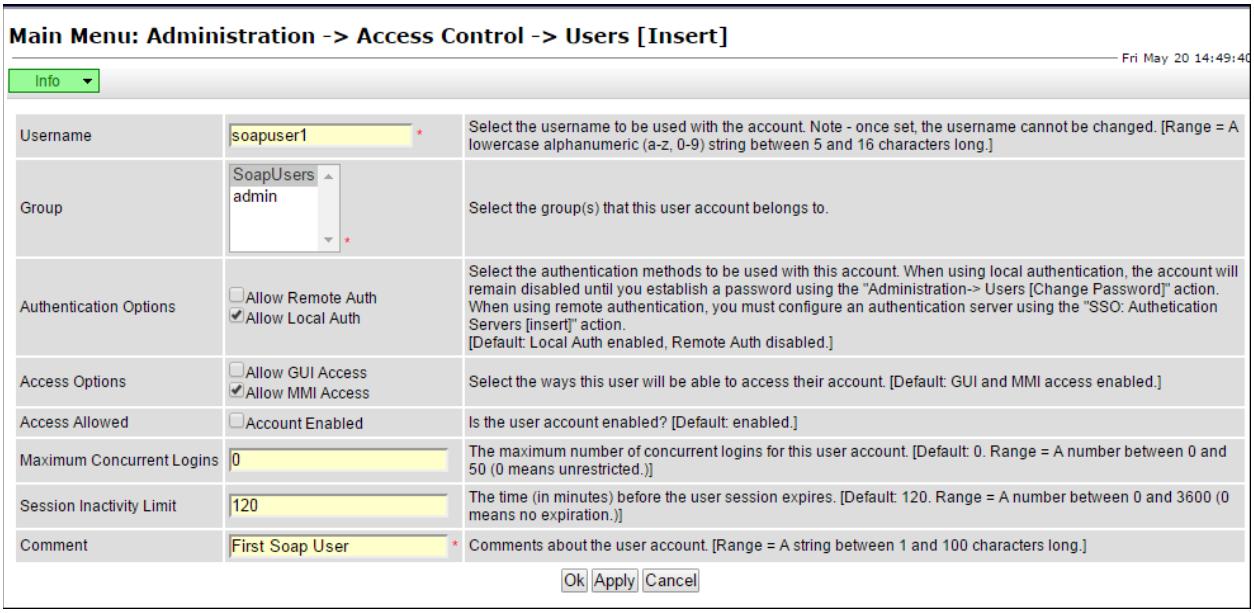


Figure 39: Creating Username

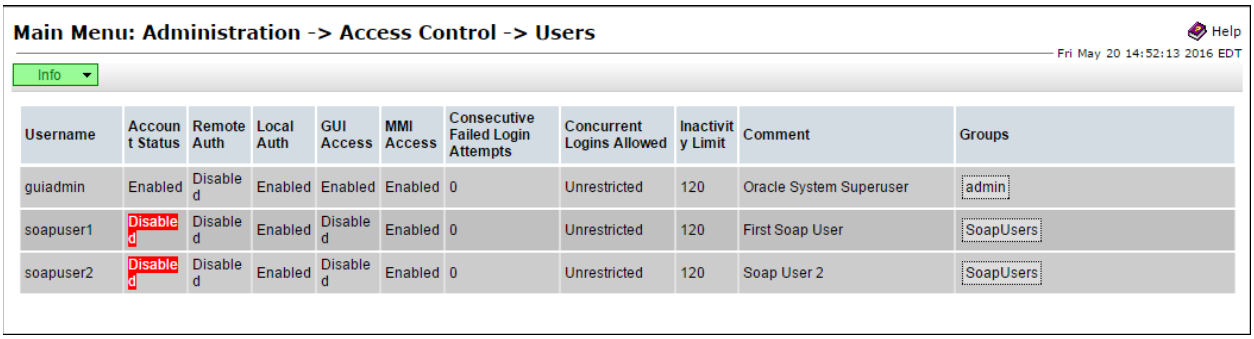
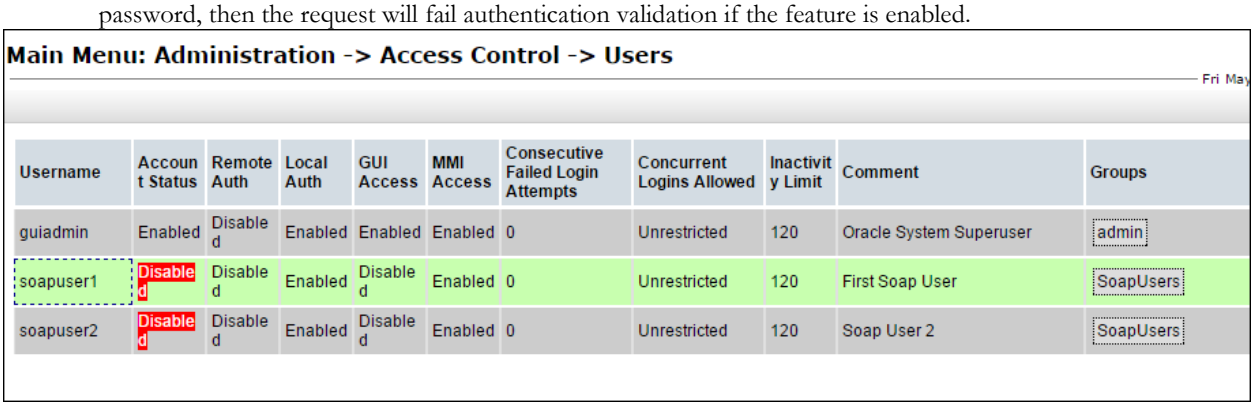


Figure 40: User Screen

To enter a SOAP Password, select the desired username and click "Change Password"

- The password needs to be between 8 and 16 characters.
- The password must contain 3 of these 4 types of characters: numeric, lowercase alpha, uppercase alpha, special character (!@#$%^&*?~).
- Passwords in the following table will expire every 90 days
- If the password were to expire in the User table and the SOAP request is not updated to reflect the new password, then the request will fail authentication validation if the feature is enabled.



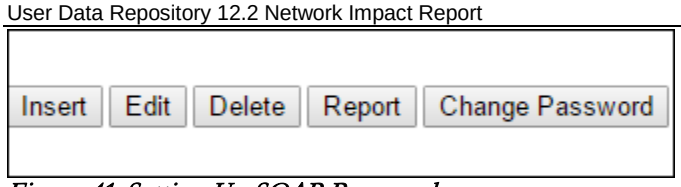


Figure 41: Setting Up SOAP Password

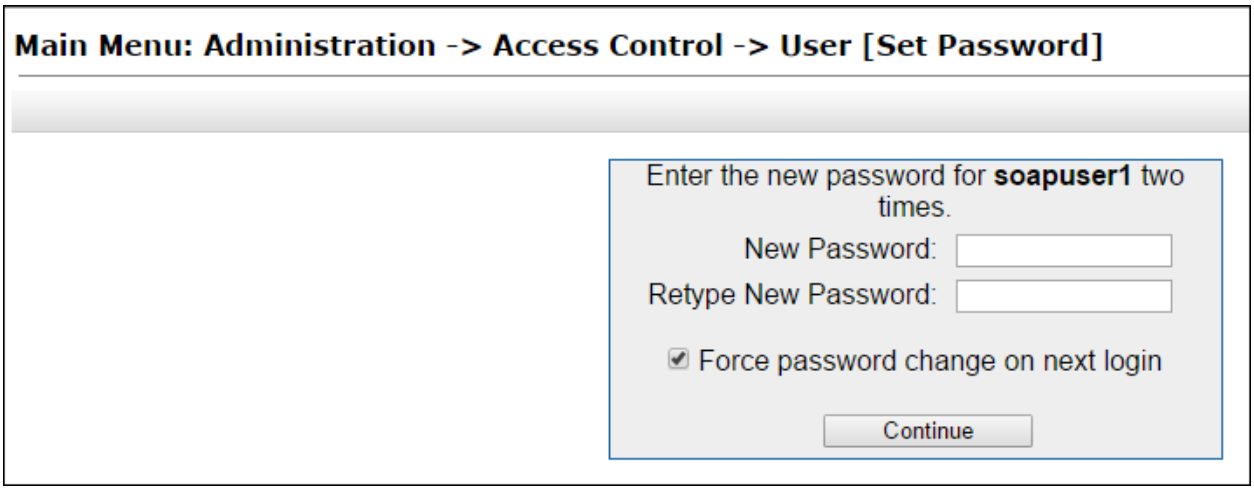


Figure 42: Entering the Password

Note:

- Permissions to be set for the feature are Subscriber Query and Provisioning and/or Create Profile/Add Entity. Whether the permissions are checked or not has no impact on this feature, authentication will be performed regardless.
- This feature is simply using the "User" table as a repository for the usernames/passwords, it is not the intent to use these as GUI login
- SOAP Authentication failure will not cause an account to become disabled or locked out

3.4.2 Provisioning Command Log Screen

The Provisioning Command Log screen is updated to capture the username associated with each SOAP request without displaying the password when SOAP Username/Password authentication feature is enabled. The text "SOAP Username = <username>, "will be appended to the beginning of the received message as shown below:

Figure 43: Update to Command Log Screen

The following is the output that is displayed with Command Log Export:

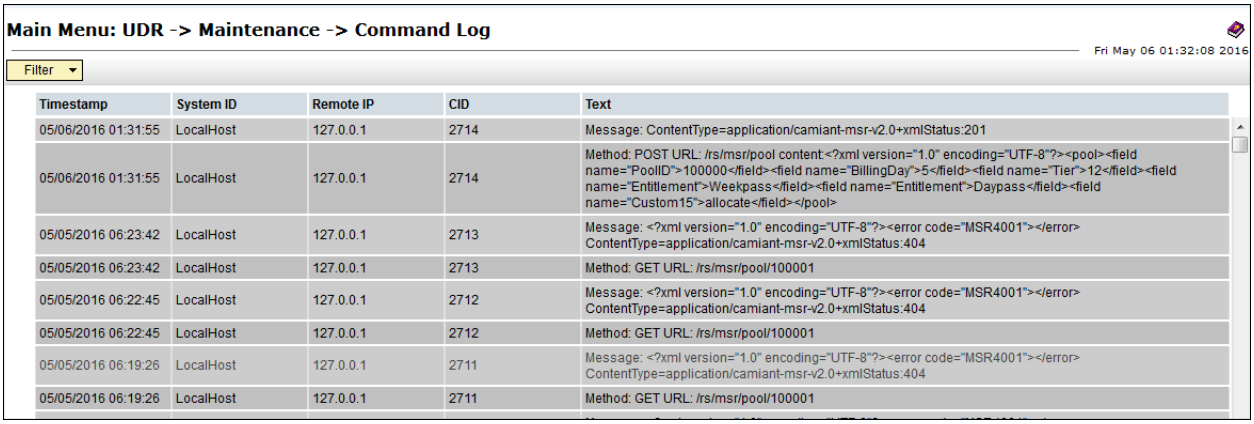
Timestam	Remote IF	CID	Text
2016/13/0	10.250.54.	1831	SOAP Username=user1,<req name="delete" resonly="n"><ent name="subscriber" ns="policy"/><where><expr><attr name="MSISDN"></attr><op value="="></op><value val="7
2016/13/0	10.250.54.	1831	<![CDATA[<?xml version="1.0" encoding="UTF-8"?><req name="delete" resonly="n"><ent name="subscriber" ns="policy"/><where><expr><attr name="MSISDN"/><op value="=
2016/13/0	10.250.54.	1832	<req name="insert" resonly="n"><ent name="subscriber" ns="policy"/><set><expr><attr name="MSISDN"/><value val="7000000001"/></expr><expr><attr name="BillingDay"/><
2016/13/0	10.250.54.	1832	<![CDATA[<?xml version="1.0" encoding="UTF-8"?><req name="insert" resonly="n"><ent name="subscriber" ns="policy"/><set><expr><attr name="MSISDN"/><value val="70000
2016/13/0	10.250.54.	1832	<req name="insert" resonly="n"><ent name="subscriber" ns="policy"/><set><expr><attr name="QuotaEntity"/><op value="="/><cdata><![CDATA[<?xml version="1.0" encoding=
2016/13/0	10.250.54.	1832	<![CDATA[<?xml version="1.0" encoding="UTF-8"?><req name="insert" resonly="n"><ent name="subscriber" ns="policy"/><set><expr><attr name="QuotaEntity"/><op value="=
2016/13/0	10.250.54.	1833	SOAP Username=user1,<req name="select" resonly="n"><ent name="subscriber" ns="policy"/><select><expr><attr name="MSISDN"/></expr><expr><attr name="Quota"/></exp
2016/13/0	10.250.54.	1833	<![CDATA[<?xml version="1.0" encoding="UTF-8"?><req name="select" resonly="n"><ent name="subscriber" ns="policy"/><select><expr><attr name="MSISDN"/></expr><expr>
2016/13/0	10.250.54.	1834	<req name="update" id="9035" resonly="n"><ent name="subscriber" ns="policy"/><set><expr><attr name="billingDay"/><op value="="></op><value val="23"></value></expr><
2016/13/0	10.250.54.	1834	<![CDATA[<?xml version="1.0" encoding="UTF-8"?><req name="update" id="9035" resonly="n"><ent name="subscriber" ns="policy"/><set><expr><attr name="billingDay"/><op
2016/13/0	10.250.54.	1835	<req name="delete" resonly="n"><ent name="subscriber" ns="policy"/><where><expr><attr name="MSISDN"></attr><op value="="></op><value val="7000000001"></value></e
2016/13/0	10.250.54.	1835	<![CDATA[<?xml version="1.0" encoding="UTF-8"?><req name="delete" resonly="n"><ent name="subscriber" ns="policy"/><where><expr><attr name="MSISDN"/><op value="=
2016/13/0	10.250.54.	1836	<req name="insert" id="1000" resonly="n"><ent name="subscriber" ns="policy"/><set><expr><attr name="MSISDN"/><value val="7000000001"/></expr><expr><attr name="Billi
2016/13/0	10.250.54.	1836	<![CDATA[<?xml version="1.0" encoding="UTF-8"?><req name="insert" id="1000" resonly="n"><ent name="subscriber" ns="policy"/><set><expr><attr name="MSISDN"/><value

Figure 44: Command Log Export Example

3.4.3 GUI Support for Create/Update/Delete Subscriber and Pool Data

3.4.3.1 Provisioning Command Log

The provisioning command log will indicate that the request is received via GUI by the System ID.



Timestamp	System ID	Remote IP	CID	Text
05/06/2016 01:31:55	LocalHost	127.0.0.1	2714	Message: ContentType=application/camiant-msr-v2.0+xmlStatus:201
05/06/2016 01:31:55	LocalHost	127.0.0.1	2714	Method: POST URL: /rs/msr/pool content:<?xml version="1.0" encoding="UTF-8"?><pool><field name="PoolID">100000</field><field name="BillingDay">5</field><field name="Tier">12</field><field name="Entitlement">Weekpass</field><field name="Entitlement">Daypass</field><field name="Custom15">allocate</field></pool>
05/05/2016 06:23:42	LocalHost	127.0.0.1	2713	Message: <?xml version="1.0" encoding="UTF-8"?><error code="MSR4001"></error> ContentType=application/camiant-msr-v2.0+xmlStatus:404
05/05/2016 06:23:42	LocalHost	127.0.0.1	2713	Method: GET URL: /rs/msr/pool/100001
05/05/2016 06:22:45	LocalHost	127.0.0.1	2712	Message: <?xml version="1.0" encoding="UTF-8"?><error code="MSR4001"></error> ContentType=application/camiant-msr-v2.0+xmlStatus:404
05/05/2016 06:22:45	LocalHost	127.0.0.1	2712	Method: GET URL: /rs/msr/pool/100001
05/05/2016 06:19:26	LocalHost	127.0.0.1	2711	Message: <?xml version="1.0" encoding="UTF-8"?><error code="MSR4001"></error> ContentType=application/camiant-msr-v2.0+xmlStatus:404
05/05/2016 06:19:26	LocalHost	127.0.0.1	2711	Method: GET URL: /rs/msr/pool/100001

Figure 45: Command Log Screen

3.4.3.2 Subscriber Query and Provisioning

The Subscriber Query and Provisioning GUI screen expands the Subscriber Query GUI to be able to Create, Retrieve, Update and Delete subscriber and pool profile along with associated entity data.

The database statistics are always displayed and are refreshed whenever the screen is refreshed or any button (*Retrieve, Update, Delete*) is pressed.

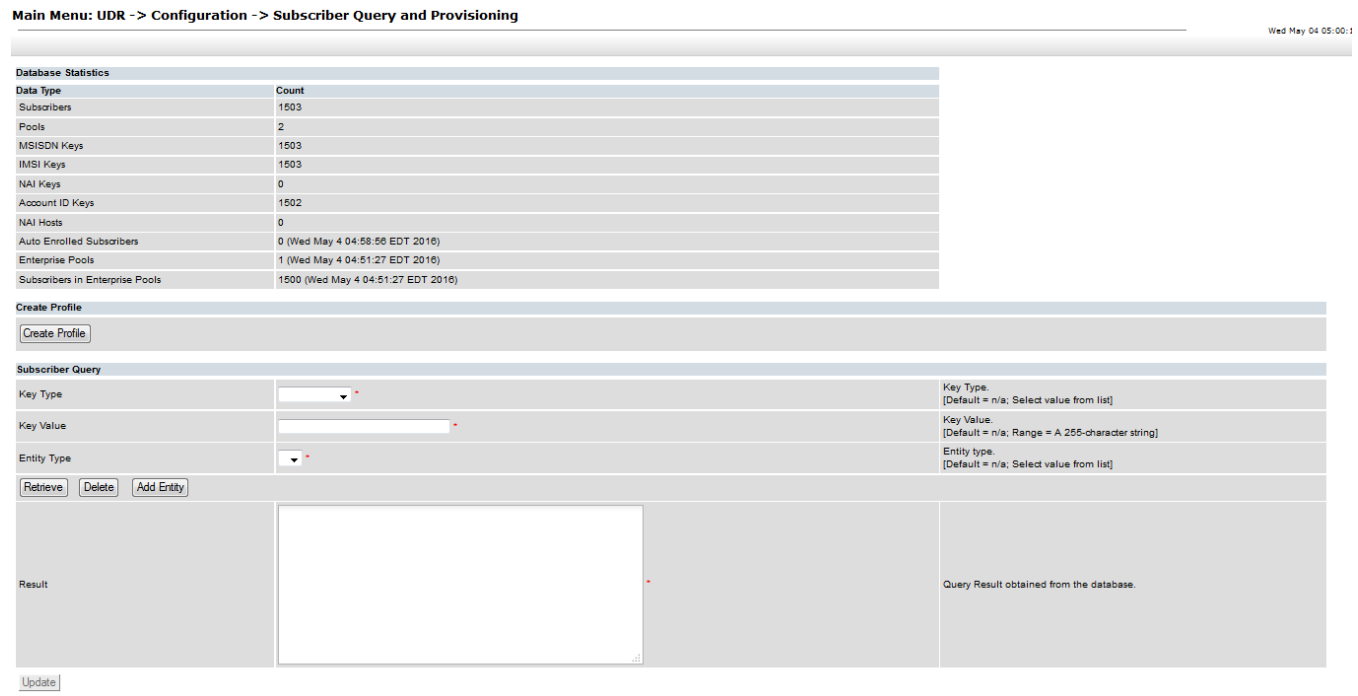


Figure 46: Subscriber Query and Provisioning

3.4.3.2.1 Retrieve Subscriber/Pool Data

The screen in R12.2 is updated to include the Create, Update and Delete operation along with Retrieve (Subscriber Query).

Submit button is renamed to "Retrieve" in existing Subscriber Query GUI.

Existing Subscriber Query GUI is moved to UDR->Configuration from UDR->Maintenance and renamed as Subscriber Query and Provisioning.

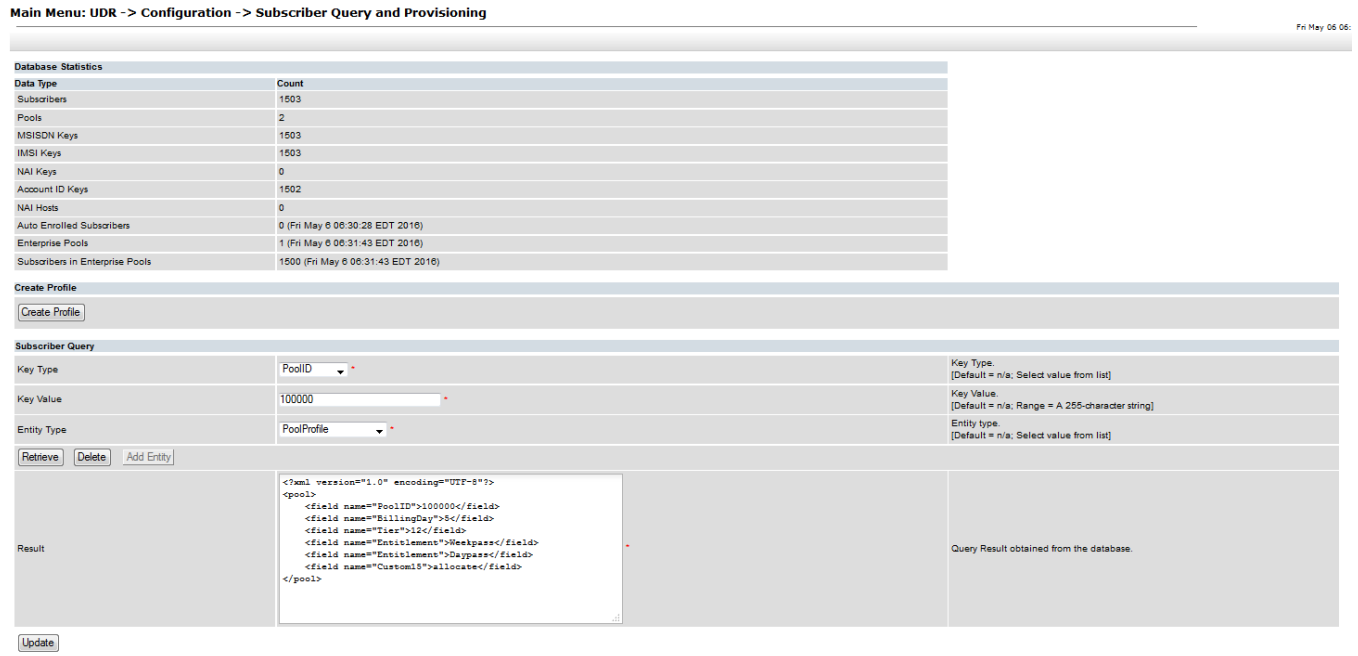


Figure 47: Retrieve Subscriber/Pool Data

Table 24: Retrieve Subscriber/Pool Data

Purpose	Display database statistics and Subscriber Information after query attributes are entered and submitted.
Required Permissions	*UDR Configuration Permissions* → *Subscriber Query and Provisioning* permissions group that is defined on the *Main Menu: Administration* → *Access Control* → *Groups* GUI screen **Note:** View permission allows retrieving subscriber/pool data.
Tooltips	• "Key Type" (Key Type (IMSI, MSISDN, NAI, Account Id or PoolID)) • "Key Value" (Key Value – a 255 character string) • "Entity Type" (Entity Type (DynamicQuota, Profile, Quota, State, Pool Information, PoolDynamicQuota, PoolProfile, PoolQuota, PoolState)) • "Result" (Subscriber Query Information)
Nuances	• The Database Statistics section contains counts for number of records in the UDR database for each of the listed data types. These numbers are updated every time the screen is refreshed or the *Retrieve* button is pressed. • The "Subscribers" count indicates the total number of provisioned and auto-enrolled subscribers. • The "*Auto Enrolled Subscribers*" count indicates the total number of auto-enrolled subscribers only. **The value displayed on the screen could be calculated over the past 24 hours. The date and time when the value was last calculated is displayed on the screen.** • The Result section contains subscriber information that are extracted after query attributes are entered and the *Retrieve* button is pressed. • The "Entity Type" available values are based upon the current "Key Type" value. If the "Entity Type" value is "PoolID", the "Entity Type" legal values are: PoolDynamicQuota, PoolProfile, PoolQuota and PoolState. If the "Entity Type" value is not "PoolID", the "Entity Type" legal values are: DynamicQuota, Profile, Quota, State, and Pool Information.
Security Log Entries	Successful Query Failure Query
Error/Status Message Trigger Condition	*[Error Code 13131] – Bad Request* Occurs when the key value doesn't go with the key type (example putting a character when a digit is expected)
Error/Status Message Trigger Condition	*[Error Code 13132] – Data not found* Requested subscriber data does not exist (If the query doesn't detect a Subscriber Record)
Error/Status Message Trigger Condition	*[Error Code 13134] – [x]* The "x" here denotes any runtime error message that came up.

3.4.3.2.2 Create Profile / Add Entity

Create Profile/Add Entity screen creates subscriber and pool profile along with associated entity data.

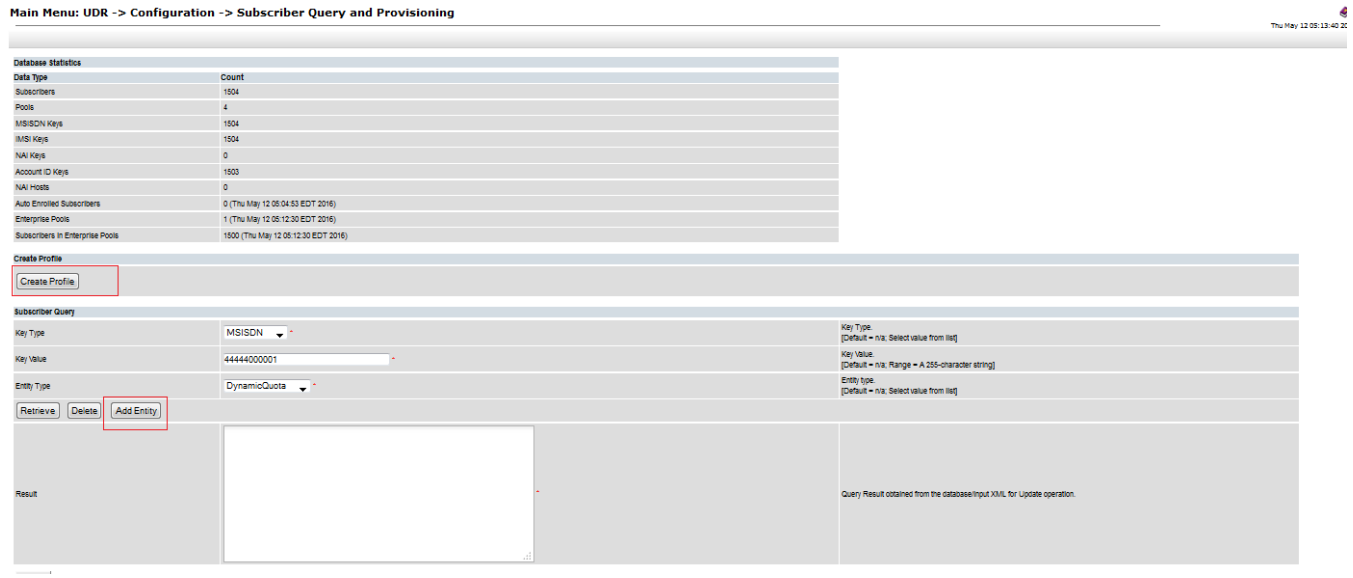


Figure 48: Create Profile / Add Entity

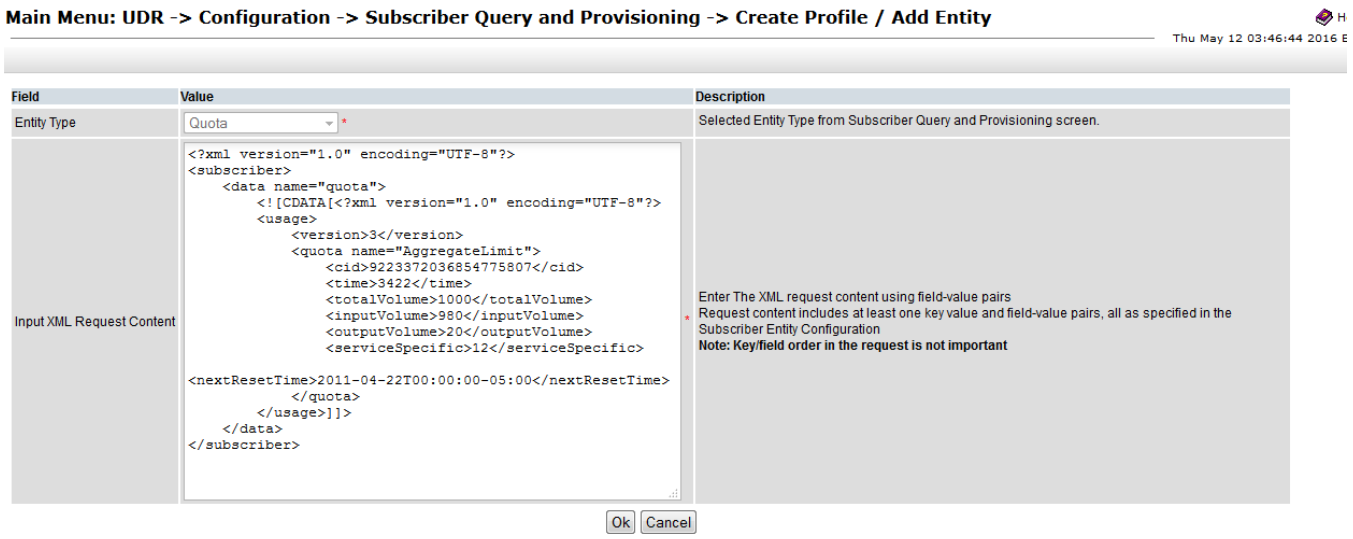


Figure 49: Subscriber Query and Provisioning->Create Profile / Add Entity

Table 25: Create Profile/Add Entity

Purpose	Displays database statistics and allow an operator to create subscriber and pool profile as well as associated entity data identified by entered attributes (Key Type, Key value, Entity Type)
Required Permissions	*UDR Configuration Permissions* → *Subscriber Query and Provisioning* permissions group that is defined on the *Main Menu: Administration* → *Access Control* → *Groups* GUI screen **Note**: Insert permission allows "Create profile" and "Add Entity"
Tooltips	**Create Profile:** • "Select Type" (Select Type (Subscriber Profile or Pool Profile)) • Input XML Request Content" (Input XML request content) **Add Entity :** • "Key Type" (Key Type (IMSI, MSISDN, NAI, Account Id or PoolID)) • "Key Value" (Key Value – a 255 character string) • "Entity Type" (Entity Type (DynamicQuota, Profile, Quota, State, Pool Information, PoolDynamicQuota, PoolProfile, PoolQuota, PoolState)) • "Input XML Request Content" (Input XML request content)

Nuances	• The Database Statistics section contains counts for number of records in the UDR database for each of the listed data types. These numbers are updated every time that the screen is refreshed or the *OK* button is pressed. • The "Subscribers" count indicates the total number of provisioned and auto-enrolled subscribers. **Create Profile:** • XML template is loaded based on profile type selected in "Select Type" • Enter valid values in the XML template loaded in the "Input Request XML content" textarea. • Clicking OK will create the selected subscriber or pool profile and display the successful/error message on GUI screen. • Clicking Cancel will redirect to Subscriber Query and Provisioning GUI page. **Add Entity :** • *Add Entity* button is disabled if selected "Entity Type" is Pool Information, Profile or Pool profile. • XML template is loaded on Create Profile/Add Entity GUI page based on entered "Key Type", "Key Value" and "Entity Type" on Subscriber Query and Provisioning GUI page. • Enter valid values in the XML template loaded in the "Input Request XML content" text area. • Clicking OK will add the selected entity and display the successful/error message on GUI screen. • Clicking Cancel will redirect to Subscriber Query and Provisioning GUI page.
Security Log Entries	Successful Insert Failed Insert
Error/Status Message Trigger Condition	*[Error Code 13167] – Subscriber field is not defined.* Occurs when fields in the XML request are not valid field name for subscriber
Error/Status Message Trigger Condition	*[Error Code 13168] – Insufficient storage.* Occurs when free system memory is low, and the database cannot store any new data
Error/Status Message Trigger Condition	*[Error Code 13169] – Pool field is not defined.* Occurs when fields in the XML request are not valid field name for pool
Error/Status Message Trigger Condition	*[Error Code 13172] – Invalid Request [x].* Occurs when RAS could not update requested "Entity Type" "x" denotes error message from RAS eg: • Invalid content request data supplied • A key is detected to be already in the system for another subscriber • The field list does not contain at least one unique key • Could not find the subscriber by key • Occurrence constraint violation • A key is detected to be already in the system for another pool • Field is not defined for this data type • Subscriber is not found • Pool is not found.
Error/Status Message Trigger Condition	*[Error Code 13170] – Field Data type is not defined* Occurs when data type is not defined
Error/Status Message Trigger Condition	*[Error Code 13134] – [x]* The "x" here denotes any runtime error message that came up.

3.4.3.2.3 Update Subscriber/Pool Data

Update Subscriber/Pool data updates the existing subscriber and pool profile along with associated entity data.

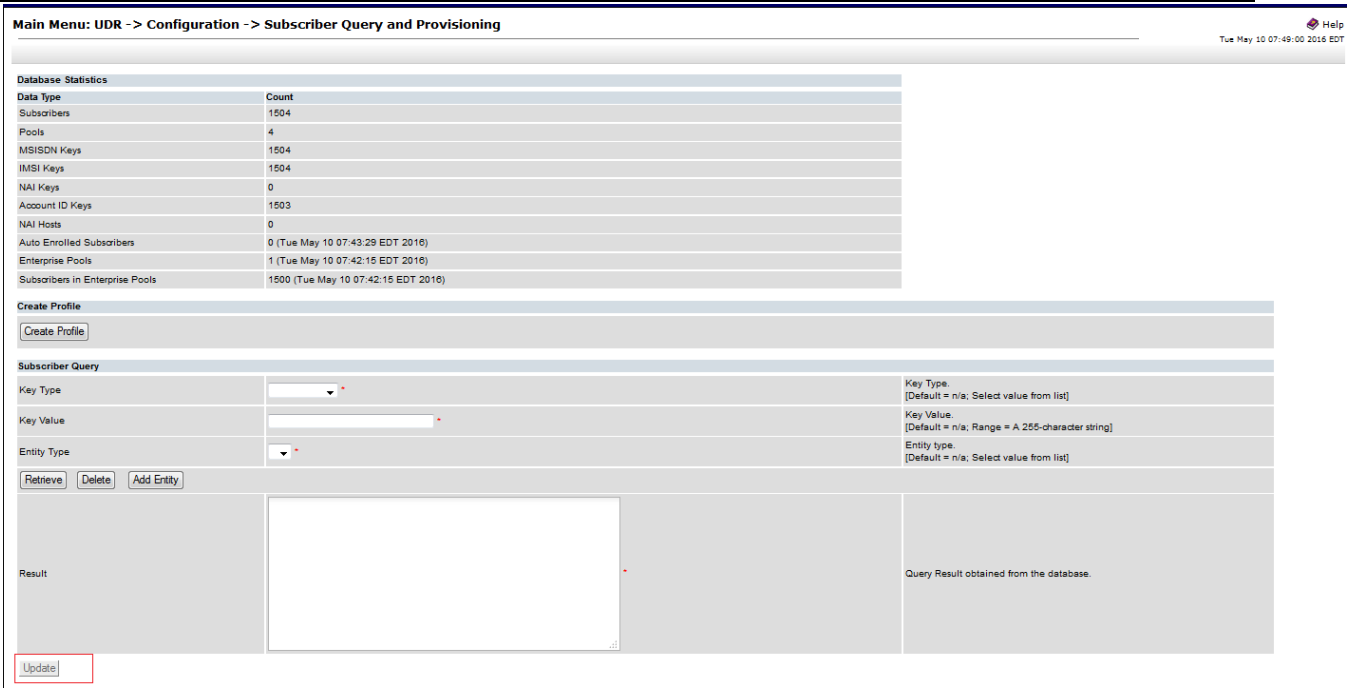


Figure 50: Update Subscriber/Pool Data (before Retrieve operation)

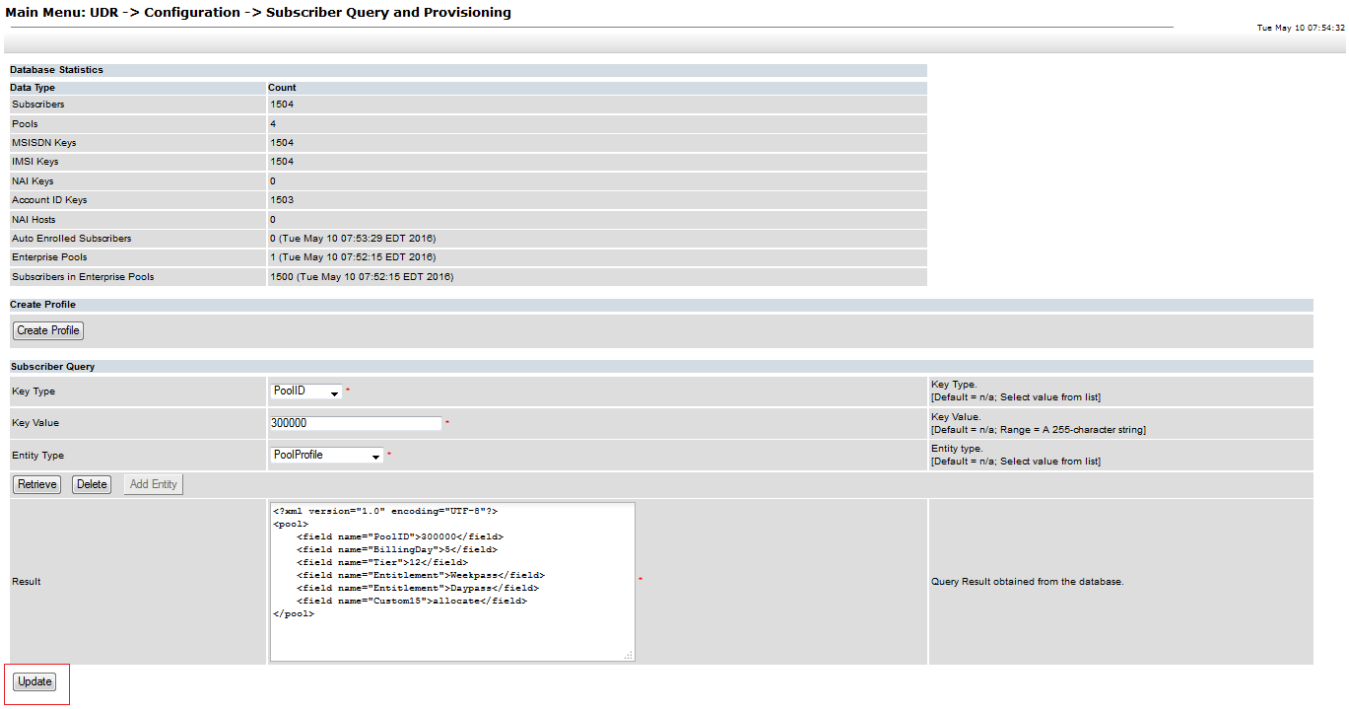


Figure 51: Update Subscriber/Pool Data (after Retrieve operation)

Table 26: Update Subscriber/Pool Data

Purpose	Displays database statistics and allow an operator to update an existing subscriber and pool profile as well as associated entity data identified by entered attributes (Key Type, Key value, Entity Type)

Required Permissions	*UDR Configuration Permissions* → *Subscriber Query and Provisioning* permissions group that is defined on the *Main Menu: Administration* → *Access Control* → *Groups* GUI screen **Note**: Edit permission allows updating subscriber/pool data.
Tooltips	• "Key Type" (Key Type (IMSI, MSISDN, NAI, Account Id or PoolID)) • "Key Value" (Key Value – a 255 character string) • "Entity Type" (Entity Type (DynamicQuota, Profile, Quota, State, Pool Information, PoolDynamicQuota, PoolProfile, PoolQuota, PoolState)) • "Result" (Displays retrieved information and allows input XML to be updated)
Nuances	• The Database Statistics section contains counts for number of records in the UDR database for each of the listed data types. These numbers are updated every time that the screen is refreshed or the *Update* button is pressed. • The "Subscribers" count indicates the total number of provisioned and auto-enrolled subscribers. • The update button is disabled until a Retrieve operation is successful. • *Update* button is disabled if selected "Entity Type" is Pool Information • Update will fail if entered "Key value" and XML key field does not match. • Clicking *Update* button will update the selected "Entity Type" and displays the successful/error message on GUI screen
Security Log Entries	Successful Edit Failed Edit
Error/Status Message Trigger Condition	*[Error Code 13104] – Missing required field [x].* The value specified for "Key Type", "Key Value", "Entity Type" or "Result" is missing.
Error/Status Message Trigger Condition	*[Error Code 13168] – Insufficient storage.* Occurs when free system memory is low, and the database cannot store any new data
Error/Status Message Trigger Condition	*[Error Code 13172] – Invalid Request [x].* Occurs when RAS could not update requested "Entity Type" "x" denotes error message from RAS eg: • Invalid content request data supplied • Subscriber field is not defined • A key is detected to be already in the system for another subscriber • The field list does not contain at least one unique key • Could not find the subscriber by key • The PoolID supplied in URL and request content do not match • Invalid value for a field, Occurrence constraint violation • Pool field is not defined • Could not find the pool by poolID • Field is not defined for this data type • Subscriber is not found.
Error/Status Message Trigger Condition	*[Error Code 13134] – [x]* The "x" here denotes any runtime error message that came up.

3.4.3.2.4 Delete Subscriber/Pool Data

Delete Subscriber/Pool data deletes the existing subscriber and pool profile along with associated entity data.

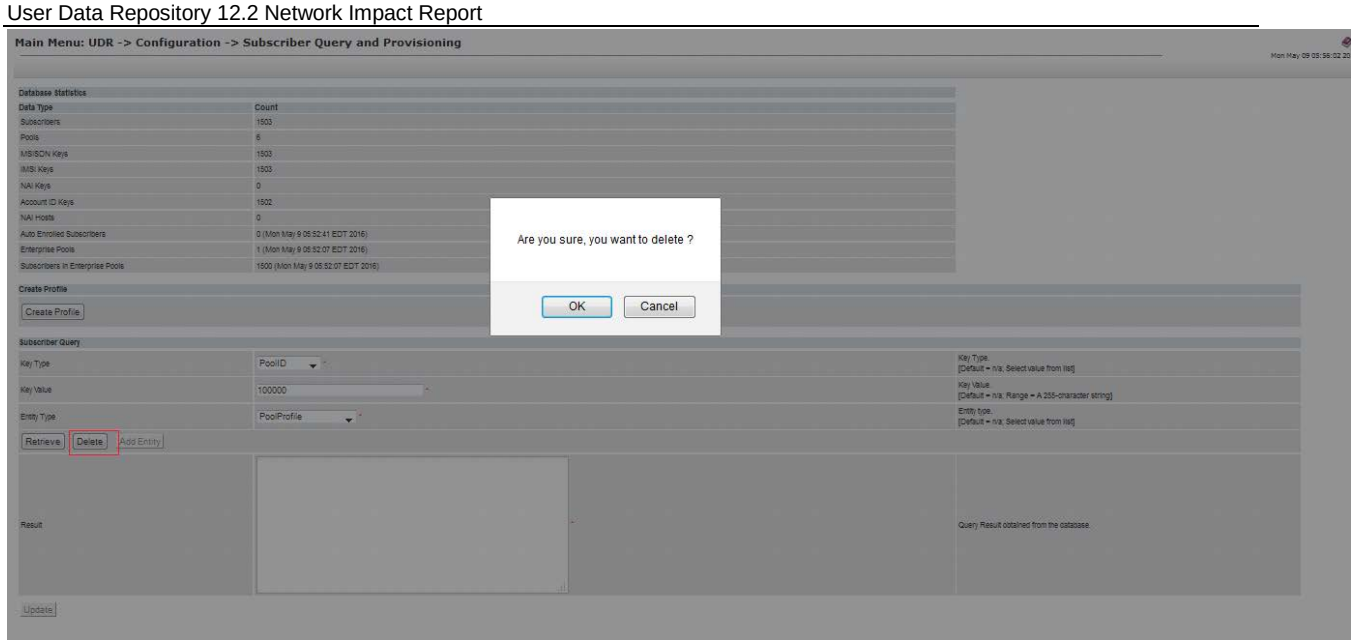


Figure 52: Delete Subscriber/Pool Data

Table 27: Delete Subscriber/Pool Data

Purpose	Displays database statistics and allow an operator to delete an existing subscriber and pool profile as well as associated entity data identified by entered attributes (Key Type, Key value, Entity Type)
Required Permissions	*UDR Configuration Permissions* → *Subscriber Query and Provisioning* permissions group that is defined on the *Main Menu: Administration* → *Access Control* → *Groups* GUI screen Note: Delete = Delete
Tooltips	• "Key Type" (Key Type (IMSI, MSISDN, NAI, Account Id or PoolID)) • "Key Value" (Key Value – a 255 character string) • "Entity Type" (Entity Type (DynamicQuota, Profile, Quota, State, Pool Information, PoolDynamicQuota, PoolProfile, PoolQuota, PoolState))
Nuances	• The Database Statistics section contains counts for number of records in the UDR database for each of the listed data types. These numbers are updated every time that the screen is refreshed or the *Delete* button is pressed. • The "Subscribers" count indicates the total number of provisioned and auto-enrolled subscribers. • The *Delete* button is disabled if selected "Entity Type" is Pool Information. • Clicking OK will delete the selected "Entity Type" and displays the successful/error message on GUI screen. • Clicking Cancel will hide the popup.
Security Log Entries	Delete Successful Delete Failed
Error/Status Message Trigger Condition	*[Error Code 13171] – Delete Failed [x]* Occurs when RAS could not delete requested "Entity Type" "x" denotes error message from RAS eg: • Could not find the subscriber by key • Cannot delete subscriber belongs to a pool • Subscriber is not found • Data type is not defined • Could not find the pool by PoolID • The pool could not be deleted as it has member subscribers • Pool is not found

Error/Status Message Trigger Condition	*[Error Code 13134] – [x]* The "x" here denotes any runtime error message that came up.

3.4.4 Delay PNR Notification after Subscriber Profile Update

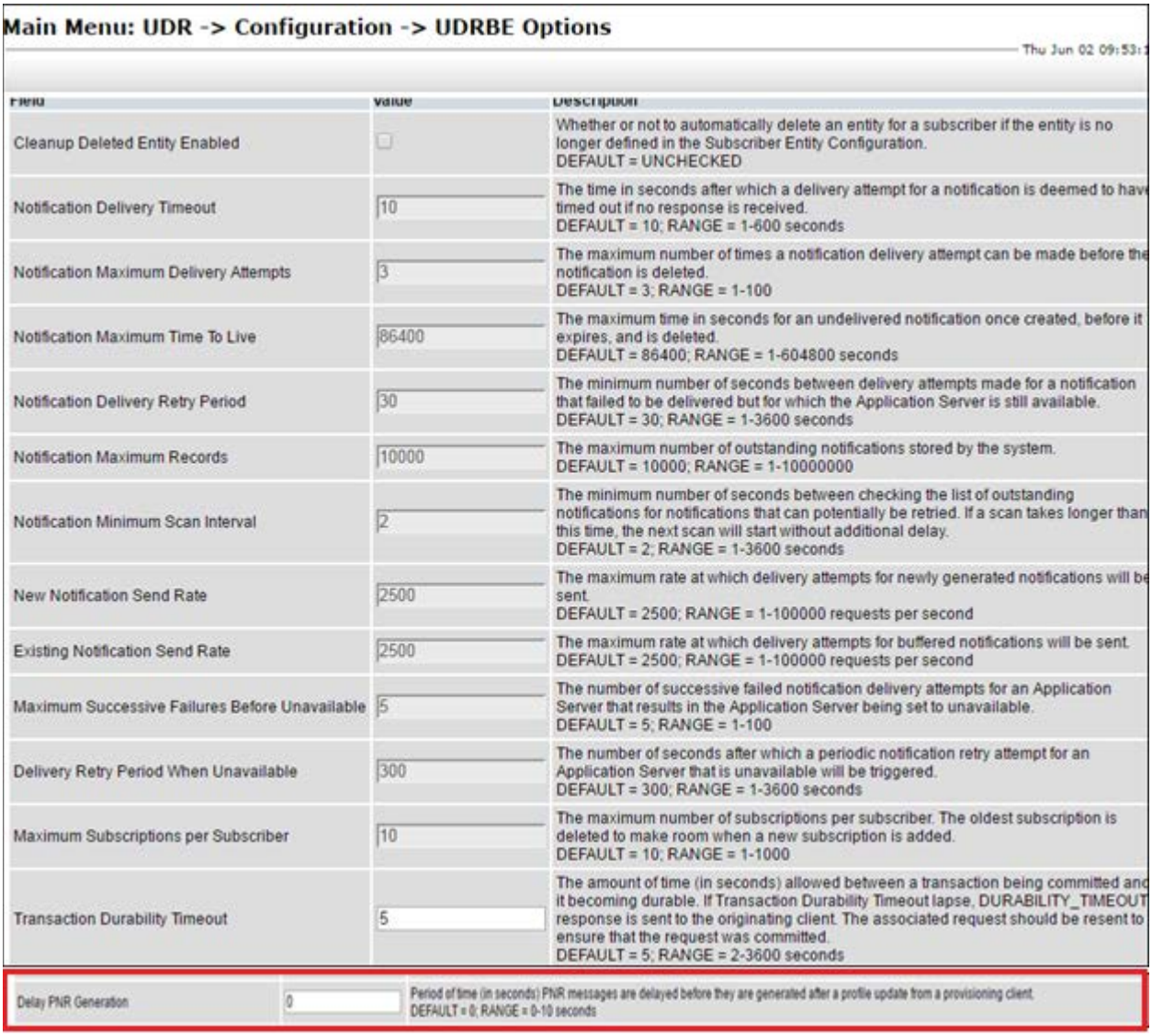


Figure 53: Update to UDRBE Options Screen

Table 28: Delay PNR Notification after Subscriber Profile Update

Error/Status Message Trigger Condition	*[Error Code 13101] –* The option [Delay PNR Generation] requires a value containing only digits.
Error/Status Message Trigger Condition	*[Error Code 13102] –* The option [Delay PNR Generation] requires a minimum value of [0].
Error/Status Message Trigger Condition	*[Error Code 13103] –* The option [Delay PNR Generation] requires a maximum value of [10].

3.5 Ud Client

3.5.1 Ud Client Options

The Ud Client Options screen is added to configure the Ud Client feature. The Ud Client Options display screen is used to configure values for the options and apply or cancel the changes.

Ud Client Options control how the Ud Client will work. The GUI is used to specify values for various global parameters that guide the behavior of the Ud Client. Unless noted, any changes to options take effect immediately.

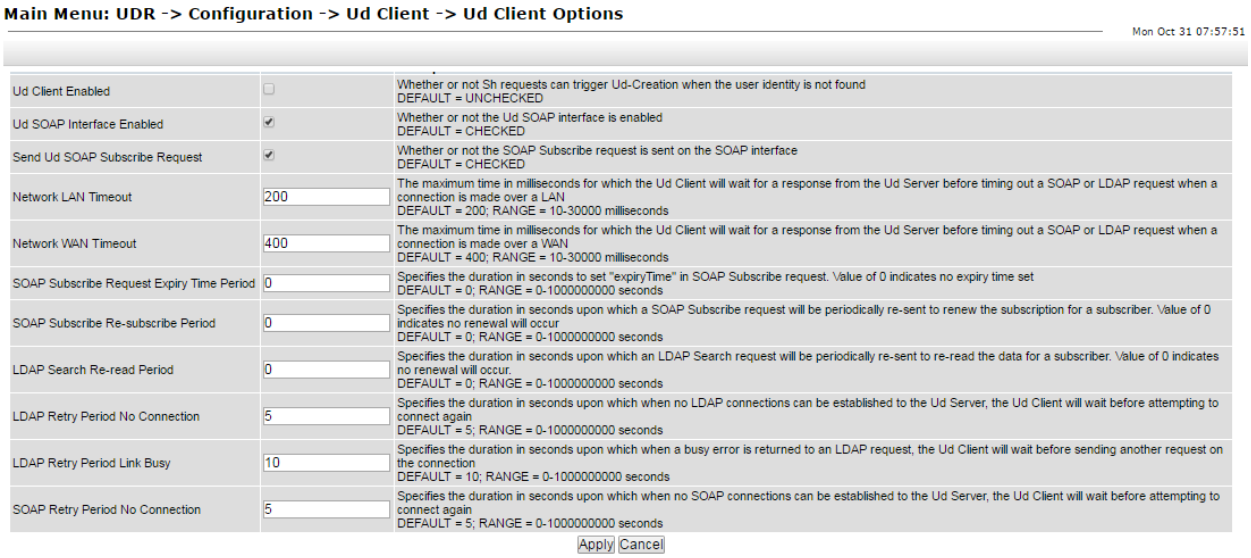


Figure 54. Ud Client Options

Table 29. Ud Client Options

Purpose	To allow an operator to update Ud Client options.
Required Permissions	*UDR Configuration Permissions* → Ud Client Options permissions group that is defined on the *Main Menu: Administration* → *Access Control* → *Groups* GUI screen

Tooltips	"Ud Client Enabled" (Whether or not Sh requests can trigger Ud-Creation when the user identity is not found. Default value: Unchecked) "Ud SOAP Interface Enabled" (Whether or not the Ud SOAP Interface is enabled. Default value: Checked) "Send Ud SOAP Subscribe Request" (Whether or not a the SOAP Subscribe request is sent on the SOAP Interface. Default value: Checked) "Network LAN Timeout" (The maximum time in milliseconds for which the Ud Client will wait for a response from the Ud Server before timing out a SOAP or LDAP request when a connection is made over a LAN. Default value: 200) "Network WAN Timeout" (The maximum time in milliseconds for which the Ud Client will wait for a response from the Ud Server before timing out a SOAP or LDAP request when a connection is made over a WAN. Default value: 400) "SOAP Subscribe Request Expiry Time Period" (Specifies the duration in seconds to set "expiryTime" in SOAP Subscribe request. Value of 0 indicates no expiry time set. Default value: 0) "SOAP Subscribe Re-subscribe Period" (Specifies the duration in seconds upon which a SOAP Subscribe request will be periodically re-sent to renew the subscription for a subscriber. Value of 0 indicates no renewal will occur. Default value: 0) "LDAP Search Re-read Period" (Specifies the duration in seconds upon which an LDAP Search request will be periodically re-sent to re-read the data for a subscriber. Value of 0 indicates no renewal will occur. Default value: 0) "LDAP Retry Period No Connection" (Specifies the duration in seconds upon which when no LDAP connections can be established to the Ud Server, the Ud Client will wait before attempting to connect again. Default value: 5) "LDAP Retry Period Link Busy" (Specifies the duration in seconds upon which when a busy error is returned to an LDAP request the Ud Client will wait before sending another request on the connection. Default value: 10) "SOAP Retry Period No Connection" (Specifies the duration in seconds upon which when no SOAP connections can be established to the Ud Server, the Ud Client will wait before attempting to connect again. Default value: 5)
Nuances	The Apply button is disabled until a value is modified.
Security Log Entries	Successful Update Failed Update
Error/Status Message Trigger Condition	*[Error Code 13101] – The option 'x' requires a value containing only digits.* The value specified for option x requires an integer value.
Error/Status Message Trigger Condition	*[Error Code 13102] – The option 'x' requires a minimum value of y.* The value specified for option x is less than y.
Error/Status Message Trigger Condition	*[Error Code 13103] – The option 'x' requires a maximum value of y.* The value specified for option x is greater than y.
Error/Status Message Trigger Condition	*Update successful.* The options were updated successfully.

3.5.2 Ud Remote Server Configuration

The Ud Remote Server Configuration screen is added to configure the connection details of the Ud Server that UDR will use.

The screen allows up to 3 different connection end-point LDAP/SOAP pairs each for the remote Ud Server, but when the Ud Client feature is enabled, only the Primary Connection must be configured.

The setting of the connection WAN/LAN type affects which timeout is used for requests

If the remote Ud Server does not support SOAP and UDR is configured to not enable the SOAP Interface, then SOAP connections do not need to be configured.

Based on the setting of the LDAP Authentication Type, then the Authentication DN and/or Authentication Password may not need to be configured.

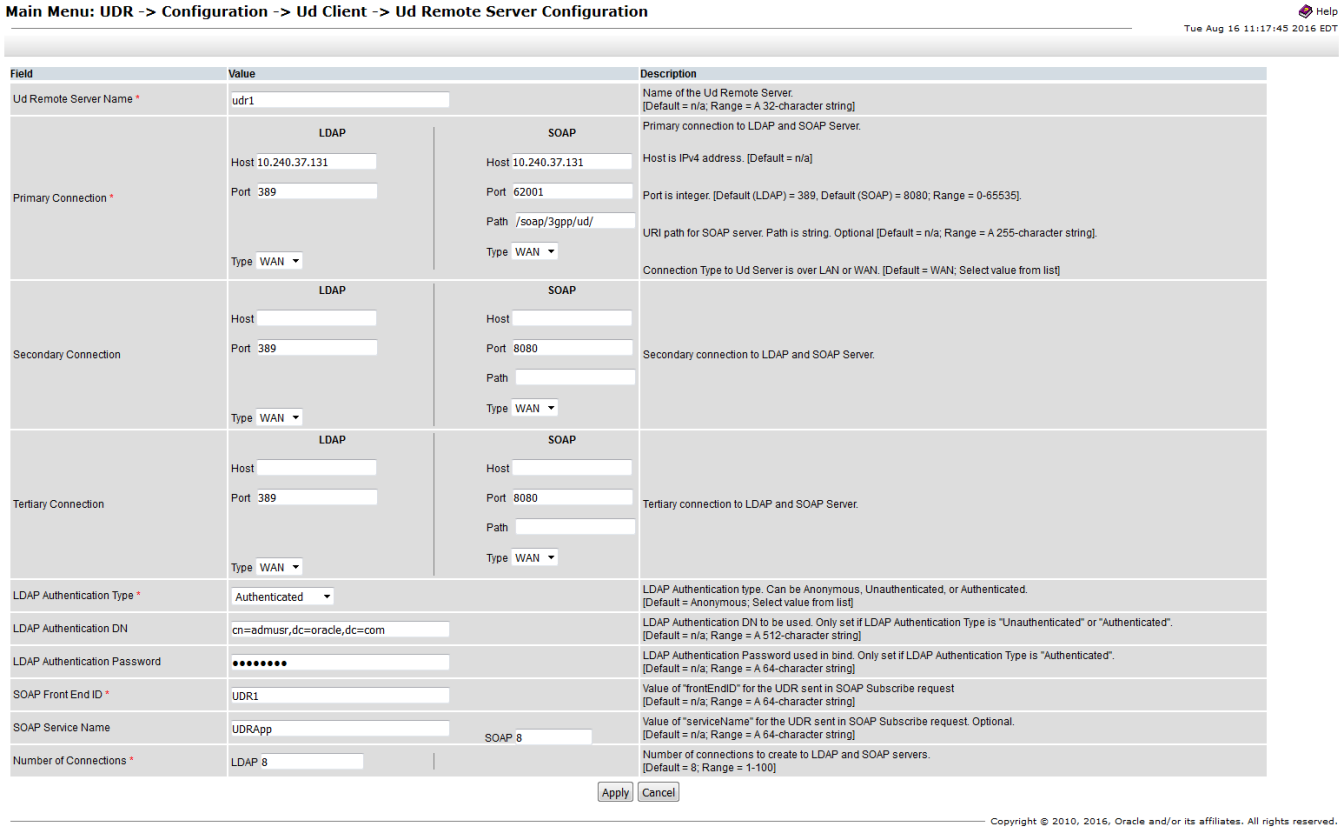


Figure 55. Ud Remote Server Configuration

Table 30. Ud Remote Server Configuration

Purpose	To allow an operator to update Ud Remote Server configuration data.
Required Permissions	*UDR Configuration Permissions* → Ud Remote Server Configuration permissions group that is defined on the *Main Menu: Administration* → *Access Control* → *Groups* GUI screen"
Tooltips	"Ud Remote Server Name" (Name of the Ud Remote Server) "Primary Connection" (Primary connection to LDAP and SOAP Server) • "Host" (Host is IPv4 address) • "Port" (Port is integer) • "Path" (URI path for SOAP server. Path is string. Optional) • "Type" (Connection Type to Ud Server is over LAN or WAN) "Secondary Connection" (Secondary connection to LDAP and SOAP Server) • (Contents as for "Primary Connection") "Tertiary Connection" (Tertiary connection to LDAP and SOAP Server) • (Contents as for "Primary Connection") "LDAP Authentication Type" (LDAP Authentication type. Can be Anonymous, Unauthenticated, or Authenticated) "LDAP Authentication DN" (LDAP Authentication DN to be used. Only set if LDAP Authentication Type is "Unauthenticated" or "Authenticated") "LDAP Authentication Password" (LDAP Authentication Password used in bind. Only set if LDAP Authentication Type is "Authenticated") "SOAP Front End ID" (Value of "frontEndID" for UDR sent in SOAP Subscribe request) "SOAP Service Name" (Value of "serviceName" for UDR sent in SOAP Subscribe request. Optional) "Number of Connections" (Number of connections to create to LDAP and SOAP servers)

Nuances	"Ud Remote Server Name" field will not accept more than 32 normal printable ASCII characters. "Host" is an IPv4 address in a valid format. "Port" for LDAP connections has a range of 0-65535, and will have a default value of 389. "Port" for SOAP connections has a range of 0-65535, and will have a default value of 8080. "Path" field will not accept more than 256 characters. "Path" field must allow all (and only) valid characters for an HTTP URI path string. "Type" drop-down for an LDAP or SOAP connection will have the following possible options - "WAN" or "LAN". Default will be "WAN". The "Secondary Connection" section will only become enabled if all mandatory fields for a "Primary Connection" have been entered. The "Tertiary Connection" section will only become enabled if all mandatory fields for a "Secondary Connection" have been entered. "LDAP Authentication Type" drop-down will have the following possible options - "Anonymous", "Unauthenticated" or "Authenticated". Default will be "Anonymous". • Only when this is set to "Unauthenticated" or "Authenticated", the "LDAP Authentication DN" field becomes enabled. • Only when this is set to "Authenticated", the "LDAP Authentication Password" field becomes enabled. "LDAP Authentication DN" field will not accept more than 512 characters. "LDAP Authentication DN" field must allow all (and only) valid characters for an LDAP DN string. "LDAP Authentication Password" field will not accept more than 64 characters. "LDAP Authentication Password" will be displayed as masked password text, although the characters will be visible as they are typed. "LDAP Authentication Password" field must allow all (and only) valid characters for an LDAP Password string. "SOAP Front End Id", and "SOAP Service Name" fields will not accept more than 64 normal printable ASCII characters. "Number of Connections" for LDAP has a range of 1-100, and will have a default value of 8. "Number of Connections" for SOAP has a range of 1-100, and will have a default value of 8. If a "Host", "Port", or "Path" is set in a SOAP "Primary Connection", "Secondary Connection", or "Tertiary Connection" section(s), then the following must be set : • Both "Host" and "Port" in each connection section(s) • "SOAP Front End Id" "Number of Connections" for SOAP
Security Log Entries	Successful Update Failed Update
Error/Status Message Trigger Condition	*[Error Code 13101] – The option 'x' requires a value containing only digits.* The value specified for option x requires an integer value.
Error/Status Message Trigger Condition	*[Error Code 13102] – The option 'x' requires a minimum value of y.* The value specified for option x is less than y.
Error/Status Message Trigger Condition	*[Error Code 13103] – The option 'x' requires a maximum value of y.* The value specified for option x is greater than y.
Error/Status Message Trigger Condition	*[Error Code 13104] – Missing required field 'x'.* The value specified for the "Ud Remote Server Name", "Host", "Port", "Path", "LDAP Authentication DN", "LDAP Authentication Password", "SOAP Front End ID", "Number of Connections (LDAP)", or the "Number of Connections (SOAP)" field is missing.
Error/Status Message Trigger Condition	*[Error Code 13107] – Invalid IP address 'x.x.x.x' – the first octet must be between 1-255, the other three must be between 0-255* The IPv4 address octets specified for "Host" fell outside valid ranges.
Error/Status Message Trigger Condition	*[Error Code 13108] – Invalid IP address 'x' – Ipv4 dot-decimal notation is required (e.g. 192.168.0.1).* The value specified for "Host" was not specified in IPv4 dot-decimal notation.
Error/Status Message Trigger Condition	*[Error code 13173] - Invalid value: [{x}] requires a maximum of {maxChar}-character string* The value specified for option x is too long, and cannot be longer than maxChar characters.
Error/Status Message Trigger Condition	*[Error code 13174] - Cannot update {x} connection data when {x} connections are not disabled.* The connection data for the x interface cannot be updated whilst the connections are enabled.

Error/Status Message Trigger Condition	*[Error code 13177] - Invalid [{x}] {y}- the specified {x} is invalid* The field x with value y is not valid.
Error/Status Message Trigger Condition	*Update successful.* The options were updated successfully.

3.5.3 Ud Client Key Details

The Ud Client Key Details screens is added to configure the LDAP search key mapping details and their mapping to internal subscriber Profile fields that UDR will use.

Only one key is required to be used. Multiple keys can be defined, the key used depends on the key used by the Sh request which triggered the Ud-Creation of the subscriber.

A key definition is expected to include a Base DN, with the specific key being included in either the Ud Attribute or the filter.

If the filter is not defined, then the specific key value (indicated by the Profile Field Name) is set at the attribute value, and placed in front on the Base DN to form a Search DN.

If a filter is required as well/instead, this is defined and may also include a key token name in the string (such as "$(imsi)").

Note: The order in which the keys are defined is relevant. If UDR has a choice of keys to use for a subscriber, the first matching key found in the order they are defined will be used. This is used for example when re-subscribing for a subscriber. There is no triggering Sh request to initiate this, a check if performed periodically. A subscriber is read, and the keys defined in the subscriber Profile are checked with the configured key details, and the first matching defined key is used to initiate the re-subscribe request

Note: A valid configuration upon the "Ud Remote Server Configuration" screen must be performed before defining the Ud Client Key Details, else upon attempting to save the Ud Client Key Details, an error will be displayed and the data will not be saved.

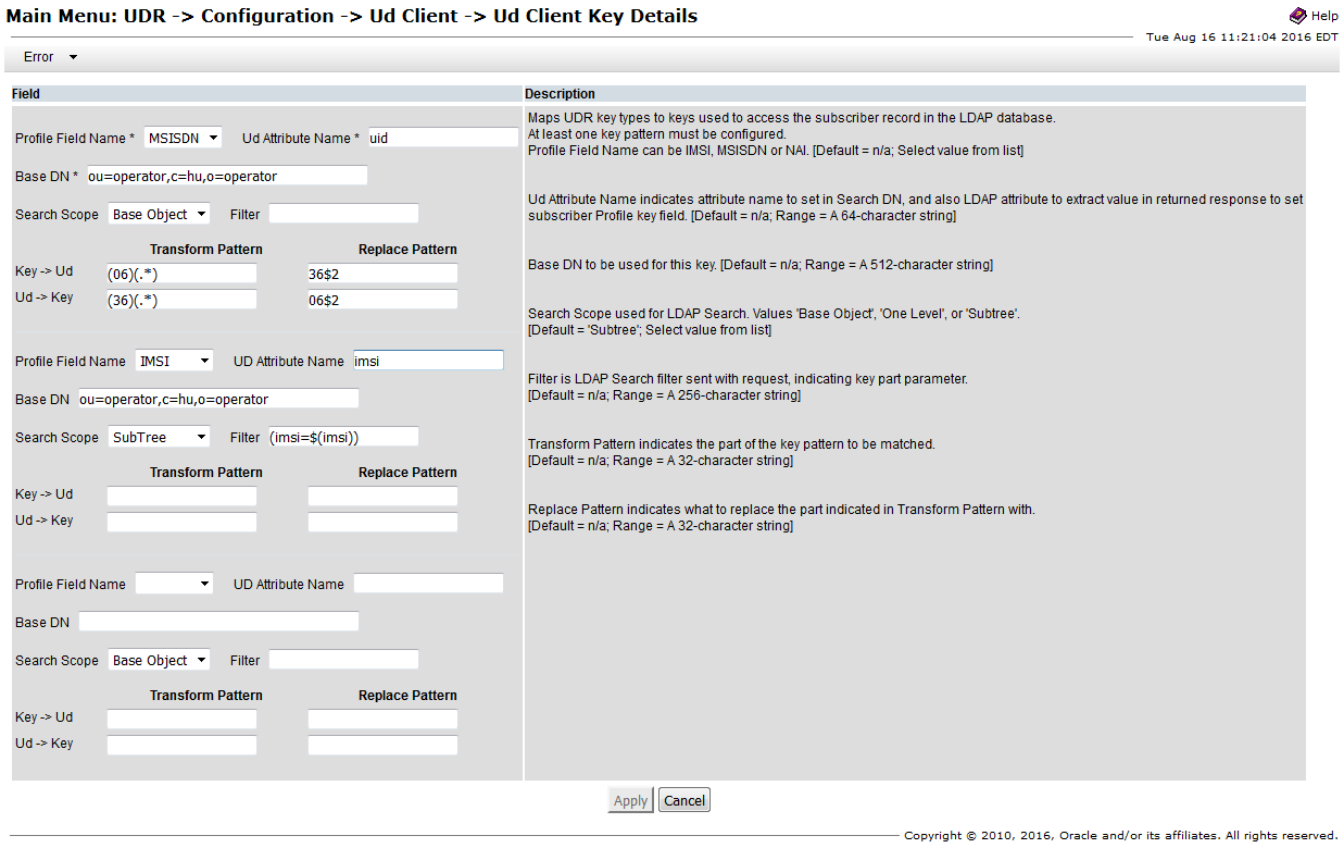


Figure 56. Ud Client Key Details

Table 31. Ud Client Key Details

Purpose	To allow an operator to update Ud Client LDAP Search key mapping data.
Required Permissions	*UDR Configuration Permissions* → Ud Client Key Details permissions group that is defined on the *Main Menu: Administration* → *Access Control* → *Groups* GUI screen
Tooltips	"Keys" (Maps UDR key types to keys used to access the subscriber record in the LDAP database. At least one key pattern must be configured) "Profile Field Name" (Profile Field Name can be IMSI, MSISDN, or NAI) "Ud Attribute Name" (Ud Attribute Name indicates attribute name to set in Search DN, and also LDAP attribute to extract value in returned response to set subscriber Profile key field) "Base DN" (Base DN to be used for this key) "Search Scope" (Search Scope used for LDAP Search. Values "Base Object", "One Level", or "Subtree") "Filter" (Filter is LDAP Search filter sent with request, indicating key part parameter) "Key -> Ud" (Transform/Replace patterns used when taking key from UDR to use as a key/filter in LDAP and SOAP requests) • "Transform Pattern" (Transform Pattern indicates the part of the key pattern to be matched) • "Replace Pattern" (Replace Pattern indicates what to replace the part indicated in Transform Pattern with) "Ud -> Key" (Transform/Replace patterns used when taking an LDAP DN/filter from a SOAP Notify to use as a key in the Ud Client) • "Transform Pattern" (Transform Pattern indicates the part of the key pattern to be matched) • "Replace Pattern" (Replace Pattern indicates what to replace the part indicated in Transform Pattern with)

Nuances	"Profile Field Name" drop-down for a key will have the following possible options - "IMSI", "MSISDN", or "NAI". Default value will be unset. "Ud Attribute Name" field will not accept more than 64 characters. "Ud Attribute Name" field must allow all (and only) valid characters for an LDAP attribute name. "Base DN" field will not accept more than 512 characters. "Base DN" field must allow all (and only) valid characters for an LDAP DN string. "Search Scope" drop-down for a key will have the following possible options - "Base Object", "One Level", or "Subtree". Default value will be "Base Object". "Filter" field will not accept more than 256 characters. "Filter" field must allow all (and only) valid characters for an LDAP filter string. • The "Filter" may contain a variable containing a specified key in the form of "$(x)" where "x" is the key name (the name is not case sensitive). The following values are allowed : o A value of "$(IMSI)" indicates to insert the value of the IMSI key for the subscriber being searched for (if set) o A value of "$(MSISDN)" indicates to insert the value of the MSISDN key for the subscriber being searched for (if set) o A value of "$(NAI)" indicates to insert the value of the NAI key for the subscriber being searched for (if set) o Any other variable names are not allowed o The key "Type" specified (such as "IMSI") must match the appropriate specified variable (such as "$(imsi)") "Transform Pattern" and "Replace Pattern" fields will not accept more than 64 characters. • "Transform Pattern" and "Replace Pattern" must allow all (and only) valid characters for a regular expression field. For each key mapping (either Ud -> Key, or Key -> Ud), either both "Transform Pattern" and "Replace Pattern" must be defined, or neither must be defined. "Formatting String" field will not accept more than 64 characters. • "Formatting String" must be a valid regular expression (regex) string The OK button is disabled until a field is modified.
Security Log Entries	Successful Update Failed Update
Error/Status Message Trigger Condition	*[Error Code 13119] - In Row# [{n}], missing required field [{x}]* The field value for field x is missing in row n.
Error/Status Message Trigger Condition	*[Error code 13175] - Invalid LDAP filter [{x}]* The specified LDAP filter value x is not a valid LDAP filter.
Error/Status Message Trigger Condition	*[Error code 13176] - Invalid regular expression [{x}] in field [{y}]* The regular expression x in field y is not a valid regular expression.
Error/Status Message Trigger Condition	*[Error code 13178] - Invalid Base DN [{x}] - the specified Base DN is invalid* The specified Base DN value x is not a valid LDAP Base DN.
Error/Status Message Trigger Condition	*[Error code 13179] - Invalid LDAP Attribute Name [{x}] - the specified LDAP Attribute name is invalid* The specified LDAP attribute name x is not a valid LDAP attribute name.
Error/Status Message Trigger Condition	*[Error code 13180] - Ud Attribute Name[{x}] already configured* The specified LDAP attribute name x is already configured for use.
Error/Status Message Trigger Condition	*[Error code 13181] - Profile Field Name[{x}] already configured* The specified subscriber Profile field x is already configured for use.
Error/Status Message Trigger Condition	*[Error code 13182] - Transform/Replace Pattern must both/neither be configured* Either both patterns must be defined, or neither, one by itself cannot be configured.
Error/Status Message Trigger Condition	*[Error code 13183] - Configuration of Remote Ud Server has not been performed* The configuration data on this screen cannot be saved until a remote Ud Server has been configured
Error/Status Message Trigger Condition	*Update successful.* The options were updated successfully.

3.5.4 Ud Client Attribute Map SEC

The Ud Client Attribute Map SEC screens are added to configure the LDAP attribute details and their mapping to internal subscriber Profile fields that UDR will use.

All LDAP attributes that map to subscriber Profile fields are entered. Keys that are used to perform an LDAP Search are not defined on this screen, as they are defined on the Ud Client Key Details screen. If a key is simply retrieved from LDAP, and not used to search, it can be defined on this screen and will be set in the subscriber profile.

A formatting string can be defined (which is a regular expression) that will format the attribute value received from LDAP, and change it according to the defined formatting string before storing the resulting value in the subscriber Profile field. For example, take the first 3 characters only.

Note: A valid configuration upon the "Ud Remote Server Configuration" screen must be performed before defining the Ud Client Attribute Map SEC, else upon attempting to insert a new mapping, an error will be displayed and the data will not be saved.

3.5.4.1 Summary Screen

The summary screen is added to display the currently configured LDAP attribute to subscriber Profile field mappings, and allow the operator to insert new attribute mappings, or edit/delete existing mappings.

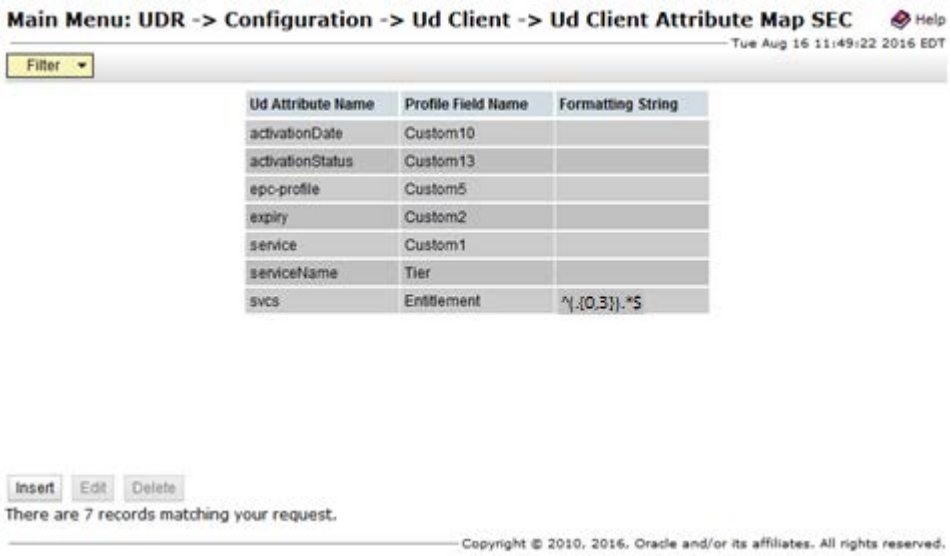


Figure 57. Ud Client Attribute Map SEC Summary Screen

Table 32. Ud Client Attribute Map SEC Summary Screen

Purpose	To allow an operator to view/update Ud Client LDAP attribute mapping data.
Required Permissions	*UDR Configuration Permissions* → Ud Client Attribute Map SEC permissions group that is defined on the *Main Menu: Administration* → *Access Control* → *Groups* GUI screen
Tooltips	"Ud Attribute Name" (Ud Attribute Name indicates LDAP field associated with subscriber Profile field) "Profile Field Name" (Profile Field Name corresponds to assign field in subscriber Profile) "Formatting String" (Formatting string to apply to retrieved LDAP attribute before assigning value to subscriber Profile field)

Nuances	By default, no attribute mapping rows will be present when the screen is first presented. UDR shall not limit the number of attribute mapping rows that can be inserted or displayed. The insert button is always enabled. Clicking upon the button navigates the GUI to the "Insert" screen as in section 3.5.4.3. The header will provide a Sorting mechanism. On clicking the header, the values of the selected column will get sorted in ascending/descending order. Clicking the header again will toggle the order (descending/ascending). Upon selecting an existing Ud Attribute in the table displayed, the "Edit" and "Delete" buttons are enabled. • Clicking on the "Edit" button navigates the GUI to the "Edit" screen as in section 3.5.4.4. The values for the selected field are pre-populated on the "Edit" screen upon entry. • Clicking on the "Delete" button pops up the delete confirmation dialogue as in section 3.5.4.5. Clicking on "OK" deletes the selected attribute mapping. Clicking on "Cancel" returns to the summary screen.
Security Log Entries	Successful Display Failed Display

3.5.4.2 Summary Screen Filter

The filter is added in order to find specific Ud Attributes.

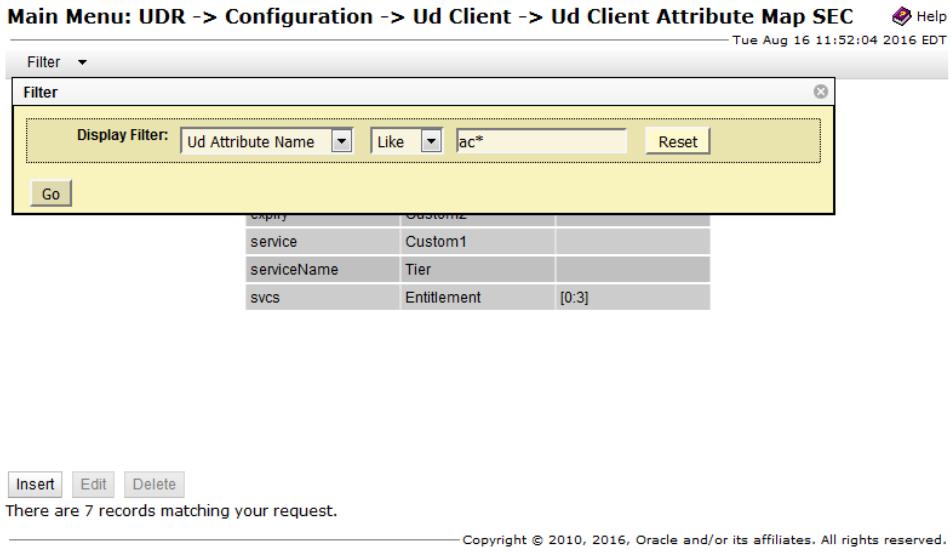


Figure 58. Ud Client Attribute Map SEC Summary Screen Filter

Table 33. Ud Client Attribute Map SEC Summary Screen Filter

Purpose	To allow an operator to view/filter Ud Client LDAP attribute mapping data.
Required Permissions	*UDR Configuration Permissions* → Ud Client Attribute Map SEC permissions group that is defined on the *Main Menu: Administration* → *Access Control* → *Groups* GUI screen
Tooltips	"Filter Field" (Field to filter results by) "Operation" (Type of match for filter) "Filter Value" (Value to filter specified field by)

Nuances	"Filter Field" drop-down will have the following possible options – "None", "Ud Attribute Name", "Profile Field Name", or "Formatting String". Default value will be "None". "Filter Field" drop-down will be set to the following value dependent on the "Filter Field" selected • "None" : value is "=" • "Ud Attribute Name" : value is "Like" • "Profile Field Name" : value is "=" • "Formatting String" : value is "Like" "Filter Value" will be unset upon entry to the screen. "Filter Value" will not become enabled for entry until a "Filter Field" other than "None" has been selected. The "Reset" button will not become enabled until a "Filter Field" other than "None" has been selected. When the "Reset" button is enabled, clicking on it shall return the "Filter Field", "Operation", and "Filter Value" fields to their default values as specified above. The Go button is always enabled. Clicking upon the button performs the requested filtering based on the selected criteria, and displays the results as for the summary screen as in section 3.5.4.1. The filter dialogue box is then closed. The summary screen displayed shall also include "(Filtered)" in the screen name to indicate that the results shown are filtered. Upon clicking on the filter button again before navigating away from the summary screen, the "Filter Field", "Operation", and "Filter Value" fields shall be initially populated with the values from the previous filter request. Upon clicking on the filter button again after navigating away from the summary screen, the "Filter Field", "Operation", and "Filter Value" fields shall be populated with their default values as specified above. Clicking on the close dialogue (X) button shall close the filter dialogue box, and leave the previously displayed summary screen (filtered or not) displayed. Upon executing a filter, the filtered search results summary screen shall be treated in the same way as if the results were not filtered, with respect to the "Insert", "Edit", and "Delete" buttons.
Security Log Entries	Successful Display Failed Display

3.5.4.3 Insert Screen

The insert screen is added to allow the operator to add a new LDAP attribute mapping to a subscriber Profile field.

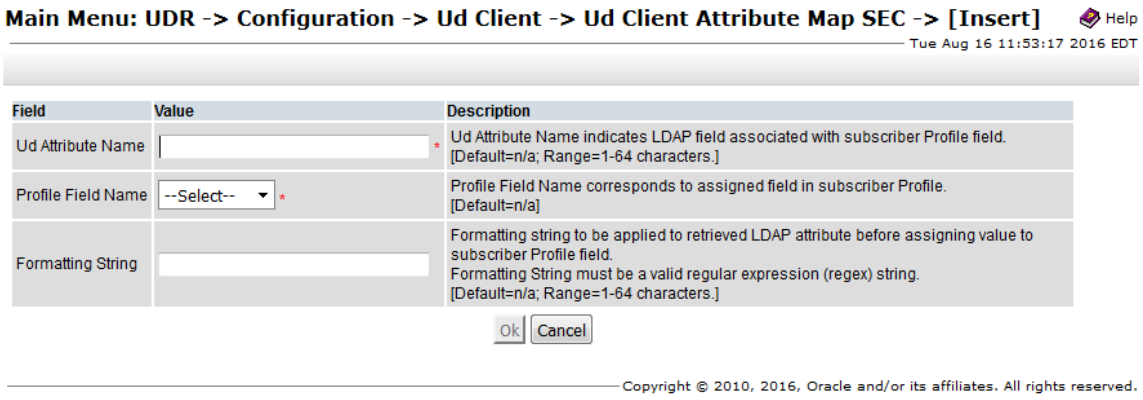


Figure 59. Ud Client Attribute Map SEC Insert Screen

Table 34. Ud Client Attribute Map SEC Insert Screen

Purpose	To allow an operator to insert a new Ud Client LDAP attribute mapping.

Required Permissions	*UDR Configuration Permissions* → Ud Client Attribute Map SEC permissions group that is defined on the *Main Menu: Administration* → *Access Control* → *Groups* GUI screen
Tooltips	"Ud Attribute Name" (Ud Attribute Name indicates LDAP field associated with subscriber Profile field) "Profile Field Name" (Profile Field Name corresponds to assigned field in subscriber Profile) "Formatting String" (Formatting string to be applied to retrieved LDAP attribute before assigning value to subscriber Profile field. Formatting String must be a valid regular expression (regex) string)
Nuances	"Profile Field Name" drop-down containing list of default subscriber Profile field names defined in the SEC. Default value will be unset. "Ud Attribute Name" field will not accept more than 64 characters. "Ud Attribute Name" field must allow all (and only) valid characters for an LDAP attribute name. "Formatting String" field will not accept more than 64 characters. • "Formatting String" must be a valid regular expression (regex) string
Security Log Entries	Successful Insert Failed Insert
Error/Status Message Trigger Condition	*[Error Code 13104] – Missing required field 'x'.* The value specified for either the "Ud Attribute Name" or the "Profile Field Name" field is missing.
Error/Status Message Trigger Condition	*[Error code 13176] - Invalid regular expression [{x}] in field [{y}]* The regular expression x in field y is not a valid regular expression.
Error/Status Message Trigger Condition	*[Error code 13179] - Invalid LDAP Attribute Name [{x}] - the specified LDAP Attribute name is invalid* The specified LDAP attribute name x is not a valid LDAP attribute name.
Error/Status Message Trigger Condition	*[Error code 13180] - Ud Attribute Name[{x}] already configured* The specified LDAP attribute name x is already configured for use.
Error/Status Message Trigger Condition	*[Error code 13181] - Profile Field Name[{x}] already configured* The specified subscriber Profile field x is already configured for use.
Error/Status Message Trigger Condition	*[Error code 13183] - Configuration of Remote Ud Server has not been performed* The configuration data on this screen cannot be saved until a remote Ud Server has been configured
Error/Status Message Trigger Condition	*Insert successful.* The attribute was created successfully.

3.5.4.4 Edit Screen

The edit screen is added to allow the operator to update an existing LDAP attribute mapping.

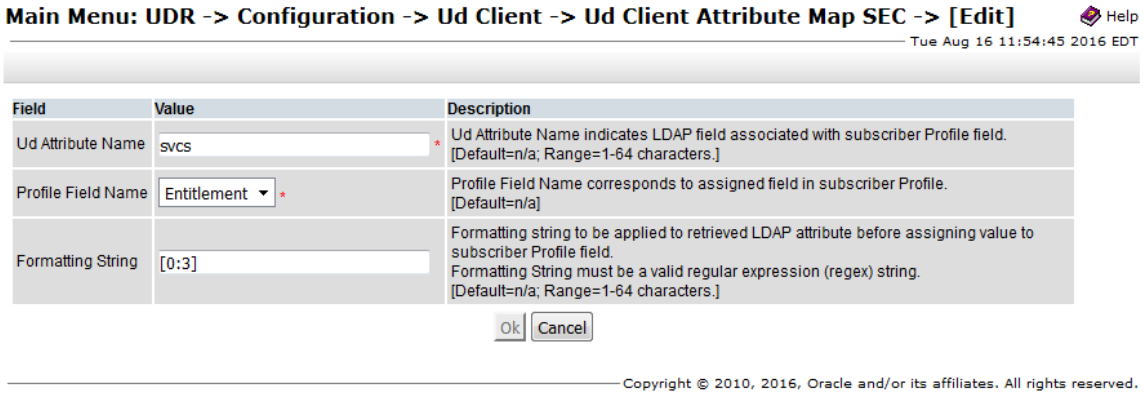


Figure 60. Ud Client Attribute Map SEC Edit Screen

Table 35. Ud Client Attribute Map SEC Edit Screen

Purpose	To allow an operator to update an existing Ud Client LDAP attribute mapping.

Required Permissions	*UDR Configuration Permissions* → Ud Client Attribute Map SEC permissions group that is defined on the *Main Menu: Administration* → *Access Control* → *Groups* GUI screen
Tooltips	"Ud Attribute Name" (Ud Attribute Name indicates LDAP field associated with subscriber Profile field) "Profile Field Name" (Profile Field Name corresponds to assigned field in subscriber Profile) "Formatting String" (Formatting string to be applied to retrieved LDAP attribute before assigning value to subscriber Profile field. Formatting String must be a valid regular expression (regex) string)
Nuances	"Profile Field Name" drop-down containing list of default subscriber Profile field names defined in the SEC. Default value will be previously assigned value for this attribute being edited. "Ud Attribute Name" field will initially contain previously assigned value for this attribute being edited. "Ud Attribute Name" field will not accept more than 64 characters. "Ud Attribute Name" field must allow all (and only) valid characters for an LDAP attribute name. "Formatting String" field will initially contain previously assigned value for this attribute being edited. "Formatting String" field will not accept more than 64 characters. • "Formatting String" must be a valid regular expression (regex) string The OK button is disabled until the "Ud Attribute Name" and "Profile Field Name" values have been set.
Security Log Entries	Successful Update Failed Update
Error/Status Message Trigger Condition	*[Error Code 13104] – Missing required field 'x'.* The value specified for either the "Ud Attribute Name" or the "Profile Field Name" field is missing.
Error/Status Message Trigger Condition	*[Error code 13176] - Invalid regular expression [{x}] in field [{y}]* The regular expression x in field y is not a valid regular expression.
Error/Status Message Trigger Condition	*[Error code 13179] - Invalid LDAP Attribute Name [{x}] - the specified LDAP Attribute name is invalid* The specified LDAP attribute name x is not a valid LDAP attribute name.
Error/Status Message Trigger Condition	*[Error code 13180] - Ud Attribute Name[{x}] already configured* The specified LDAP attribute name x is already configured for use.
Error/Status Message Trigger Condition	*[Error code 13181] - Profile Field Name[{x}] already configured* The specified subscriber Profile field x is already configured for use.
Error/Status Message Trigger Condition	*Update successful.* The attribute was updated successfully.

3.5.4.5 Delete Screen

The delete screen is added to allow the operator to delete an existing LDAP attribute mapping.

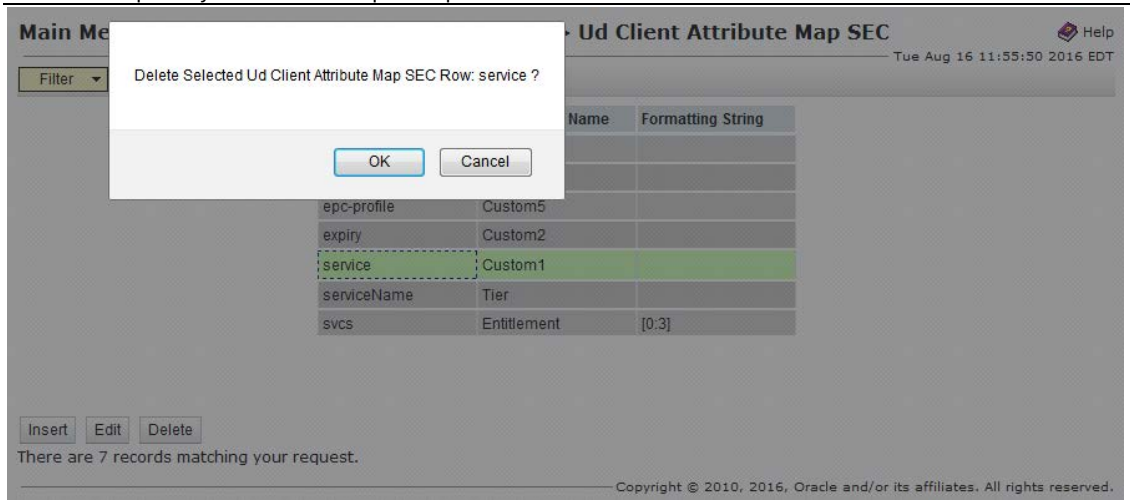


Figure 61. Ud Client Attribute Map SEC Delete Screen

Table 36. Ud Client Attribute Map SEC Delete Screen

Purpose	To allow an operator to delete an existing Ud Client LDAP attribute mapping.
Required Permissions	*UDR Configuration Permissions* → Ud Client Attribute Map SEC permissions group that is defined on the *Main Menu: Administration* → *Access Control* → *Groups* GUI screen
Tooltips	N/A
Nuances	Confirmation dialogue is display upon requested deletion of attribute. • Clicking on "OK" will delete the selected attribute. • Clicking on "Cancel" will not delete the selected attribute, and return the operator to the summary screen.
Security Log Entries	Successful Delete Failed Delete
Error/Status Message Trigger Condition	*Delete successful.* The attribute was deleted successfully.

3.5.5 Connection Status

The Connection Status screen is added to view the status of the LDAP and SOAP connections from the Ud Client to the Ud Server.

The status of the LDAP and SOAP connections are only displayed if the Ud Client feature is enabled and the Ud Remote Server Configuration has been performed. SOAP connection information is not displayed if the SOAP connection is disabled. The connection status information is refreshed only when the screen is refreshed.

This screen allows the LDAP and SOAP connections to be enabled or disabled once the Ud Client feature is enabled and configured.

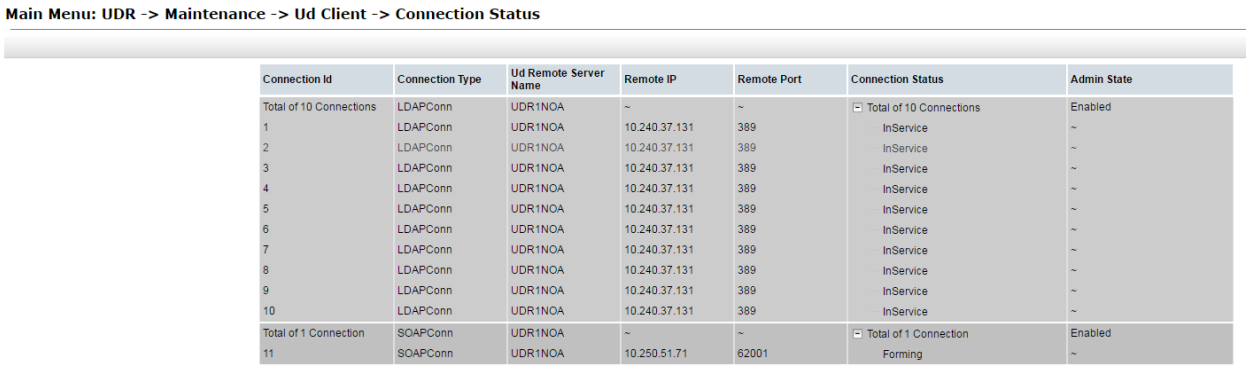


Figure 62. Ud Client Connection Status

Table 37. Ud Client Connection Status

Purpose	To allow an operator to view the current status of the Ud Client LDAP and SOAP connections, and enable/disable them.
Required Permissions	*UDR Configuration Permissions* → Ud Client Attribute Connection Status permissions group that is defined on the *Main Menu: Administration* → *Access Control* → *Groups* GUI screen
Tooltips	"Connection Id" (Unique connection number for LDAP/SOAP connection) "Connection Type" (Type of connection, LDAP or SOAP) "Ud Remote Server Name" (Configured name of the remote Ud Server to which the connection is made) "Remote IP" (Configured remote Ud Server host IPv4 address to which connection is to) "Remote Port" (Configured remote Ud Server port to which connection is to) "Connection Status" (Status of the connection. Value is either "Down", "Forming", "InService", "Degraded", or "Busy") "Admin State" (Indicates if the LDAP/SOAP connections are enabled or disabled)
Nuances	When the Ud Client feature is disabled, the SOAP and LDAP Admin state shall be "Disabled", and 0 connections shall be shown for SOAP and LDAP connections. The "Disable" and "Enable" button shall not be active for either SOAP or LDAP connections. When the Ud Client feature is enabled, but the SOAP Interface is disabled, the SOAP and Admin state shall be "Disabled", and 0 connections shall be show for SOAP connections. The "Disable" and "Enable" button shall not be active for SOAP connections. SOAP and LDAP headers/connections shall always be displayed on the screen, regardless of if the Ud Client feature is enabled. The "Disable" button is disabled until a SOAP or LDAP header row is selected, and the "Admin State" is set to "Enabled". The "Enable" button is disabled until a SOAP or LDAP header row is selected, and the "Admin State" is set to "Disabled". When a SOAP or LDAP header row is collapsed (i.e. showing the [-] symbol), clicking on one of the [+] symbols on that header row will expand the row, and display the individual connections and their status. When a SOAP or LDAP header row is expanded (i.e. showing the [+] symbol), clicking on one of the [-] symbols on that header row will collapse the row, hiding the individual connections and their status. When a connection type (SOAP or LDAP) is disabled, all individual connections will display the status "Down".

Security Log Entries	Successful Display Failure Display Connection Status Enabled Failed to Enable Connection Status Connection Status Disabled Failed to Disable Connection Status
Error/Status Message Trigger Condition	*Connection Status Disabled.* The connection was successfully disabled.
Error/Status Message Trigger Condition	*Connection Status Enabled.* The connection was successfully enabled.

3.5.6 Subscriber Query and Provisioning

The Subscriber Query and Provisioning screen is updated to include the count of the number of Ud-Created subscribers in the Database Statistics are.

Note: No other changes made to the screen, with regards to existing errors, nuances etc. Only the new values related to the Ud Client are described below.

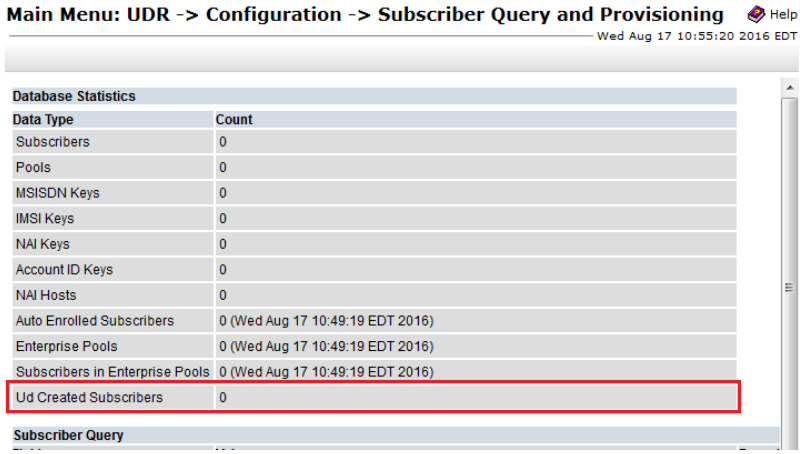


Figure 63. Subscriber Query and Provisioning Screen

Table 38. Subscriber Query and Provisioning Screen

Purpose	To allow an operator to view/edit subscriber/pool data, and view database statistics.
Required Permissions	*UDR Maintenance Permissions UDR Configuration Permissions* → Subscriber Query permissions group that is defined on the *Main Menu: Administration* → *Access Control* → *Groups* GUI screen
Tooltips	"Ud Created Subscribers" (Number of Ud-Created subscribers in UDR)
Nuances	"Ud Created Subscribers" shall be calculated each time the screen is refreshed.

3.5.7 Summary of Ud Client configuration

Ud Client functionality can be configured and enabled as explained in steps below:

1. Install and configure UDR 12.2
2. Configure LDAP/SOAP connection details to the Ud Server as described in section 3.5.2 – Ud Remote Server Configuration.
3. Configure the LDAP attribute to UDR subscriber Profile key field mappings as described in section 3.5.3 – Ud Client Key Details
    a. Map the LDAP attributes that will be used as keys by the Ud Server to the UDR subscriber Profile key fields (i.e. MSISDN/IMSI/NAI)

i. Configure the LDAP Base DN, attribute name, and/or filter to be used for the LDAP Search request

ii. If required, configure the key transform/replace patterns (both directions) between UDR field and LDAP attributes

4. Configure the LDAP attribute to UDR subscriber Profile non-key field mappings as described in section 3.5.4 – Ud Client Attribute Map SEC

    a. Map the non-key LDAP attributes stored on the Ud Server to the UDR subscriber Profile fields

        i. If required, configure the formatting strings to convert the attribute value to an UDR subscriber Profile field

5. Configure Ud Client Options as described in section 3.5.1 – Ud Client Options.

6. Activate the Ud Client feature on UDR by checking the box on the "Ud Client Enabled" configuration item on the Ud Client Options screen (as described in section 3.5.1)

7. Check the Ud Client Connection Status GUI screen (see section 3.5.5) to check that LDAP and SOAP (if SOAP is configured) connections are enabled and connected

8. If the "Admin State" for the LDAP and/or SOAP connections is "Disabled", then select the header row of the connection type and click on the "Enable" button

9. If connections do not go into the "InService" status, check alarms, Ud Client measurements and the Event History on the UDR GUI for further information as to why the connections are not being established

4 User Data Repository 12.2 MEAL Summary

This section will summarize the Alarms, Measurements, KPIs and Events.

4.1 Alarms

Table 39: Alarms

Alarm ID	Alarm Name	Severity	HA Score	MIB Required (Y/N)	New/ Modified / Deleted
13255	Notification Table Full	Major	Normal	Yes	Deleted
13256	Notification Table Utilization	Minor, Major, Critical	Normal	Yes	New
13369	UdNoLDAPConnection	Major	Normal	Yes	New
13370	UdNoSOAPConnection	Major	Normal	Yes	New

4.2 Measurements

Measurements are A level measurements aggregated at NOAMP and viewable from NOAMP GUI.

Table 40: Measurements

ID	Tag	Description	Collect Interval	Scope (s)	Groups	New/ Modified / Deleted
PSO Summary Measurements (for KPIs)						
3526	TxUdrBePsoRequest	Total number of PSO events sent.	5 min	Server Group	PSO Performance	New
3527	RxUdrBePsoRequest	Total number of PSO events received.	5 min	Server Group	PSO Performance	New
PSO Inter-NO Traffic measurements (Remote Pool Member Host Read Request)						
3531	TxUdrBePsoReadMsgs	Total number of PSO read requests sent due to a read request.	5 min	Server Group	PSO Performance	New
3532	RxUdrBePsoReadSuccess	Total number of PSO read responses received indicating success.	5 min	Server Group	PSO Performance	New
3533	RxUdrBePsoReadUnkPool	Total number of PSO read responses received where the Pool did not exist.	5 min	Server Group	PSO Performance	New
3534	RxUdrBePsoReadFailed	Total number of PSO read responses received that failed.	5 min	Server Group	PSO Performance	New
PSO Inter-NO Traffic measurements (Remote Pool Member Host Subscribe with Read Request)						
3535	TxUdrSmPsoReadMsgs	Total number of PSO read requests sent due to a subscribe request.	5 min	Server Group	PSO Performance	New
3536	RxUdrSmPsoReadSuccess	Total number of PSO read responses received due to a subscribe request indicating success.	5 min	Server Group	PSO Performance	New
3537	RxUdrSmPsoReadUnkPool	Total number of PSO read responses received due to a subscribe request where the pool did not exist.	5 min	Server Group	PSO Performance	New
3538	RxUdrSmPsoReadFailed	Total number of PSO read responses received due to a subscribe request that failed.	5 min	Server Group	PSO Performance	New
PSO Inter-NO Traffic measurements (Remote Pool Host Read Request)						
3539	RxUdrBePsoReadMsgs	Total number of PSO read requests received	5 min	Server Group	PSO Performance	New
3540	TxUdrBePsoReadSuccess	Total number of PSO read requests processed	5 min	Server Group	PSO Performance	New

ID	Tag	Description	Collect Interval	Scope (s)	Groups	New/ Modified / Deleted
3541	TxUdrBePsoReadUnkPool	Total number of PSO read requests that could not be processed because the pool did not exist	5 min	Server Group	PSO Performance	New
3542	TxUdrBePsoReadFailed	Total number of PSO read responses processed that failed	5 min	Server Group	PSO Performance	New
PSO Inter-NO Traffic measurements (Remote Pool Member Host Update Request)						
3543	TxUdrBePsoUpdateMsgs	Total number of PSO update requests sent	5 min	Server Group	PSO Performance	New
3544	RxUdrBePsoUpdateSuccess	Total number of PSO update responses received	5 min	Server Group	PSO Performance	New
3545	RxUdrBePsoUpdateUnkPool	Total number of PSO update responses received where the Pool did not exist	5 min	Server Group	PSO Performance	New
3546	RxUdrBePsoUpdateOutOfSync	Total number of PSO update responses received where the incorrect sequence number was supplied	5 min	Server Group	PSO Performance	New
3547	RxUdrBePsoUpdateInvalidEntity	Total number of PSO update responses received where an unknown entity was encountered	5 min	Server Group	PSO Performance	New
3548	RxUdrBePsoUpdateTooBusy	Total number of PSO update responses received where the request could not be processed because of congestion	5 min	Server Group	PSO Performance	New
3549	RxUdrBePsoUpdateFailed	Total number of PSO update responses received that failed	5 min	Server Group	PSO Performance	New
PSO Inter-NO Traffic measurements (Remote Pool Host Update Request)						
3550	RxUdrBePsoUpdateMsgs	Total number of PSO update requests received	5 min	Server Group	PSO Performance	New
3551	TxUdrBePsoUpdateSuccess	Total number of PSO update responses sent	5 min	Server Group	PSO Performance	New
3552	TxUdrBePsoUpdateUnkPool	Total number of PSO update messages which could not be processed because the pool did not exist	5 min	Server Group	PSO Performance	New
3553	TxUdrBePsoUpdateOutOfSync	Total number of PSO update messages where the incorrect sequence number was supplied	5 min	Server Group	PSO Performance	New
3554	TxUdrBePsoUpdateInvalidEntity	Total number of PSO update messages where an unknown entity was encountered	5 min	Server Group	PSO Performance	New
3555	TxUdrBePsoUpdateTooBusy	Total number of PSO update messages where the request could not be processed because of congestion	5 min	Server Group	PSO Performance	New
3556	TxUdrBePsoUpdateFailed	Total number of PSO update messages processed that failed	5 min	Server Group	PSO Performance	New
PSO Inter-NO Traffic measurements (Remote Pool Host Notify Processing)						
3557	TxUdrBePsoNotifyMsgs	Total number of PSO notify messages sent	5 min	Server Group	PSO Performance	New
3558	RxUdrBePsoNotifySuccess	Total number of PSO notify response messages received	5 min	Server Group	PSO Performance	New
3559	RxUdrBePsoNotifyNoMembers	Total number of PSO notify response messages received where there were no local members found in the pool	5 min	Server Group	PSO Performance	New
3560	RxUdrBePsoNotifyPoolNotExist	Total number of PSO notify response messages received where there the pool did not exist	5 min	Server Group	PSO Performance	New

ID	Tag	Description	Collect Interval	Scope (s)	Groups	New/ Modified / Deleted
PSO Inter-NO Traffic measurements (Remote Pool Member Host Notify Processing)						
3561	RxUdrBePsoNotifyMsgs	Total number of PSO notify messages received	5 min	Server Group	PSO Performance	New
3562	TxUdrBePsoNotifySuccess	Total number of PSO notify response messages sent	5 min	Server Group	PSO Performance	New
3563	TxUdrBePsoNotifyNoMembers	Total number of PSO notify response messages sent where there were no local members found in the Pool	5 min	Server Group	PSO Performance	New
3564	TxUdrBePsoNotifyPoolNotExist	Total number of PSO notify response messages sent where there were the pool did not exist	5 min	Server Group	PSO Performance	New
PSO Inter-NO Traffic measurements (Get PSO Pool Membership Processing)						
3565	RxUdrBePsoGetMembersMsgs	Total number of PSO get members requests received	5 min	Server Group	PSO Performance	New
3566	RxUdrBePsoGetMembersSuccess	Total number of PSO get members responses received indicating success.	5 min	Server Group	PSO Performance	New
3567	RxUdrBePsoGetMembersFailed	Total number of PSO get members responses received that failed.	5 min	Server Group	PSO Performance	New
3568	RxUdrBePsoGetMembersUnkPool	Total number of PSO get members responses received where the Pool did not exist.	5 min	Server Group	PSO Performance	New
3569	TxUdrBePsoGetMembersMsgs	Total number of PSO get members messages sent due to a provisioning GetAllPoolMembers request	5 min	Server Group	PSO Performance	New
3570	TxUdrBePsoGetMembersSuccess	Total number of PSO get members responses processed.	5 min	Server Group	PSO Performance	New
3571	TxUdrBePsoGetMembersUnkPool	Total number of PSO get members requests that could not be processed because the pool did not exist	5 min	Server Group	PSO Performance	New
Failures of PSO Notify messages						
3581	TxUdrBePsoNotifyFailed	Total number of PSO notify messages processed that failed	5 min	Server Group	PSO Performance	New
3582	RxUdrBePsoNotifyFailed	Total number of PSO notify response messages received that failed	5 min	Server Group	PSO Performance	New
PSO Inter-NO Traffic measurements (Exception Measurements)						
3572	RxUdrBePsoReadTimeOut	Total number of PSO read requests that timed out	5 min	Server Group	UDRBE Exception	New
3573	RxUdrSmPsoReadTimeOut	Total number of PSO read requests due to a subscribe request that timed out	5 min	Server Group	UDRBE Exception	New
3574	RxUdrBePsoUpdateTimeOut	Total number of PSO update requests that timed out	5 min	Server Group	UDRBE Exception	New
3575	RxUdrBePsoNotifyTimeOut	Total number of PSO notify messages that timed out	5 min	Server Group	UDRBE Exception	New
3576	RxUdrBePsoGetMembersTimeOut	Total number of PSO get members requests sent for which a timely response was not received	5 min	Server Group	UDRBE Exception	New
Failures of update, read and subscribe requests due to the PSO request failing						
3577	TxUdrBeUpdateReqPsoFailed	Total number of update requests where the PSO update request failed.	5 min	Server Group	UDRBE Performance	New
3578	TxUdrBeReadReqPsoFailed	Total number of read requests where the PSO read request failed.	5 min	Server Group	UDRBE Performance	New

ID	Tag	Description	Collect Interval	Scope (s)	Groups	New/ Modified / Deleted
3579	TxUdrSmSubscribeReqPsoFailed	Total number of subscribe requests where the PSO read request failed.	5 min	Server Group	UDRBE Performance	New
3580	TxUdrBePsoGetMembersFailed	Total number of PSO get members responses processed that failed	5 min	Server Group	UDRBE Performance	New
PSO Request Latency						
3528	UdrBePsoTransTimeMax	Maximum PSO transaction life-time in milliseconds	5 min	Server Group	UDRBE Performance	New
3529	UdrBePsoTransTimeAvg	Average PSO transaction life-time in milliseconds	5 min	Server Group	UDRBE Performance	New
UDRBE Measurements						
3170	TxUdrBeReadTooMuchData	Total number of read requests which could not be processed because UserData size exceeds maxUserDataSize	5 min	Server Group	UDRBE Exception	New
3264	TxUdrSmUnsubscribeTooMuchData	Total number of unsubscribe requests which could not be processed because UserData size exceeds maxUserDataSize	5 min	Server Group	UDRBE Exception	New
3265	TxUdrSmSubscribeTooMuchData	Total number of subscribe requests which could not be processed because UserData size exceeds maxUserDataSize	5 min	Server Group	UDRBE Exception	New
3293	TxUdrNotifTooMuchData	Total number of notifications to be sent for which UserData size exceeds maxUserDataSize	5 min	Server Group	UDRBE Exception	New
Provisioning Performance						
3065	TotalSubscriberCount	The total number of Subscribers in a 30 minute period.	5 min	Server Group	Provisioning Performance	New
3066	TotalPoolCount	The total number of Pools in a 30 minute period.	5 min	Server Group	Provisioning Performance	New
Ud Client Summary Measurements (for KPIs)						
3903	RxUdShUdrCreateMsgs	Total number of UDR requests received via the Sh interface where the subscriber was unknown and Ud-Creation was triggered to create the subscriber	5 min	Server Group	Ud Client Performance	New
3904	RxUdShPurCreateMsgs	Total number of PUR requests received via the Sh interface where the subscriber was unknown and Ud-Creation was triggered to create the subscriber	5 min	Server Group	Ud Client Performance	New
3905	RxUdShSnrCreateMsgs	Total number of SNR requests received via the Sh interface where the subscriber was unknown and Ud-Creation was triggered to create the subscriber	5 min	Server Group	Ud Client Performance	New
3916	TxUdrBeUdSearchRequestSent	Total number of Ud Search requests sent triggered by the initial Ud-Creation of a subscriber	5 min	Server Group	Ud Client Performance	New
3944	TxUdSubscribeRequestInitialSent	Total number of Ud Subscribe requests sent triggered by the initial Ud-Creation of a subscriber	5 min	Server Group	Ud Client Performance	New
3933	TxUdReSearchSendSearch	Total number of Ud Search requests sent upon re-reading a Ud-Created subscriber	5 min	Server Group	Ud Client Performance	New
3949	TxUdSearchRequestSent	Total number of LDAP Search requests sent on the LDAP interface	5 min	Server Group	Ud Client Performance	New
3945	TxUdReSubscribeSendSubscribe	Total number of Ud Subscribe requests sent upon re-subscribing a Ud-Created subscriber	5 min	Server Group	Ud Client Performance	New

ID	Tag	Description	Collect Interval	Scope(s)	Groups	New/ Modified / Deleted
3960	TxUdSubscribeRequestSent	Total number of Ud Subscribe requests sent on the SOAP interface	5 min	Server Group	Ud Client Performance	New
3986	RxUdNotifyRequestReceived	Total number of SOAP Notify requests received by the SOAP Interface	5 min	Server Group	Ud Client SOAP Interface	New
UDR Application and Ud Client Application Measurements						
3906	RxUdShCreateSubSuccess	Total number of Ud-Created subscribers created via the Sh interface	5 min	Server Group	Ud Client Performance	New
3907	EvUdShCreateSubFailed	Total number of failed attempts to create an auto-enrolled subscriber via the Sh interface	5 min	Server Group	Ud Client Exception	New
3917	TxUdrBeUdSearchRequestSendFailed	Total number of Ud Search requests that failed to be sent from the UDR BE to the Ud Client application	5 min	Server Group	Ud Client Exception	New
3901	EvUdSubscribeUpdateSuccess	Total number of successful Ud Subscribe attempts where the subscribers "last subscribe time" was updated successfully	5 min	Server Group	Ud Client Performance	New
3902	EvUdSubscribeUpdateFailed	Total number of successful Ud Subscribe attempts where the subscribers "last subscribe time" failed to be updated	5 min	Server Group	Ud Client Exception	New
3899	EvUdSubscribeDeleteSuccess	Total number of Ud Subscribe requests which resulted in an "Unknown Subscriber" response, and the subscriber was successfully deleted	5 min	Server Group	Ud Client Performance	New
3900	EvUdSubscribeDeleteFailed	Total number of Ud Subscribe requests which resulted in an "Unknown Subscriber" response, and the subscriber failed to be deleted	5 min	Server Group	Ud Client Exception	New
3972	RxUdNotifyRequest	Total number of SOAP Notify requests received by the UDR application	5 min	Server Group	Ud Client Performance	New
3921	EvUdNotifyUnknownSubscriber	Total number of individual notifications within a SOAP Notify request for which the subscriber was not found in UDR	5 min	Server Group	Ud Client Performance	New
3922	EvUdNotifySubscriberNotUdCreated	Total number of individual notifications within a SOAP Notify request for which the subscriber exists, but was not Ud-Created	5 min	Server Group	Ud Client Performance	New
3923	EvUdNotifyDeleteSubscriber	Total number of individual notifications within a SOAP Notify request which indicated the deletion of a subscriber	5 min	Server Group	Ud Client Performance	New
3924	EvUdNotifyDeleteSubscriberSuccess	Total number of subscribers indicated as deleted in a SOAP Notify request where the subscriber was successfully deleted	5 min	Server Group	Ud Client Performance	New
3925	EvUdNotifyDeleteSubscriberFailed	Total number of subscribers indicated as deleted in a SOAP Notify request where the subscriber failed to be deleted	5 min	Server Group	Ud Client Exception	New
3926	EvUdNotifyFieldUpdateFailure	Total number of individual notifications within a SOAP Notify request which attempted to update a field to an invalid value according to the field definition in the SEC	5 min	Server Group	Ud Client Exception	New
3927	EvUdNotifyUnexpectedUpdateField	Total number of individual notifications within a SOAP Notify request which contained an updated field value in an unexpected SOAP Notify field	5 min	Server Group	Ud Client Exception	New
3928	EvUdNotifyNoUpdatesMade	Total number of individual notifications within a SOAP Notify request which were	5 min	Server Group	Ud Client Performance	New

ID	Tag	Description	Collect Interval	Scope(s)	Groups	New/Modified/Deleted
		valid, but did not result in the subscriber Profile being updated				
3929	EvUdNotifyUpdateSuccess	Total number of individual notifications within a SOAP Notify request which were valid, resulted in the subscriber Profile needing to be updated, and the Profile was successfully updated	5 min	Server Group	Ud Client Performance	New
3930	EvUdNotifyUpdateFailed	Total number of individual notifications within a SOAP Notify request which were valid, resulted in the subscriber Profile needing to be updated, but the Profile failed to be updated	5 min	Server Group	Ud Client Exception	New
3931	TxUdNotifyResponseSent	Total number of Ud Notify responses sent to the Ud Client application	5 min	Server Group	Ud Client Performance	New
3932	TxUdReSearchSendThrottled	Total number of Ud Search requests that were attempted to be sent as part of a re-read, but were not sent due to throttling of re-read requests	5 min	Server Group	Ud Client Performance	New
3934	TxUdReSearchFailedInitiate	Total number of Ud Subscribe requests that failed to be sent from the UDR BE to the Ud Client application	5 min	Server Group	Ud Client Exception	New
3935	EvUdReSearchProfileDifferent	Total number of LDAP Search requests for re-reading a subscriber where the returned data was different to the existing subscriber data thus requiring a subscriber Profile update	5 min	Server Group	Ud Client Performance	New
3939	EvUdReSearchProfileSame	Total number of LDAP Search requests for re-reading a subscriber where the returned data was the same as the existing subscriber data thus not requiring a subscriber Profile update	5 min	Server Group	Ud Client Performance	New
3936	EvUdReSearchProfileUpdateSuccess	Total number of LDAP Search requests for re-reading a subscriber where the returned data was different to the existing subscriber data thus requiring a subscriber Profile update, and the subscriber Profile update was successful	5 min	Server Group	Ud Client Performance	New
3937	EvUdReSearchProfileUpdateFailed	Total number of LDAP Search requests for re-reading a subscriber where the returned data was different to the existing subscriber data thus requiring a subscriber Profile update, and the subscriber Profile update failed	5 min	Server Group	Ud Client Exception	New
3938	RxUdReSearchUnknownSubscriber	Total number of LDAP Search requests for re-reading a subscriber which indicated that the subscriber was unknown on the Ud Server	5 min	Server Group	Ud Client Performance	New
3940	EvUdReSearchDeleteSuccess	Total number of LDAP Search requests for re-reading a subscriber which indicated that the subscriber was unknown on the Ud Server, and the subscriber was successfully deleted	5 min	Server Group	Ud Client Performance	New
3941	EvUdReSearchDeleteFailed	Total number of LDAP Search requests for re-reading a subscriber which indicated that the subscriber was unknown on the Ud Server, and the subscriber failed to be deleted	5 min	Server Group	Ud Client Exception	New

ID	Tag	Description	Collect Interval	Scope(s)	Groups	New/Modified/Deleted
3942	RxUdReSearchBusy	Total number of LDAP Search requests for re-reading a subscriber which failed due to a "Busy" error	5 min	Server Group	Ud Client Performance	New
3943	RxUdReSearchFailed	Total number of LDAP Search requests for re-reading a subscriber which failed due to an error other than "Busy" or "Unknown Subscriber"	5 min	Server Group	Ud Client Performance	New
3946	TxUdReSubscribeFailedNoValidKey	Total number of LDAP Search requests for re-reading a subscriber which could not be sent, because the subscriber Profile did not contain a key that could be mapped to a valid Search DN/filter	5 min	Server Group	Ud Client Exception	New
3947	TxUdReSubscribeFailednitiate	Total number of Ud Subscribe requests that failed to be sent from the Ud-Created Audit task to the Ud Client application	5 min	Server Group	Ud Client Exception	New
3918	EvUdSimultaneousAccessReq	Total number of Sh requests that resulted in Ud-Creating a subscribe at the same time as another request also creating the same subscriber	5 min	Server Group	Ud Client Performance	New
3919	EvUdSimultaneousAccessReqProfileSame	Total number of Sh requests that resulted in Ud-Creating a subscribe at the same time as another request also creating the same subscriber where the subscriber Profile was read again, but was the same as the existing Profile	5 min	Server Group	Ud Client Performance	New
3920	EvUdSimultaneousAccessReqProfileDiff	Total number of Sh requests that resulted in Ud-Creating a subscribe at the same time as another request also creating the same subscriber where the subscriber Profile was read again, but was different to existing Profile, resulting in a subscriber Profile update	5 min	Server Group	Ud Client Performance	New
3987	TxUdrBeUdUnsubscribeRequestSent	Total number of Ud Subscribe requests to unsubscribe triggered by a provisioning request to delete a subscriber	5 min	Server Group	Ud Client Performance	New
3988	TxUdrBeUdUnsubscribeRequestSendFailed	Total number of Ud Subscribe requests to unsubscribe that failed to be sent from the UDR BE to the Ud Client application	5 min	Server Group	Ud Client Exception	New
3990	RxUdrBeUdSearchResponseReceived	Total number of Ud Search responses received by the UDR BE	5 min	Server Group	Ud Client Performance	New
3991	RxUdrBeUdSubscribeResponseReceived	Total number of Ud Subscribe responses received by the UDR BE	5 min	Server Group	Ud Client Performance	New
Ud LDAP Interface Measurements						
3890	EvUdBindRequest	Total number of LDAP Bind requests attempted to be sent	5 min	Server Group	Ud Client LDAP Interface	New
3891	TxUdBindRequestSendSuccess	Total number of LDAP Bind requests which were sent successfully	5 min	Server Group	Ud Client LDAP Interface	New
3892	TxUdBindRequestSendFailed	Total number of LDAP Bind requests which failed to be sent	5 min	Server Group	Ud Client Exception	New
3893	EvUdBindRequestTimedOut	Total number of LDAP Bind requests which timed out before a response was received	5 min	Server Group	Ud Client Exception	New
3894	RxUdBindResponseSuccess	Total number of LDAP Bind requests which resulted in a successful response	5 min	Server Group	Ud Client LDAP	New

ID	Tag	Description	Collect Interval	Scope(s)	Groups	New/ Modified / Deleted
					Interface	
3898	RxUdBindResponseAuthenticationFailed	Total number of LDAP Bind requests which resulted in a response indicating "Authentication Failed"	5 min	Server Group	Ud Client Exception	New
3895	RxUdBindResponseFailed	Total number of LDAP Bind requests which resulted in a response indicating "Failure"	5 min	Server Group	Ud Client Exception	New
3896	EvUdUnbindRequest	Total number of LDAP Unbind requests attempted to be sent	5 min	Server Group	Ud Client LDAP Interface	New
3897	TxUdUnbindRequestSent	Total number of LDAP Unbind requests which were sent successfully	5 min	Server Group	Ud Client LDAP Interface	New
3908	EvUdLDAPIdleConnectionDropped	Total number of times an LDAP connection has been disconnected after requests have been sent, but no data has been received within the configured time period	5 min	Server Group	Ud Client Exception	New
3909	EvUdLDAPTCPSendBufferFull	Total number of times an attempt to send an LDAP Search request on a connection has failed because the TCP/IP send buffer is full	5 min	Server Group	Ud Client Exception	New
3910	EvUdLDAPConnectionBusy	Total number of times an attempt to send an LDAP Search request has failed because a "Busy" error has been returned	5 min	Server Group	Ud Client LDAP Interface	New
3911	EvUdSearchCannotSend	Total number of times an attempt to send an LDAP Search request has failed because no LDAP connection was available to send it upon	5 min	Server Group	Ud Client Exception	New
3948	RxUdSearchRequest	Total number LDAP Search requests received by the Ud Client application	5 min	Server Group	Ud Client LDAP Interface	New
3950	TxUdSearchRequestSendBufferFull	Total number of times an attempt to send an LDAP Search request on a connection has failed because the TCP/IP send buffer is full	5 min	Server Group	Ud Client Exception	New
3951	RxUdSearchRequestTimedOut	Total number of LDAP Search requests which timed out before a response was received	5 min	Server Group	Ud Client Exception	New
3952	RxUdSearchResponseRequestNotFound	Total number of LDAP Search responses received where the initiating request could not be found in the list of outstanding requests	5 min	Server Group	Ud Client Exception	New
3953	RxUdSearchResponseSuccess	Total number of LDAP Search responses received which indicated "Success"	5 min	Server Group	Ud Client LDAP Interface	New
3954	RxUdSearchResponseUnknownSubscriber	Total number of LDAP Search responses received which indicated "Unknown Subscriber"	5 min	Server Group	Ud Client LDAP Interface	New
3955	RxUdSearchResponseFailed	Total number of LDAP Search responses received which indicated "Failed"	5 min	Server Group	Ud Client LDAP Interface	New
3956	RxUdSearchResponseAuthenticationFailed	Total number of LDAP Search responses received which indicated "Authentication Failed"	5 min	Server Group	Ud Client Exception	New

ID	Tag	Description	Collect Interval	Scope(s)	Groups	New/ Modified / Deleted
3957	RxUdSearchResponseBusy	Total number of LDAP Search responses received which indicated the Ud Server was busy	5 min	Server Group	Ud Client LDAP Interface	New
3958	RxUdSearchResponseTimeout	Total number of LDAP Search responses received which indicated "Timeout"	5 min	Server Group	Ud Client Exception	New
Ud SOAP Interface Measurements						
3912	EvUdSubscribeCannotSend	Total number of times an attempt to send a SOAP Search request has failed because no SOAP connection was available to send it upon	5 min	Server Group	Ud Client Exception	New
3913	EvUdSOAPIdleConnectionDropped	Total number of times a SOAP connection has been disconnected after requests have been sent, but no data has been received within the configured time period	5 min	Server Group	Ud Client Exception	New
3914	EvUdSOAPTCPSendBufferFull	Total number of times an attempt to send a SOAP Subscribe request on a connection has failed because the TCP/IP send buffer is full	5 min	Server Group	Ud Client Exception	New
3915	EvUdSOAPConnectionBusy	Total number of times an attempt to send a SOAP Subscribe request has failed because a "Busy" error has been returned	5 min	Server Group	Ud Client SOAP Interface	New
3959	RxUdSubscribeRequest	Total number SOAP Subscribe requests received by the Ud Client application	5 min	Server Group	Ud Client SOAP Interface	New
3961	TxUdSubscribeRequestSubscribeSent	Total number of SOAP Subscribe requests which indicate a request to "subscribe" to subscriber data change notifications that were successfully sent	5 min	Server Group	Ud Client SOAP Interface	New
3962	TxUdSubscribeRequestUnsubscribeSent	Total number of SOAP Subscribe requests which indicate a request to "unsubscribe" to subscriber data change notifications that were successfully sent	5 min	Server Group	Ud Client SOAP Interface	New
3963	TxUdSubscribeRequestSendBufferFull	Total number of SOAP Subscribe requests that failed to be sent due to the TCP/IP send buffer being full	5 min	Server Group	Ud Client Exception	New
3964	TxUdSubscribeRequestSendFailed	Total number of SOAP Subscribe requests that failed to be sent due to another error than the TCP/IP send buffer being full	5 min	Server Group	Ud Client Exception	New
3965	EvUdSubscribeRequestTimedOut	Total number of SOAP Subscribe requests that timed out before a response was received	5 min	Server Group	Ud Client Exception	New
3966	RxUdSubscribeResponseReceived	Total number of SOAP Subscribe responses received	5 min	Server Group	Ud Client SOAP Interface	New
3967	RxUdSubscribeResInvldCorrelationHeader	Total number of SOAP Subscribe responses received that contained an invalid correlation header	5 min	Server Group	Ud Client Exception	New
3968	RxUdSubscribeResponseRequestNotFound	Total number of SOAP Subscribe responses received where the initiating request could not be found in the list of outstanding requests	5 min	Server Group	Ud Client Exception	New
3969	RxUdSubscribeResponseSuccess	Total number of SOAP Subscribe responses received which indicated "Success"	5 min	Server Group	Ud Client SOAP Interface	New
3970	RxUdSubscribeResponseUnknownSubscriber	Total number of SOAP Subscribe responses received which indicated "Unknown	5 min	Server Group	Ud Client SOAP	New

ID	Tag	Description	Collect Interval	Scope(s)	Groups	New/Modified/Deleted
		Subscriber"			Interface	
3971	RxUdSubscribeResponseFailed	Total number of SOAP Subscribe responses received which indicated "Failed"	5 min	Server Group	Ud Client SOAP Interface	New
3973	RxUdNotifyRequestInvalidRequest	Total number of SOAP Notify requests received that did not comply to the expected format	5 min	Server Group	Ud Client SOAP Interface	New
3974	RxUdNotifyRequestTooMuchData	Total number of SOAP Notify requests received that were too large to process	5 min	Server Group	Ud Client Exception	New
3975	RxUdNotifyRequestInvalidKey	Total number of SOAP Notify requests received that contained a DN/objectClass from which a valid key type could not be deduced	5 min	Server Group	Ud Client Exception	New
3976	RxUdNotifyRequestBusy	Total number of SOAP Notify requests rejected because UDR was too busy	5 min	Server Group	Ud Client SOAP Interface	New
3977	RxUdNotifyRequestValid	Total number of SOAP Notify requests that were sent by the Ud Client application to the UDR BE	5 min	Server Group	Ud Client SOAP Interface	New
3978	EvUdNotifyRequestTimeout	Total number of SOAP Notify requests that were sent by the Ud Client application to the UDR BE for which no response was received within the expected time period	5 min	Server Group	Ud Client Exception	New
3979	RxUdNotifyResponseRequestNotFound	Total number of SOAP Notify responses received by the Ud Client application from the UDR BE where the corresponding SOAP Notify request could not be found in the list of outstanding requests	5 min	Server Group	Ud Client Exception	New
3980	RxUdNotifyResponseSuccess	Total number of SOAP Notify responses received by the Ud Client application from the UDR BE indicating the result "Success"	5 min	Server Group	Ud Client SOAP Interface	New
3981	RxUdNotifyResponseUnknownSubscriber	Total number of SOAP Notify responses received by the Ud Client application from the UDR BE indicating the result "Unknown Subscriber"	5 min	Server Group	Ud Client SOAP Interface	New
3982	RxUdNotifyResponseBusy	Total number of SOAP Notify responses received by the Ud Client application from the UDR BE indicating the result "Busy"	5 min	Server Group	Ud Client SOAP Interface	New
3983	RxUdNotifyResponseFailed	Total number of SOAP Notify responses received by the Ud Client application from the UDR BE indicating the result "Failed"	5 min	Server Group	Ud Client SOAP Interface	New
3984	RxUdNotifyResponseInvalidRequest	Total number of SOAP Notify responses received by the Ud Client application from the UDR BE indicating the result "Invalid Request"	5 min	Server Group	Ud Client SOAP Interface	New
3985	TxUdNotifyResponseSendFailed	Total number of SOAP Notify responses received which failed to be send on the SOAP connection	5 min	Server Group	Ud Client Exception	New
3992	RxUdNotifyRequestDiscarded	Total number of Ud Notify Requests discarded	5 min	Server Group	Ud Client SOAP Interface	New
3989	RxUdUnsubscribeRequest	Total number SOAP Unsubscribe requests received by the Ud Client application	5 min	Server Group	Ud Client SOAP Interface	New

4.3 KPIs

Table 41: KPIs

ID	Name	Avg. Interval	Description	New/ Modified / Deleted
13192	TxPsoRequestRate	10 sec	The number of inter-NO requests sent per second	New
13193	RxPsoRequestRate	10 sec	The number of inter-NO requests received per second	New
13450	TxUdSearchRate	10 sec	The number of LDAP Search requests sent per second	New
13451	TxUdSearchInitialRate	10 sec	The number of LDAP Search requests sent when initially creating a subscriber sent per second	New
13452	TxUdSearchReSearchRate	10 sec	The number of LDAP Search requests sent when performing a re-search per second	New
13453	TxUdSubscribeRate	10 sec	The number of SOAP Subscribe requests sent per second	New
13454	TxUdSubscribeInitialRate	10 sec	The number of SOAP Subscribe requests sent when initially creating a subscriber sent per second sent per second	New
13455	TxUdSubscribeReSubscribeRate	10 sec	The number of SOAP Subscribe requests sent when performing a re-subscribe per second	New
13456	RxUdNotifyRate	10 sec	The number of SOAP Notify requests received per second	New
13457	RxUdShUdrRate	10 sec	The number of Sh UDR requests that trigger the Ud-Creation of a subscriber received per second	New
13458	RxUdShPurRate	10 sec	The number of Sh PUR requests that trigger the Ud-Creation of a subscriber received per second	New
13459	RxUdShSnrRate	10 sec	The number of Sh SNR requests that trigger the Ud-Creation of a subscriber received per second	New

4.4 Events

Table 42: Events

ID	Name/Descr Text	Addl Info	Description	New/ Modified / Deleted
13362	Pool Audit Complete	None	This event is generated each time a Pool audit completes	New
13363	User Data Size exceeds Max User Data Size	None	This event is generated each time UDR/SNR/PNR fails because of userdata size exceeding Max User Data Size	New
13160	xgSDMUdShCreateFailed	Subscriber User Identity	Failed to create Ud-Created subscriber via the Sh interface	New
13161	xgSDMUdBindRequestTimeout	None	An LDAP Bind request was sent, but a response was not received within the expected time period	New
13162	xgSDMUdBindRequestFailed	LDAP Error Received	An LDAP Bind requested was not successful, and failed with a general failure error	New
13163	xgSDMUdBindRequestAuthenticationFailed	LDAP Error Received	An LDAP Bind requested was not successful, and failed with an authentication failure error	New
13164	xgSDMUdSearchRequestFailed	Subscriber User Identity, LDAP Error Received	An LDAP Search requested was not successful, and failed with a general failure error	New
13165	xgSDMUdSearchRequestAuthenticationFailed	Subscriber User Identity, LDAP Error Received	An LDAP Search requested was not successful, and failed with an authentication failure error	New
13166	xgSDMUdSearchRequestUnknownSubscriber	Subscriber User Identity, LDAP Error Received	An LDAP Search requested was not successful, and failed with an unknown subscriber error	New
13167	xgSDMUdSubscribeRequestUnknownSubscriber	Subscriber User Identity, HTTP Error Received, Subscribe Type (subscribe/unsubscribe)	A SOAP Subscribe requested was not successful, and failed with an unknown subscriber error	New
13168	xgSDMUdSubscribeRequestFail	Subscriber User Identity, HTTP Error Received,	A SOAP Subscribe requested was not	New

	ed	Subscribe Type (subscribe/unsubscribe)	successful, and failed with a general failure error	
13169	xgSDMUdNotifyRequestInvalidKey	SOAP Notify DN, SOAP Notify objectClass	A SOAP Notify request was received containing a notification with an unknown key	New
13170	xgSDMUdCreatedSubscriberAuditComplete	None	Ud-Created Subscriber Audit Complete	New

4.5 Current MEAL Data

Currently available MEAL data in Release12.2 is present in xls: MEAL_UDR-12.2.0.0.0-15.2.0.xlsx

Delta between Release 12.2 and 12.1 is present in xls: MEAL_UDR-12.1.0.0.0-13.8.0-UDR-12.2.0.0.0-15.12.0.xlsx


MEAL_UDR-12.2.0.0
.0-15.2.0.xlsx


MEAL_UDR-12.1.0.0
.0-13.8.0-UDR-12.2.(

TPD MEAL data in Release 12.2 is present in xls: MEAL_tpd-7.0.3.0.0_86.46.0.xlsx

Delta between Release 12.2 and 12.1 is present in xls: MEAL_tpd-7.0.2.0.0_86.36.0-tpd-7.0.3.0.0_86.46.0.xlsx


MEAL_tpd-7.0.3.0.0
_86.46.0.xlsx


MEAL_tpd-7.0.2.0.0
_86.36.0-tpd-7.0.3.(

Appendix A. Locate Product Documentation on the Oracle Help Center Site

Oracle 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 www.adobe.com.

A.1 User Data Repository Documentation

To access User Data Repository User Guides follow the following steps:

1. Log into the Oracle Help Center site at http://docs.oracle.com
2. Select "Industries"
3. Select "Oracle Communications documentation" under "Oracle Communications"
4. Select "User Data Repository" under "Network Session Delivery and Control Infrastructure"
5. Select the Release
6. To download a file to your location, right-click the PDF link and select Save Target As

A.2 Platform Documentation

To access Platform User Guides and Release Notes follow the following steps:

1. Log into the Oracle Help Center site at http://docs.oracle.com
2. Select "Industries"
3. Select "Oracle Communications documentation" under "Oracle Communications"
4. Select "Tekelec" under "Platform"
5. Select the Release
6. To download a file to your location, right-click the PDF link and select Save Target As