Subscriber Data Management

XML Notifications-XML Interface Description

910-6553-001 Revision B

June 2013

Tekelec

Table of Contents

List of Figures

List of Tables

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

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. Five 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)

For a more detailed explanation of the condition triggering this XML notification refer to the description of the "XML notifications on UL, UL-GPRS, SAI, Ready SM, Purge MS and Cancel Location (CL)" feature in the *SDM Product Description* manual.

Chapter

3

Service Subscription

Topics:

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
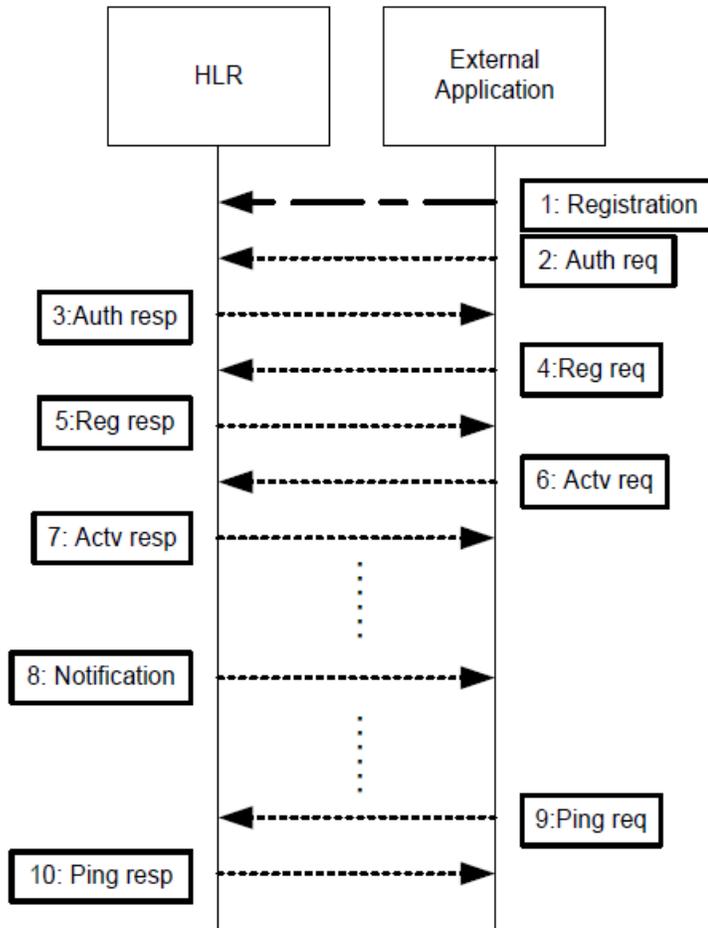
1: Registration (Establishing the IP connection)
2: XML Authentication req
3: XML Authentication resp
4: XML Registration to Roaming Notification service request
5: XML Registration to Roaming Notification service response
6: XML Activate registrations request
7: XML Activate registrations response
8: 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

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)
- 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)

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

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

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

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

Glossary

C

CC   Country Code

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

I

IMSI   International Mobile Subscriber
                      Identity

M

MAP   Mobile Application Part

N

NDC   Network destination code

S

SGSN   Serving GPRS Support Node

SMS   Short Message Service

V

VLR   Visitor Location Register

V

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.

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.