

**Oracle® Communications
Subscriber Data Management**

XML Notifications-XML Interface Description

910-6553-001 Revision C

January 2014

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

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

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

U.S. GOVERNMENT RIGHTS Programs, software, databases, and related documentation and technical data delivered to U.S. Government customers are "commercial computer software" or "commercial technical data" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, the use, duplication, disclosure, modification, and adaptation shall be subject to the restrictions and license terms set forth in the applicable Government contract, and, to the extent applicable by the terms of the Government contract, the additional rights set forth in FAR 52.227-19, Commercial Computer Software License (December 2007). Oracle America, Inc., 500 Oracle Parkway, Redwood City, CA 94065.

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

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

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

This software or hardware and documentation may provide access to or information on content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services.

Table of Contents

Chapter 1: Introduction.....	7
Chapter 2: Notification Types.....	8
Mobile subscriber roaming into a new country or changing IMSI.....	9
Message received from the VLR.....	9
Chapter 3: Service Subscription.....	10
Connection.....	11
User Authentication.....	11
Subscription to a Service.....	11
Activating the Service.....	11
Unsubscribing from a Service.....	11
Connection Management.....	11
External Application Interaction with the HLR.....	12
Chapter 4: Notifications.....	13
Roaming Welcome Notification, CC+NDC Change Notification, and IMSI Change Notification.....	14
VLR Message Notification.....	14
Chapter 5: XML Requests Format.....	16
Message Format.....	17
Authentication Request.....	17
Subscribe Request.....	17
Activate Request.....	18
Unsubscribe.....	18
Ping Request.....	18
Chapter 6: XML Notifications Format.....	20
XML Notifications Guidelines.....	21

Roaming Welcome Notification, CC+NDC Change Notification, and IMSI Change Notification.....	21
VLR Message Notification (XML) example.....	22
Chapter 7: References.....	23
List of references.....	24
Glossary.....	25

List of Figures

Figure 1: External Application Interaction with the HLR.....	12
--	----

List of Tables

Table 1: Roaming Welcome Notification Information.....14

Chapter 1

Introduction

This document describes how the Tekelec ngHLR provides an XML-based interface for sending notifications to external applications based on specific criteria, e.g., either the reception of a VLR message or on the subscriber roaming into a different country.

It is possible for several criteria to be used at the same time, e.g., the same subscriber enabled for the above two notification types will trigger two notifications for one Location Update message.

The same external application can register for different notification types.

Different applications can register independently to the same notification types.

Chapter 2

Notification Types

Topics:

- *Mobile subscriber roaming into a new country or changing IMSI.....9*
- *Message received from the VLR.....9*

Mobile subscriber roaming into a new country or changing IMSI

The Tekelec ngHLR is able to notify a server when it receives a MAP Location_Update or MAP Location_Update_for_GPRS message with:

- A Country Code (CC) different from the previously registered one
- A Country Code and National Destination Code (CC+NDC) different from the previously registered one
- An IMSI different from the previously registered one

Some markets require the operators to notify by SMS their end-users when they roam into a different country, this feature allows the Tekelec ngHLR to detect when end-users roam into a new country and then notify the server which will be in charge of sending the welcome SMS to the user.

For a more detailed explanation of the condition triggering this XML notification please refer to the description of the features "Roaming Welcome Notification" and "XML Notifications on NDC change or IMSI change" in the *SDM Product Description*.

Message received from the VLR

The Tekelec ngHLR is able to notify an external application of the reception of a message from the VLR or SGSN. These MAP message types generate XML notifications:

1. Location Update (UL)
2. Location Update for GPRS (UL_GPRS)
3. Send Authentication Info (SAI)
4. Ready for SM (ReadySM)
5. Purge MS (PurgeMS)
6. Cancel Location (CL)
7. Standalone Insert Subscriber Data (ISD)
8. Standalone Delete Subscriber Data (DSD)
9. Standalone Cancel Location (CL)

For a more detailed explanation of the condition triggering this XML notification, refer to the section "VLR Message Notifications (XML Notifications)" in the *SDM Product Description*.

Chapter 3

Service Subscription

Topics:

- *Connection.....11*
- *User Authentication.....11*
- *Subscription to a Service.....11*
- *Activating the Service.....11*
- *Unsubscribing from a Service.....11*
- *Connection Management.....11*
- *External Application Interaction with the HLR.....12*

The Tekelec ngHLR provides an interface to external applications (EA) by providing an OAMP virtual IP address (VIP) for access over TCP/IP.

Connection

In order to receive the notifications, the External Application (EA) must first establish a TCP/IP connection with the SDM using the system-defined OAMP VIP on port 62001.

User Authentication

Once the EA connects to the SDM, it must authenticate itself before any other action can be performed. The authentication process is performed through a user name and password authorized for accessing the SDM, using an Operation request in XML. The detailed XML request used to authenticate the external application is described in the [Authentication Request](#) section of this document.

Subscription to a Service

Once a connection is authenticated, the EA can subscribe (register) to a notification service through an XML request. The subscription operation does not have any user customizable fields. The detailed XML request used to subscribe to the notification service is described in the [Subscribe Request](#) section of this document.

Activating the Service

The last step required by the EA to receive the notification is to use an Activate request. The request will activate all services that the EA is currently subscribed to. The operation does not have any user customizable fields. The detailed XML format can be found in the [Activate Request](#) section of this document.

Unsubscribing from a Service

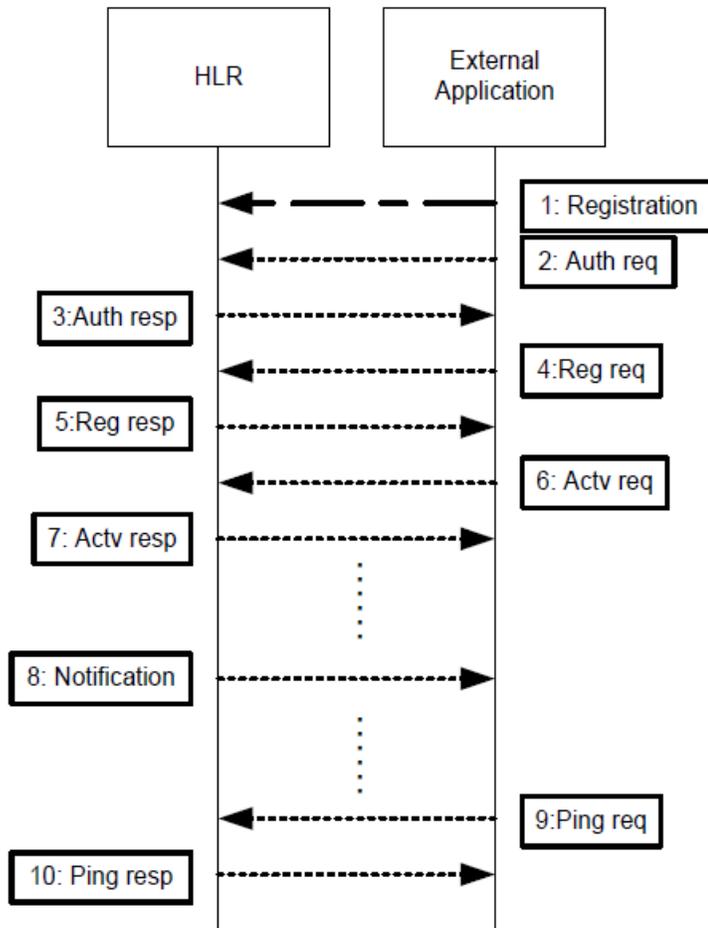
It is possible to unsubscribe from a notification service. The detailed XML request required to unsubscribe from the notification service is provided in the [Unsubscribe](#) section of this document.

Connection Management

Once the connection is established, it is the responsibility of the EA to monitor the connection status. If the connection is broken, the EA will need to go through the process of authentication, registration, and activation in order to continue receiving the notifications.

In order to monitor the connection, a ping service is offered to the external application. The ping is sent as an XML request. The format of the ping message is described in detail in the [Ping Request](#) section of this document.

External Application Interaction with the HLR



- 1: Registration (Establishing the IP connection)
- 2: XML Authentication req
- 3: XML Authentication resp
- 4: XML Registration to Roaming Notification service request
- 5: XML Registration to Roaming Notification service response
- 6: XML Activate registrations request
- 7: XML Activate registrations response
- 8: XML Roaming in new Country notification\
- 9: XML Ping req(note1)
- 10: XML Ping resp(note1)

note : The status of the connection must be monitored by the application server. A ping service is offered, if no other methods to monitor the connection are available to the application server

Figure 1: External Application Interaction with the HLR

Chapter 4

Notifications

Topics:

- *Roaming Welcome Notification, CC+NDC Change Notification, and IMSI Change Notification.....14*
- *VLR Message Notification.....14*

Roaming Welcome Notification, CC+NDC Change Notification, and IMSI Change Notification

Each EA subscribed to the above service on a given Tekelec ngHLR will receive an XML notification when a subscriber roams in a new country (changes CC), when the subscriber changes CC and NDC, or when the subscriber changes IMSI. The notification will contain the following information:

Table 1: Roaming Welcome Notification Information

Field	Description
MsIsdn	The MsIsdn
IMSI	The current or new IMSI
VlrGtt	The GTT address of the VLR where the subscriber is roaming
UpdLocIsGPRS	A Boolean flag indicating nature of the registration. The flag is false for a non-GPRS registration and true on a GPRS registration.
TimeStamp	The Location Update timestamp in the following format: "%Y-%m-%d %H:%M:%S" • %Y : Year with century • %m : Month as a decimal number [01,12] • %d : Day • %H : Hour (24-hour clock) • %M : Minute • %S : Second Example: 2012-07-28 19:55:23

VLR Message Notification

When a message from the VLR is received in the HLR, a notification will be sent to the EA. The notification will contain the following information:

- The local **timestamp**
- The registered **IMSI** of the subscriber
- The "displayed" **MSISDN** of the subscriber
- The **type** of message received (UL | UL_GPRS | SAI | ReadySM | PurgeMS | CL | standalone ISD, DSD, CL)
- The **Global Title (E.164) address** of the node that sent the message (VLR or SGSN)
- The **Result Notification** with information on whether the message reply was a success or a failure. The supported values are "Successful" and "Fail".

For all message types the following "optional" information is included:

- The **ResultCodeError**. If the Result Notification is "Fail" then the MAP error message is included in the XML notification message. If the Result Notification is "Successful" then no ResultCodeError is included in the XML notification message.

Depending on the message type, additional "optional" information is included:

If the type of the message received is UL:

- The **MSC E.164 address**

If the type of message received is ReadySM:

- The **Alert Reason** (integer value)

If the type of message received is standalone ISD, DSD or CL:

- The **Retry Number** (number of times the system tried to re-send a dialogue)

VLR Message Notification Log File

The information that is sent in the VLR Message Notification (XML) to the EA can also be added to a log file. The log file is a comma-separated values (CSV) file. For more detailed information please see section "VLR Message Notification Log File" in the *SDM Product Description*.

Chapter 5

XML Requests Format

Topics:

- *Message Format.....17*
- *Authentication Request.....17*
- *Subscribe Request.....17*
- *Activate Request.....18*
- *Unsubscribe.....18*
- *Ping Request.....18*

Message Format

All the messages sent to or received from HLR must be in the following format:

Request size (4 bytes)	Request
------------------------	---------

The maximum length of a request is 32K bytes (excluding the request size) and must be in XML format.

Authentication Request

The XML format of the authentication request must be as follows:

```
<req name="operation">
<oper name = "RequestUserAuc" ent="UserAuthentication" ns="bn">
<expr>
<param name="UserName" />
<op value="="/>
<value val="USER_NAME" />
</expr>
<expr>
<param name="UserPasswd" />
<op value="="/>
<value val="USER_PASSWD" />
</expr>
<expr>
<param name="InterfaceModuleId" />
<op value="="/>
<value val="25" />
</expr>
</oper>
</req>
```

Subscribe Request

The Subscribe messages are built using XML Operation requests following the format shown below:

```
<req name="operation">
<oper name="Subscribe" ent="ExternalServiceManager" ns="bn">
<expr>
<param name="Namespace" />
<op value="="/>
<value val="bn" />
</expr>
<expr>
<param name="Entity" />
<op value="="/>
<value val="Hlr" />
</expr>
<expr>
<param name="Attribute" />
```

```

        <op value="" />
        <value val="RoamingWelcomeNotification" />
    </expr>
</oper>
</req>

```

Activate Request

The Activate Notification messages are built using XML Operation requests following the format shown below:

```

<req name="operation">
<oper name="ActivateNotification" ent="ExternalServiceManager" ns="bn">
</oper>
</req>

```

Unsubscribe

The Unsubscribe messages are built using XML Operation requests following the format shown below:

```

<req name="operation">
<oper name="Unsubscribe" ent="ExternalServiceManager" ns="bn">
    <expr>
        <param name="Namespace" />
        <op value="" />
        <value val="bn" />
    </expr>
    <expr>
        <param name="Entity" />
        <op value="" />
        <value val="Hlr" />
    </expr>
    <expr>
        <param name="Attribute" />
        <op value="" />
        <value val="RoamingWelcomeNotification" />
    </expr>
</oper>
</req>

```

Ping Request

The Ping Request messages are built using XML Operation requests following the format shown below:

Ping Request

```
<req name="operation">  
<oper name = "PingOampmanager" ent="ExternalServiceManager" ns="bn"/>  
</req>
```

Chapter 6

XML Notifications Format

Topics:

- *XML Notifications Guidelines.....21*
- *Roaming Welcome Notification, CC+NDC Change Notification, and IMSI Change Notification.....21*
- *VLR Message Notification (XML) example.....22*

XML Notifications Guidelines

The Tekelec ngHLR sends XML notifications using the general guidelines defined under the “User Interface” section in the *SDM Subscriber Provisioning Reference Manual*.

Roaming Welcome Notification, CC+NDC Change Notification, and IMSI Change Notification

The RoamingWelcomeNotification messages are built using XML Operation requests following the format shown below:

```
<notif nbreq="1">
  <req name="operation" ver="VERSION" state="undefined">
    <oper name = "RoamingWelcomeNotification" ent="HlrServer" ns="bn">
      <expr>
        <param name="MsIsdn" />
        <op value="="/>
        <value val="MS_ISDN" />
      </expr>
      <expr>
        <param name="Imsi" />
        <op value="="/>
        <value val="IMSI" />
      </expr>
      <expr>
        <param name="VlrGtt" />
        <op value="="/>
        <value val="VLR_GTT" />
      </expr>
      <expr>
        <param name="UpdLocIsGPRS" />
        <op value="="/>
        <value val="UPD_LOC_IS_GPRS" />
      </expr>
      <expr>
        <param name="TimeStamp" />
        <op value="="/>
        <value val="TIME_STAMP" />
      </expr>
    </oper>
  </req>
</notif>
```

VLR Message Notification (XML) example

An example notification (for a Ready SM message) is shown below:

```
<notif nbreq="1">
<req name="operation" ver="VERSION" state="undefined">
<oper name="VlrMessageNotification" ent="Hlr" ns="bn">
  <expr>
    <param name="TimeStamp" />
    <op value=""/>
    <value val="TIME_STAMP"/>
  </expr>
  <expr>
    <param name="Imsi" />
    <op value=""/>
    <value val="IMSI"/>
  </expr>
  <expr>
    <param name="MsIsdn" />
    <op value=""/>
    <value val="MSISDN"/>
  </expr>
  <expr>
    <param name="MessageType" />
    <op value=""/>
    <value val="TYPE"/>
  </expr>
  <expr>
    <param name="VlrGtt" />
    <op value=""/>
    <value val="VLR_GTT"/>
  </expr>
  <expr>
    <param name="MscAddress" />
    <op value=""/>
    <value val="MSC_ADDR"/>
  </expr>
  <expr>
    <param name="ResultNotify"/>
    <op value=""/>
    <value val="RESULT"/>
  </expr>
  <expr>
    <param name="AlertReason" />
    <op value=""/>
    <value val="ALERT REASON"/>
  </expr>
  <expr>
    <param name="ResultCodeError"/>
    <op value=""/>
    <value val="RESULT"/>
  </expr>
</oper>
</req>
</notif>
```

The operator can activate logging of VLR Message Notification. For more detailed information see section "VLR Message Notification Log File" in the *SDM Product Description*

Chapter 7

References

Topics:

- *List of references.....24*

List of references

- 3GPP TS 29.002: *Mobile Application Part (MAP) specification*.

C

CC
Connection Confirmed
Country Code
Composite Clock

CSV
Comma-separated values
The comma-separated value file format is a delimited data format that has fields separated by the comma character and records separated by newlines (a newline is a special character or sequence of characters signifying the end of a line of text).

E

EA
Expedited Data Acknowledgment

H

HLR
Home Location Register
A component within the Switching Subsystem of a GSM network. The HLR database is the central database within the GSM architecture. This is where information about the mobile communications subscribers who are assigned to a specific location area is stored. The subscriber data is used to establish connections and control services. Depending on the network size, the number of subscribers and the network organization, a number of HLRs can exist within a GSM network.

I

I

IMSI

International Mobile Subscriber Identity

A unique internal network ID identifying a mobile subscriber.

International Mobile Station Identity

M

MAP

Mated Application Part

Mobile Application Part

An application part in SS7 signaling for mobile communications systems.

N

NDC

Network destination code

Network Data Collection

S

SGSN

Serving GPRS Support Node

SMS

Short Message Service

A communication service component of the GSM mobile communication system that uses standard communications protocols to exchange short text messages between mobile phone devices. See also GSM.

V

VLR

Visitor Location Register

A component of the switching subsystem, within a GSM network. The switching subsystem includes various databases which store individual subscriber data. One of these databases is the HLR database or Home Location Register; and the VLR is another.

V

Virtual Location Register

X

XML

eXtensible Markup Language

A version of the Standard Generalized Markup Language (SGML) that allows Web developers to create customized tags for additional functionality.