# User Guide to Restcomm GMLC

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# Preface

# Document Conventions

This manual uses several conventions to highlight certain words and phrases and draw attention to specific pieces of information.

In PDF and paper editions, this manual uses typefaces drawn from the Liberation Fonts set. The Liberation Fonts set is also used in HTML editions if the set is installed on your system. If not, alternative but equivalent typefaces are displayed. Note: Red Hat Enterprise Linux 5 and later includes the Liberation Fonts set by default.

## Typographic Conventions

Four typographic conventions are used to call attention to specific words and phrases. These conventions, and the circumstances they apply to, are as follows.

`Mono-spaced Bold`

Used to highlight system input, including shell commands, file names and paths. Also used to highlight key caps and key-combinations. For example:

> To see the contents of the file *my_next_bestselling_novel* in your current working directory, enter the `cat my_next_bestselling_novel` command at the shell prompt and press `Enter` to execute the command.

The above includes a file name, a shell command and a key cap, all presented in Mono-spaced Bold and all distinguishable thanks to context.

Key-combinations can be distinguished from key caps by the hyphen connecting each part of a key-combination. For example:

> Press `Enter` to execute the command.
>
> Press  to switch to the first virtual terminal. Press  to return to your X-Windows session.

The first sentence highlights the particular key cap to press. The second highlights two sets of three key caps, each set pressed simultaneously.

If source code is discussed, class names, methods, functions, variable names and returned values mentioned within a paragraph will be presented as above, in `Mono-spaced Bold`. For example:

> File-related classes include `filesystem` for file systems, `file` for files, and `dir` for directories. Each class has its own associated set of permissions.

`Proportional Bold`

This denotes words or phrases encountered on a system, including application names; dialogue box text; labelled buttons; check-box and radio button labels; menu titles and sub-menu titles. For example:

> Choose **System** > **Preferences** > **Mouse** from the main menu bar to launch `Mouse Preferences`. In the Buttons tab, click the Left-handed mouse check box and click **[ Close ]** to switch the primary mouse button from the left to the right (making the mouse suitable for use in the left hand).
>
> To insert a special character into a `gedit` file, choose **Applications** > **Accessories** > **Character Map** from the main menu bar. Next, choose **Search** > **Find** | **] from the `Character Map` menu bar** | **type the name of the character in the Search field and click [ Next**. The character you sought will be highlighted in the Character Table. Double-click this highlighted character to place it in the Text to copy field and then click the **[ Copy ]** button. Now switch back to your document and choose **Edit** > **Paste** from the `gedit` menu bar.

The above text includes application names; system-wide menu names and items; application-specific menu names; and buttons and text found within a GUI interface, all presented in Proportional Bold and all distinguishable by context.

Note the menu:>[] shorthand used to indicate traversal through a menu and its sub-menus. This is to avoid the difficult-to-follow 'Select  from the **Preferences** | **] sub-menu in the menu:System[** menu of the main menu bar' approach.

`Mono-spaced Bold Italic` or `Proportional Bold Italic`

Whether Mono-spaced Bold or Proportional Bold, the addition of Italics indicates replaceable or variable text. Italics denotes text you do not input literally or displayed text that changes depending on circumstance. For example:

> To connect to a remote machine using ssh, type `ssh username@domain.name` at a shell prompt. If the remote machine is *example.com* and your username on that machine is john, type `ssh john@example.com`.
>
> The `mount -o remount file-system` command remounts the named file system. For example, to remount the */home* file system, the command is `mount -o remount /home`.
>
> To see the version of a currently installed package, use the `rpm -q package` command. It will return a result as follows: `package-version-release`.

Note the words in bold italics above —username, domain.name, file-system, package,

version and release. Each word is a placeholder, either for text you enter when issuing a command or for text displayed by the system.

Aside from standard usage for presenting the title of a work, italics denotes the first use of a new and important term. For example:

> When the Apache HTTP Server accepts requests, it dispatches child processes or threads to handle them. This group of child processes or threads is known as a *server-pool*. Under Apache HTTP Server 2.0, the responsibility for creating and maintaining these server-pools has been abstracted to a group of modules called *Multi-Processing Modules* (*MPMs*). Unlike other modules, only one module from the MPM group can be loaded by the Apache HTTP Server.

## Pull-quote Conventions

Two, commonly multi-line, data types are set off visually from the surrounding text.

Output sent to a terminal is set in `Mono-spaced Roman` and presented thus:

```
books        Desktop   documentation  drafts  mss    photos   stuff  svn
books_tests  Desktop1  downloads      images  notes  scripts  svgs
```

Source-code listings are also set in `Mono-spaced Roman` but are presented and highlighted as follows:

```
package org.jboss.book.jca.ex1;

import javax.naming.InitialContext;

public class ExClient
{
   public static void main(String args[])
       throws Exception
   {
      InitialContext iniCtx = new InitialContext();
      Object         ref    = iniCtx.lookup("EchoBean");
      EchoHome       home   = (EchoHome) ref;
      Echo           echo   = home.create();

      System.out.println("Created Echo");

      System.out.println("Echo.echo('Hello') = " + echo.echo("Hello"));
   }

}
```

# Notes and Warnings

Finally, we use three visual styles to draw attention to information that might otherwise be overlooked.

*Note*

A note is a tip or shortcut or alternative approach to the task at hand. Ignoring a note should have no negative consequences, but you might miss out on a trick that makes your life easier.

*Important*

Important boxes detail things that are easily missed: configuration changes that only apply to the current session, or services that need restarting before an update will apply. Ignoring Important boxes won't cause data loss but may cause irritation and frustration.

*Warning*

A Warning should not be ignored. Ignoring warnings will most likely cause data loss.

# Provide feedback to the authors!

If you find a typographical error in this manual, or if you have thought of a way to make this manual better, we would love to hear from you! Please submit a report in the the {this-issue.tracker.ur}, against the product Restcomm GMLC` `, or contact the authors.

When submitting a bug report, be sure to mention the manual's identifier: Restcomm GMLC

If you have a suggestion for improving the documentation, try to be as specific as possible when describing it. If you have found an error, please include the section number and some of the surrounding text so we can find it easily.

# Chapter 1. Introduction to Restcomm GMLC

Restcomm GMLC is an Open Source Java based Gateway Mobile Location Centre platform, which enables offering Location Based Services (LBS) around mobile subscribers roaming accross either legacy GSM or UMTS/HSPA+ networks, or Next Generation Networks like LTE/LTE-Advanced.

Restcomm GMLC strictly adheres to the standards and specifications defined by the International Telecommunications Union (ITU) and the 3rd Generation Partnership Project / Long Term Evolution (3GPP/LTE) .

Restcomm GMLC is easy-to-install and easy-to-deploy allowing you to have the Gateway set up and configured very quickly.

Restcomm GMLC comes with an efficient Command Line Interface (CLI) tool allowing you to completely configure the Gateway at run-time and manage it using simple commands rather than do everything manually. Restcomm GMLC also comes with a Graphical User Interface (GUI) that will allow you to configure, monitor and manage the Gateway through a convenient user-friendly interface.

Further, the Open Source Software gives you flexibility to understand the readily available source code and freedom to customise the product to meet your Enterprise needs.

This guide provides details on configuring and using the platform and information regarding the supported protocols and compliant standards.

For installation instructions, please refer to the Installation Guide published along with this.

# Chapter 2. GMLC

## 2.1. Overview

GMLC stands for Gateway Mobile Location Centre enables you to offer Location Based Services (LBS) to mobile subscribers roaming across several Mobile Network Operator's Radio Access Networks, regardless of the type of access (GERAN, UTRAN or E-UTRAN).

Existing PLMN (Public Land Mobile Network) network elements are proprietary and run on non-standard operating environments located in trusted operator's zones which make it difficult to build and deploy new applications. Also, these network elements do not provide the tools and interfaces needed to access and retrieve data from content providers over the Internet. The GMLC connects to these network elements and enables the flow of LCS (Location Services) messages to be extended to an open, standards-based application server (AS) located in the IP network. The AS also provides the tools and interfaces to enable access to content providers through the Internet.

In one PLMN (Public Land Mobile Network), there may be more than one GMLC. A GMLC is the first node an external LCS client accesses in a PLMN.

The simplest location information a GMLC can retrieve is by issuing a MAP ATI (Any Time Interrogation) request to the HLR (Home Location register). MAP ATI is part of CAMEL phase 1. If the GMLC is allowed to proceed with the operation at the HLR, the latter will respond with the Cell Global Identity (CGI) as for the latest MAP Update Location operation carried out between the HLR and VLR at which the target mobile equipment is attached too (therefore, an additional parameter known as "Age of Location Information" is also included in the response). As shown in the figure below taken from 3GPP TS 23.003, CGI is made up of multiple components, namely, MCC (Mobile Country Code), MNC (Mobile Network Code), LAC (Location Area Code) and CI (Cell Identity). The combination of MCC and MCC represents the PLMN at which the cell is located, in other words, the country and Mobile Network Operator it belongs to. LAC represents a geographic location area in which a cluster of Base Transceiver Stations (BTS) are located for radio access, while CI, uniquely identifies the BTS providing service to the target subscriber in that area (more commonly known as cell). From CAMEL phase 4 compliance onward, MAP ATI can also retrieve the IMEI and MS Classmark.

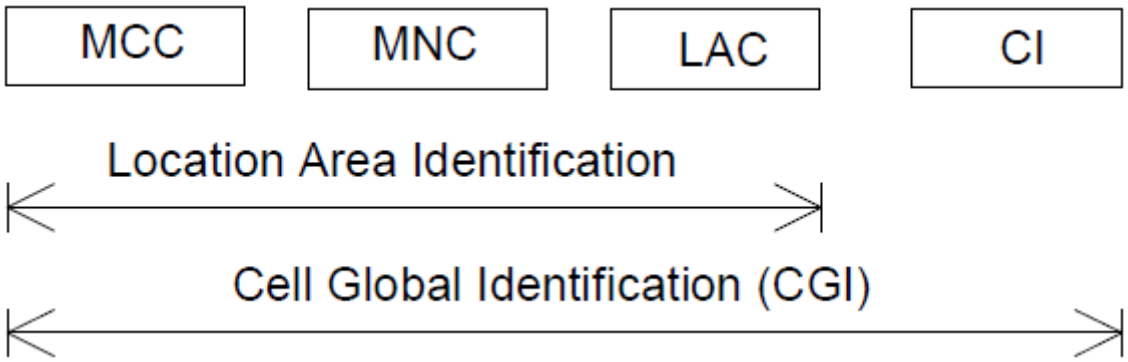


*Figure 1. Cell Global Identification structure (3GPP TS 23.003)*

CGI represents the location information with greatest error margin retrievable by a GMLC in GSM based core networks.

From 3G (UMTS) and beyond, more accurate positioning methods were developed for cellular networks. Of course, accuracy comes with a price. When these dearer location capabilities are available, the GMLC may request routing information from the HLR via the Lh interface or HSS (Home Subscriber Server) via the SLh/Lh interface.

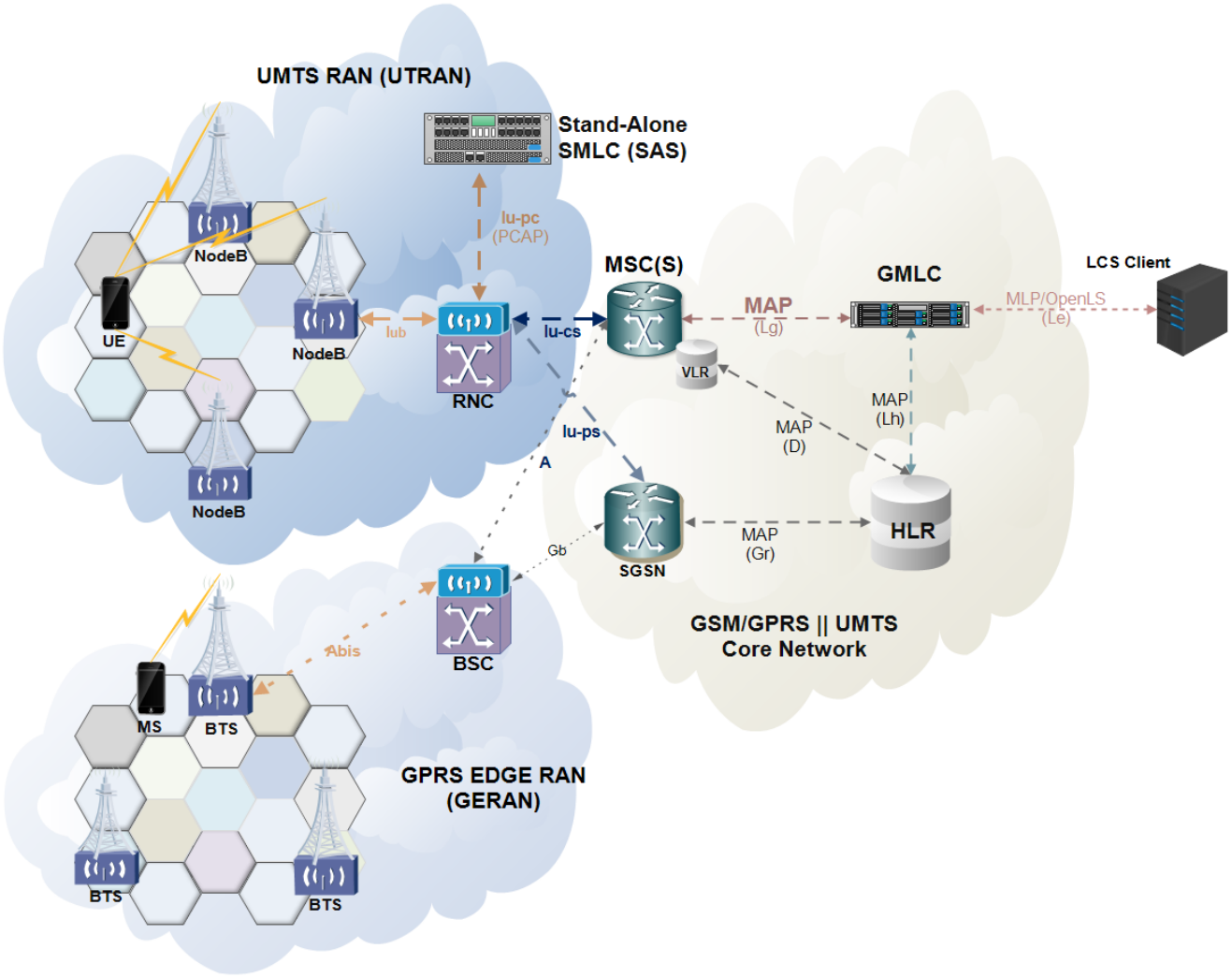


*Figure 2. GSM/GPRS/UMTS Location Services interfaces*

While Lh interface reside in a Circuit-Switched Core Network and therefore demands SS7 MAP operations, SLh is placed in the Evolved Packet Core (EPC) and is a Diameter-based interface for LTE location services, as specified by 3GPP TS 29.172. After performing registration authorization, it may send positioning requests to either VMSC (Visited Mobile Switching Centre), SGSN (Serving GPRS Support Node), MSCS (Mobile Switching Centre Server) or MME (Mobility Management Entity) and receives final location estimates from the corresponding entity via the Lg, Lgd or SLg interface. Again, Lg/Lgd interfaces demand SS7 MAP operations while SLg is a Diameter-based interface for LTE location occupying ELP procedures, where ELP stands for EPC Location Protocol as specified by 3GPP TS 29.172.

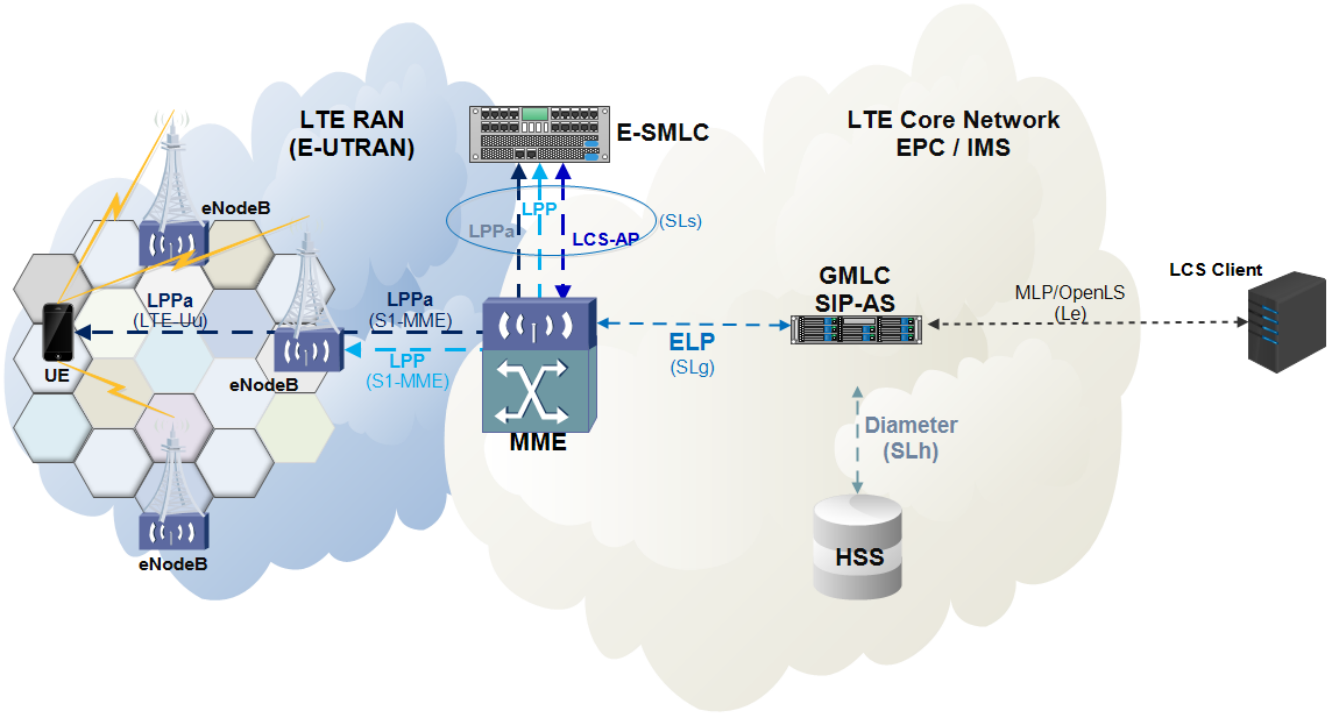


*Figure 3. LTE EPC Location Services interfaces*

Up to this point, what is known as "Immediate Location Request" has been covered. A GMLC can also handle "Deferred Location Request", which represents retrieving of location contingent on some current or future events where the response from the LCS Server to the LCS Client may occur some time after the request was sent, as described in 3GPP TS 23.271. When a deferred location request is triggered by the GMLC, event-based "Subscriber Location Reports", either conveyed through MAP or ELP are sent back to the GMLC by the entity at which the target mobile equipment is attached to (VMSC, MSCS, SGSN or MME).

Finally, Restcomm supports the following MAP and Diameter-based operations for LCS (Location Services) within Mobile Network Operators:

- MAP ATI: Any-Time-Interrogation, to gather Cell Global Identity, age of location information and state of the target mobile station from the HLR.
- MAP SRIforLCS: Send Routing Information for Location Services, to gather IMSI and core network entity address (MSC or SGSN) to which send further location request.
- MAP PSL: Provide Subscriber Location, to gather location information from the UTRAN (UMTS Terrestrial Radio Access Network), which should include, besides Cell Global Identity, location estimates in geographic coordinates of the target User Equipment, depending on available positioning methods (e.g. E-OTD, OTDOA, UTDOA, A-GPS, etc.).
- MAP SLR: Subscriber Location Report, to gather location of a target User Equipment from the MSC or SGSN when a request for location is either implicitly administered or made at some earlier time in MAP PSL for event based deferred type of location.
- Diameter Routing Information Request/Answer (RIR/RIA): analogous to MAP SRIforLCS but over Diameter based SLh interface between GMLC and HSS.
- ELP Provide Location Request/Answer (PLR/PLA): analogous to MAP PSL but over Diameter-based Evolve Packet Core Location Protocol (ELP) SLg interface between GMLC and MME.
- ELP Location Report Request/Answer (LRR/LRA): analogous to MAP SLR, but over Diameter-

based Evolve Packet Core Location Protocol (ELP) SLg interface between GMLC and MME.

## 2.2. Message Flow

GMLC service begins when the network sends an HTTP (GET/POST) request to the GMLC Gateway.

The message flow involves the following steps:

## 2.3. Restcomm GMLC

### 2.3.1. Major Features

Restcomm 's implementation of GMLC Gateway is the first and only open source GMLC Gateway with a host of rich features and advantages.

*Java-based*

Restcomm GMLC is the only Java based GMLC Gateway. It is robust and reliable and can be installed on any Operating System that supports Java (JDK 7 and SCTP).

*Open Source*

The Software is open-source, giving you the freedom to understand the code and customise it to your enterprise needs. It is supported by a vibrant Open source community.

*Carrier Grade Performance*

Restcomm GMLC has been developed to be deployed at Mobile Network Operators around the world so as to process billions of LCS transactions every day. A single RestComm GMLC node can process up to 1500’s LCS/sec and can be adapted to the needs of Communication Service Providers of different sizes in any country reducing CAPEX and OPEX costs.

*Cloud Ready*

Restcomm GMLC is Cloud-ready. It can be deployed on dedicated hardware, private cloud infrastructure or public IaaS such as AWS.

*SS7 Hardware Cards*

Restcomm GMLC can be used with Intel family boards (Dialogic SS7 cards) or Zaptel/Dahdi compatible TDM devices (Digium, Sangoma). For production its recommended to use Dialogic boards only.

*SIGTRAN (M3UA)*

It also has in-built support for SIGTRAN (M3UA using SCTP).

*Diameter-based SLh and SLg (ELP)*

It also has in-built support for LCS in LTE networks.

*HTTP interface*

HTTP interface is a common interface that can be used for connection with service applications. Restcomm GMLC supports network/application/service initiated LCS requests.

*MLP*

Location requests can be sent to the GMLC using plain XML over HTTP(S), with the request being encoded in OMA MLP (Mobile Location Protocol). See the full OMA MLP technical specification here: http://technical.openmobilealliance.org/Technical/technical-information/release-program/current-releases/mlp-v3-1

*Easy Configuration and Management*

Restcomm GMLC comes with an efficient Command Line Interface (CLI) tool allowing you to completely configure the Gateway at run-time and manage it using simple commands rather than do everything manually. Restcomm GMLC also comes with a Graphical User Interface that will allow you to configure, monitor and manage the Gateway through a convenient user-friendly interface.

### 2.3.2. Technical Specifications

Restcomm GMLC is not restricted by Transaction Per Second model. The only restricting factor is memory + CPU capacity of the host servers, third-party applications or the underlying database service.

- Restcomm GMLC supports as many as 1073741823 incoming and 1073741823 outgoing concurrent sessions/dialogs.
- Restcomm GMLC supports unlimited E1 links and the only limiting factor is the underlying TDM board used.
- Restcomm GMLC SCTP supports as many associations as supported by the underlying Operating System. Can be setup in multihome.
- Restcomm GMLC M3UA can be confgured to have as many ASP's / IPSP's as needed by the system.
- Restcomm GMLC SCCP can be confgured to have virtually unlimited Global Title Translation rules and also supports wild characters for partial matching of Global Title digits.

### 2.3.3. HTTP Transfer Mechanism

The Restcomm makes use of HTTP protocol between the gateway and the third-party applications (or Value Added Service Modules). Restcomm receives the GMLC request from the third-party applications and then translates these requests to SS7 MAP or Diameter based commands when applies. The HTTP callback mechanism allows the third-party Application to be agnostic to Operating System, Programming Language and Framework. The third-party Application can be either of the following technologies on any Operating System:

- Apache Tomcat, JBoss AS, Oracle Application Server, IBM Websphere etc for JSP/Servlet on Java
- PHP
- Microsoft IIS for ASP

# Chapter 3. Running

## 3.1. Running the Gateway

*Procedure: Run Restcomm GMLC*

1. Pre-requisite:
    - You must have Restcomm GMLC installed as explained in the Installation Guide.
    - If you are using the SS7 board on server, you must ensure that the `java.library.path` variable is set to point to the directory containing the native component. Alternatively you can copy it to the JBoss native library path manually.
2. All you have to do to start the Gateway is start the JBoss Application Server. To start the JBoss Server you must execute the *run.sh* (Unix) or *run.bat* (Microsoft Windows) startup script in the installation directory *restcomm-gmlc-/jboss-5.1.0.GA/bin*. Note that this will start the server in the default profile. The "default" profile is a clean profile where you start from scratch and configure the entire SS7 Stack and GMLC Gateway to suit your requirements.
3. Result: If the service started properly you should see the following last few output lines in the Unix terminal or Command Prompt depending on your environment:

```
19:49:43,856 INFO  [ServiceManagementImpl] (main) Activated
ServiceID[name=mobicents-gmlc,vendor=org.mobicents,version=1.0]
19:49:44,123 INFO  [ShellServer] (main) Starting SS7 management shell environment
19:49:44,124 INFO  [ShellServer] (main) ShellExecutor listening at /127.0.0.1:3435
19:49:44,175 INFO  [Ss7Management] (main) Starting ...
19:49:44,175 INFO  [MBeanHostImpl] (main) Found MBeanServer matching for
agentId=jboss
19:49:44,175 WARN  [MBeanHostImpl] (main) Found non-matching MBeanServer with
default domian = null
19:49:44,176 INFO  [Ss7Management] (main) Started ...
19:49:44,184 INFO  [MBeanHostImpl] (main) Registered MBean with
ObjectName=org.mobicents.ss7:layer=ALARM,type=Management,name=AlarmHost
19:49:44,184 INFO  [Ss7Management] (main) Registered MBean: AlarmHost
19:49:44,192 INFO  [CounterProviderManagement-CounterHost] (main) Starting ...
19:49:44,192 INFO  [CounterProviderManagement-CounterHost] (main) CounterManagement
configuration file path /home/telestax/RestComm/restcomm-gmlc-1.0.42/jboss-
5.1.0.GA/server/default/data/CounterHost_CounterProvider.xml
19:49:44,207 INFO  [MBeanHostImpl] (main) Registered MBean with
ObjectName=org.mobicents.ss7:layer=COUNTER,type=Management,name=CounterHost
19:49:44,211 INFO  [Ss7Management] (main) Registered MBean: CounterHost
19:49:44,243 INFO  [CounterProviderManagement-CounterHost] (main) Started ...
19:49:44,337 INFO  [MBeanHostImpl] (main) Registered MBean with
ObjectName=org.mobicents.ss7:layer=SCTP,type=Management,name=SCTPManagement
19:49:44,338 INFO  [Ss7Management] (main) Registered MBean: SCTPManagement
19:49:44,366 INFO  [MBeanHostImpl] (main) Registered MBean with
ObjectName=org.mobicents.ss7:layer=M3UA,type=Management,name=Mtp3UserPart
19:49:44,366 INFO  [Ss7Management] (main) Registered MBean: Mtp3UserPart
19:49:44,392 INFO  [MBeanHostImpl] (main) Registered MBean with
ObjectName=org.mobicents.ss7:layer=SCCP,type=Management,name=SccpStack
19:49:44,392 INFO  [Ss7Management] (main) Registered MBean: SccpStack
19:49:44,397 INFO  [MBeanHostImpl] (main) Registered MBean with
ObjectName=org.mobicents.ss7:layer=SCCP,type=Router,name=SccpStack
19:49:44,397 INFO  [Ss7Management] (main) Registered MBean: SccpStack
19:49:44,399 INFO  [MBeanHostImpl] (main) Registered MBean with
ObjectName=org.mobicents.ss7:layer=SCCP,type=Resource,name=SccpStack
19:49:44,399 INFO  [Ss7Management] (main) Registered MBean: SccpStack
19:49:44,433 INFO  [TcapManagementJmx-TcapStack] (main) Starting ...
19:49:44,436 INFO  [MBeanHostImpl] (main) Registered MBean with
ObjectName=org.mobicents.ss7:layer=TCAP,type=Management,name=TcapStack
19:49:44,437 INFO  [CounterProviderManagement-CounterHost] (main) Registered
CounterMediator: Tcap-TcapStack
19:49:44,437 INFO  [Ss7Management] (main) Registered MBean: TcapStack
19:49:44,437 INFO  [TcapManagementJmx-TcapStack] (main) Started ...
19:49:44,530 INFO  [Http11Protocol] (main) Starting Coyote HTTP/1.1 on http-
127.0.0.1-8080
19:49:44,566 INFO  [AjpProtocol] (main) Starting Coyote AJP/1.3 on ajp-127.0.0.1-
8009
19:49:44,571 INFO  [ServerImpl] (main) JBoss (Microcontainer) [5.1.0.GA (build:
SVNTag=JBoss_5_1_0_GA date=200905221634)] Started in 1m:35s:965ms
```

4. If you are starting GMLC-1.0.0-SNAPSHOT for the first time, SS7 is not configured. You can use either the Shell Client or the GUI to connect to GMLC-1.0.0-SNAPSHOT and configure the SS7 Stack, GMLC parameters and Routing Rules. Once configured, the state and configuration of SS7 and GMLC are both persisted which stands a server re-start operation. The next chapter will discuss in detail about configuring SS7 and the GMLC Gateway.

*Procedure: Stop the Gateway*

1. To stop the Restcomm GMLC , you must shut down the JBoss Application Server. To shut down the server(s) you must execute the `shutdown.sh -s` (Unix) or `shutdown.bat -s` (Microsoft Windows) script in the installation directory *restcomm-gmlc-/jboss-5.1.0.GA/bin*.
2. If the server stopped properly, you will see the following three lines as the last output in the Unix terminal or Command Prompt:

```
INFO  [ServerImpl] (JBoss Shutdown Hook) Shutdown complete
Shutdown complete
Halting VM
```

## 3.2. Running the Gateway - Simulator Profile

The Restcomm GMLC offers you an option to run the Gateway with a "simulator" profile for testing purpose. The "simulator" profile is a pre-configured profile to work with the jss7-simulator. Starting the Gateway with the "simulator" profile is similar to the steps explained for the "default" profile except that you must pass the string value "simulator" to the -c command line option when invoking the run script.

```
[bin]$ ./run.sh -c simulator
```

By default, the GMLC Simulator profile is configured for use in Linux systems. For using it in Microsoft Windows systems, you must configure the parameters as explained below.

Open the file *restcomm-gmlc-<version>/jboss-5.1.0.GA/server/simulator/data/SCTPManagement_sctp.xml* and replace in two places, the parameter `ipChannelType="0"` with `ipChannelType="1"` to enable TCP connection instead of SCTP since Windows does not support SCTP. If you are using in a Linux system, there is no modification required to the settings.

## 3.3. Running GMLC Examples in Simulator

If you are not familiar with the Restcomm jSS7 Simulator, you can find instructions about using the jSS7-simulator in the Restcomm jSS7 User Guide. You will also find example test cases explained in detail in the jSS7 User Guide. In this section you will find a simple Location Service example explained using the jSS7 Simulator.

*Procedure: Running Restcomm jSS7 Simulator - MAP ATI TEST SERVER Example*

1. Change the working directory to the bin folder in the Simulator's installation directory.

```
[vinu@vinu-neha ~]$ cd restcomm-gmlc-<version>/tools/restcomm-ss7-simulator/bin
```

2. Ensure that the *run.sh* start script is executable.

```
bin$ chmod +x run.sh
```

3. Execute the *run.sh* Bourne shell script with the command `./run.sh gui`.

```
bin$ ./run.sh gui
```

   This will launch the Simulator GUI Application.

4. When the GUI shows up, select "main" (default) as host name [or type "win" as host name under Windows] and press the 'Start' button. The Simulator is already pre-configured to connect to the GMLC Gateway (running in simulator profile). Press 'Run test' and again click on 'Start' in the next screen. The Simulator will connect to GMLC (via a SIGTRAN SCTP/M3UA association). The Low layer is configured to SCTP (not TCP) protocol, therefore you can test the GMLC in a Linux environment. To test under Windows OS, you must change the SS7 simulator settings to TCP.

5. After approximately 30 seconds you will see the appear two events in the the Simulator window log showing "Sctp connection is up" and "M3UA connection is active" as in figure below:

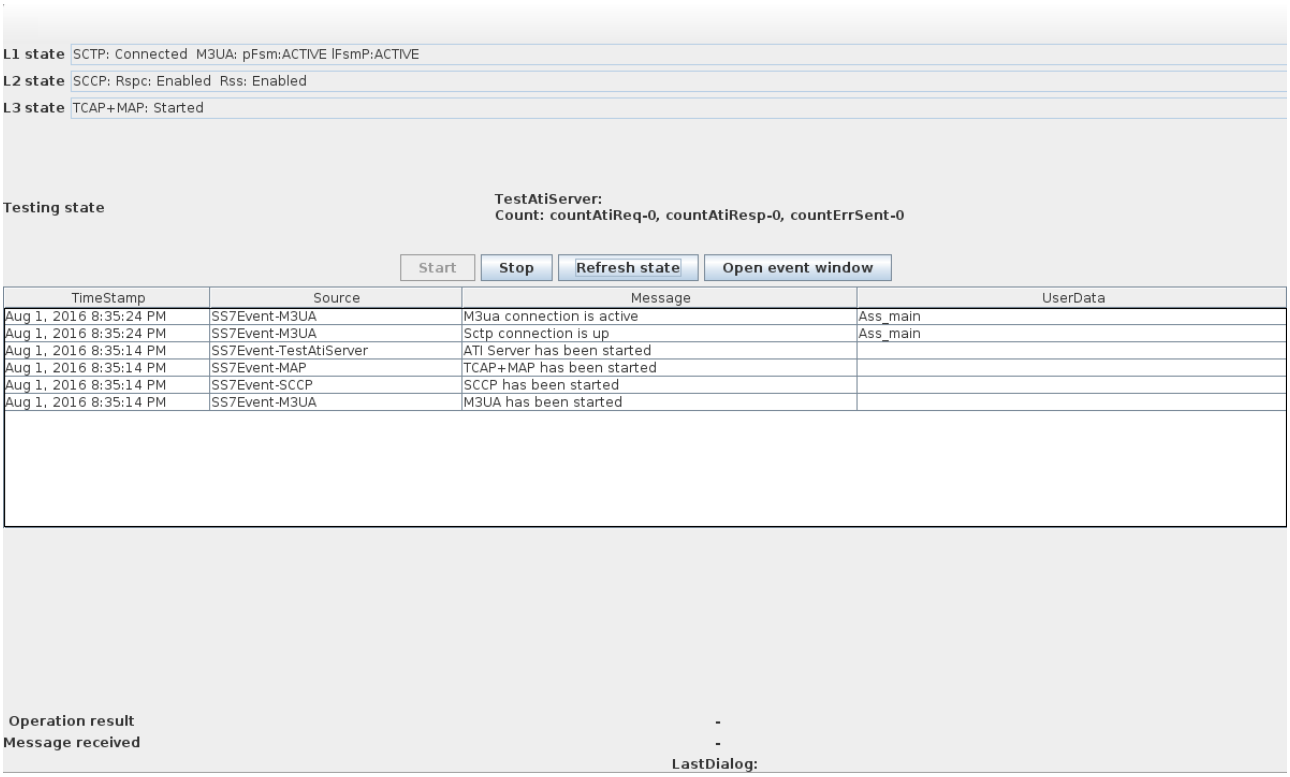


*Figure 4. GMLC SS7 Simulator - Active*

6. Restcomm GMLC is configured, in simulator mode, to process an HTTP GET to trigger a MAP ATI at the jSS7 Simulator, which will return a fake answer for the only purpose of testing. Assuming the server is running with no IP binding (i.e. it's running in loopback address 127.0.0.1), open a browser and perform an HTTP GET test, for example (msisdn can be any number except the

dummy one reserved, i.e. 19395550113): http://127.0.0.1:8080/restcomm/gmlc/rest?msisdn=87583439

You should immediately receive the following testing response with GCI + Age of Location Information parameters: mcc=250,mnc=1,lac=32000,cellid=221,aol=5,vlrNumber=5555555666

If you check the SS7 simulator (where the MAP ATI was sent and responded back), you should be able to see the following request and response (click on "Open Event Window" on each event logged):

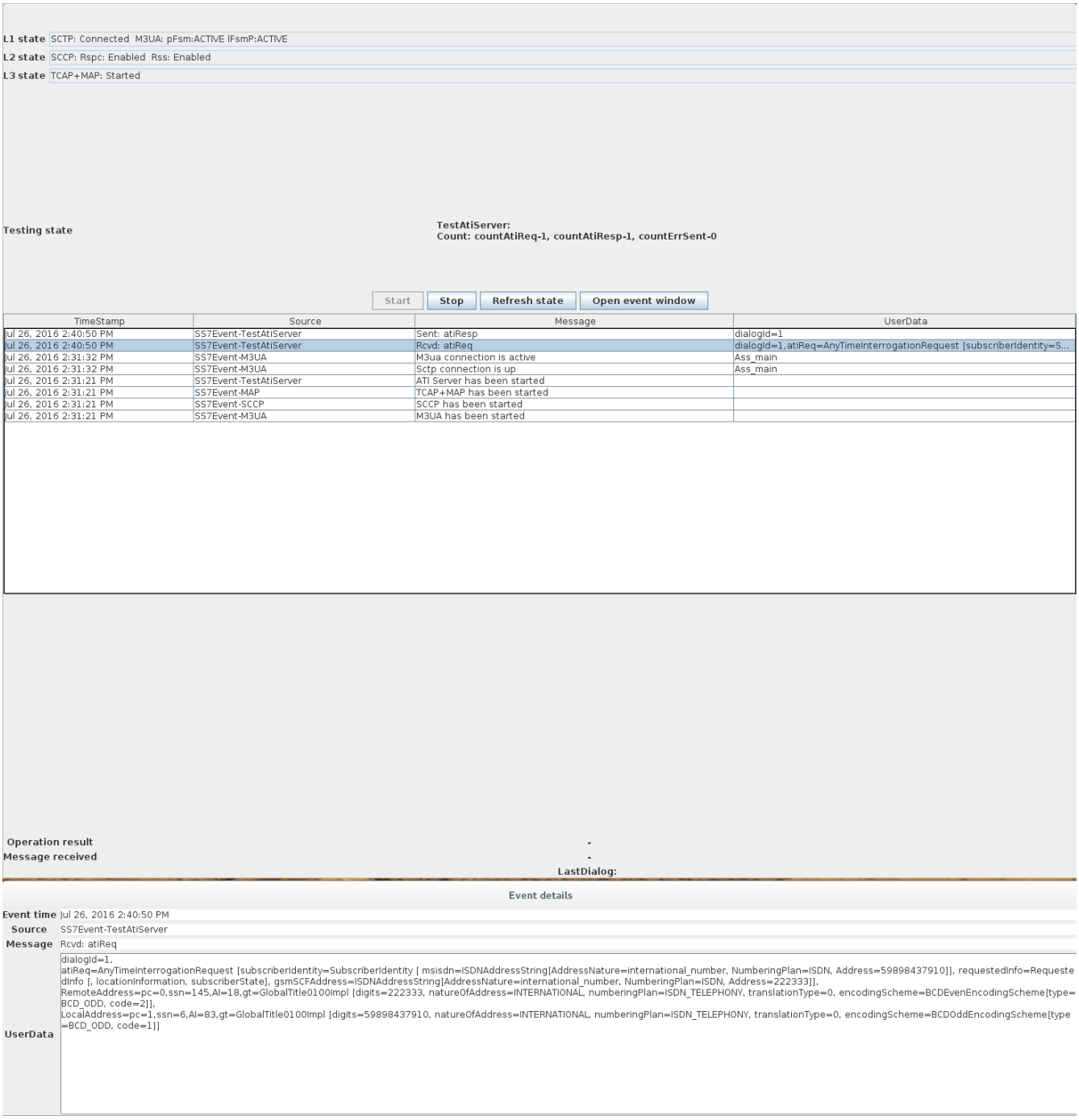


*Figure 5. GMLC SS7 Simulator - MAP ATI Request with opened Event Window*

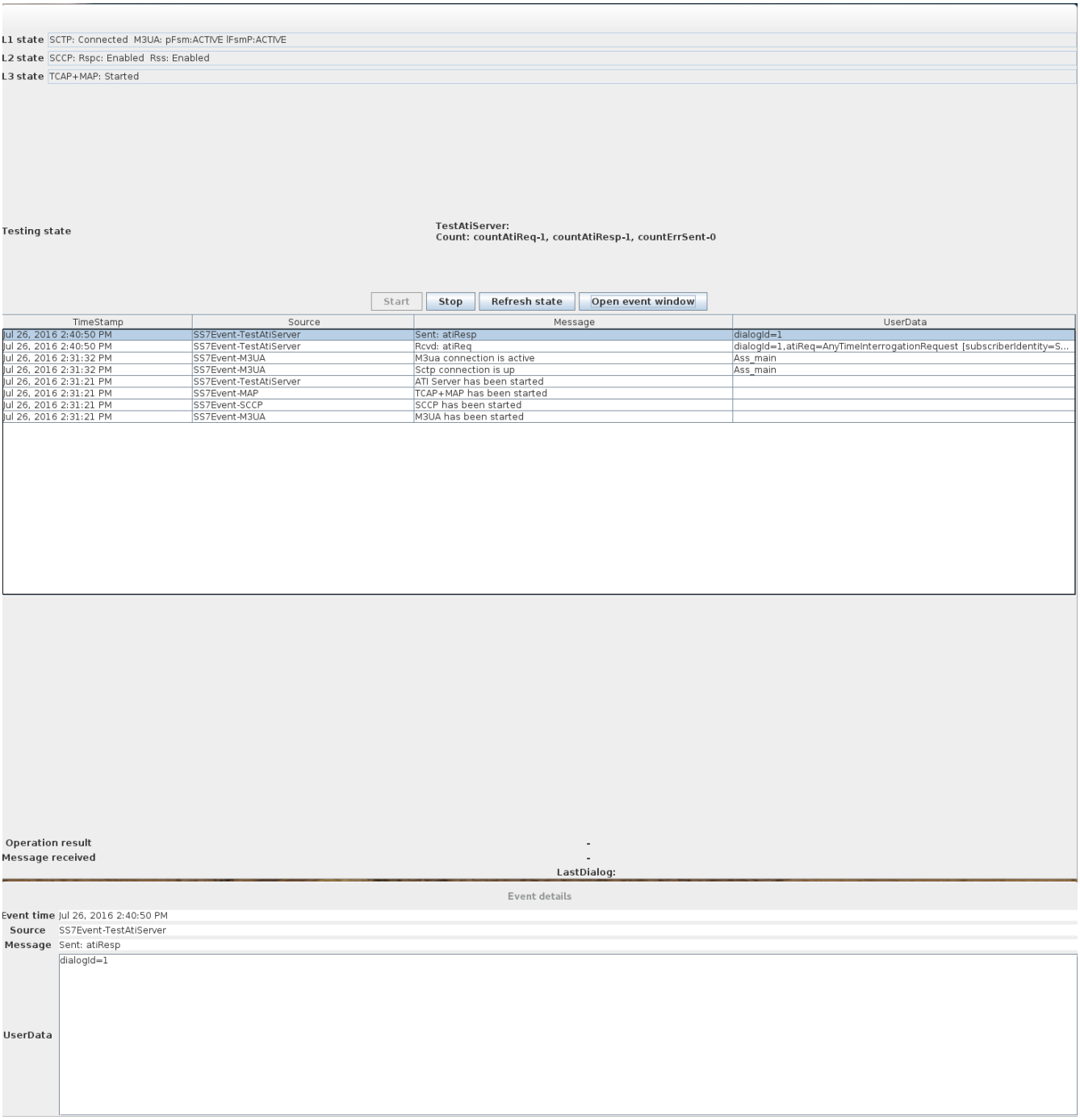


*Figure 6. GMLC SS7 Simulator - MAP ATI Response with opened Event Window*

*Procedure: Running Restcomm jSS7 Simulator - HTTP POST MLP Request*

1. You must first start the Restcomm GMLC in simulator profile.

```
[telestax@127 ~]$ cd restcomm-gmlc-<version>/jboss-5.1.0.GA/bin
[telestax@127 bin]$./run.sh -b 127.0.0.1 -c simulator
```

1. To send an OMA MLP request test, in the same path from where you just ran the server, issue the following command:

```
curl -X POST -d @mlpreq.txt http://127.0.0.1:8080/restcomm/gmlc/mlp
```

mlpreq.txt is like this (you may change the MSISDN):

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE svc_init SYSTEM "MLP_SVC_INIT_310.DTD">
<svc_init xmlns="MLP_SVC_INIT_310.dtd">
    <hdr>
        <client>
                <id>USERNAME</id>
                <pwd>PASSWORD</pwd>
                <serviceid>SERVICEID</serviceid>
            </client>
    </hdr>
    <slir>
            <msids>
                <msid type="MSISDN">59899077937</msid>
            </msids>
            <eqop>
                <resp_timer>15</resp_timer>
            </eqop>
    </slir>
</svc_init>
```

You should immediately receive the following testing MLP response:

```
<?xml version="1.0" encoding="UTF-8"?><!DOCTYPE svc_result SYSTEM
"MLP_SVC_RESULT_310.DTD">
<svc_result xmlns="MLP_SVC_RESULT_310.dtd" ver="3.1.0">
    <slia ver="3.1.0">
        <pos>
            <msid>59899077937</msid>
            <pd>
                <time utc_off="-0300">20160801211238</time>
                <shape>
                    <CircularArea>
                        <coord>
                            <X>27 28 25.00S</X>
                            <Y>153 01 43.00E</Y>
                        </coord>
                        <radius>5000</radius>
                    </CircularArea>
                </shape>
            </pd>
        </pos>
    </slia>
</svc_result>
```

## 3.4. Running the Shell

You must start the Shell client and connect to the managed instance prior to executing commands to configure the Gateway. Shell can be started by issuing the following command from *restcomm-gmlc-/jboss-5.1.0.GA/bin* directory:

```
[$] ./ss7-cli.sh
```

Once console starts, it will print following information and await further commands:

```
version=7.0.1383,name=Restcomm jSS7 CLI,prefix=restcomm,vendor=TeleStax
```

Before issuing further commands you must connect to a managed instance. For more details on connecting to an instance and for a list of all supported commands and details on configuring the SS7 stack refer to the Restcomm SS7 Stack User Guide.

## 3.5. Connect to a new Instance

You can connect to a new instance by entering the IP:Port values and then login credentials in the top left corner of the GUI.

## 3.6. Authentication

Restcomm GMLC GUI Management Security is based on the JBoss Security Framework.

As of now, there is basic authentication offered (which is based on the JBoss Security framework). When you try to start the Web Console, you will be prompted to enter login credentials. These credentials can be configured in the files *jmx-console-roles.properties* and *jmx-console-users.properties* located at *restcomm-gmlc-<version>/jboss-5.1.0.GA/server/<profile>/conf/props/*.

You can also change the authentication from flat file system to database by making necessary configurations in the file *restcomm-gmlc-<version>/jboss-5.1.0.GA/server/<profile>/conf/login-config.xml*.

For detailed instructions and to know more about JBoss Security Framework please refer to the JBoss Installation Guide here.

Deafult user-id and password for GUI Management Console is admin and admin. You can change the user-id and password in files *jmx-console-roles.properties* and *jmx-console-users.properties* located at *restcomm-gmlc-<version>/jboss-5.1.0.GA/server/<profile>/conf/props/*

# Chapter 4. Configuring

You must fine-tune Memory and Database settings for better performance before using Restcomm GMLC in production. Once you complete setting up the Gateway you must configure the SS7 Stack and GMLC paramters. Restcomm GMLC comes with a convenient user-friendly Graphical User Interface (GUI) and a Command Line Interface (CLI) that will allow you to configure, monitor and manage the Gateway. While the CLI tool allows complete configuration and control of the Gateway, the GUI-based management enhances the usability of the Gateway and gives you the ability to configure and manage the GMLC Gateway dynamically. This chapter will explain how to manage the Gateway effectively using both the GUI and the CLI.

## 4.1. Memory Settings

You should fine tune the JVM memory settings based on your needs but we recommend you allocate a minimum of 3 GB for initial and maximum heap size. These settings are specified in the file[path]*restcomm-gmlc-/jboss-5.1.0.GA/bin/run.conf*.

*-Xms3072m*

Initial heap size, set in megabytes

*-Xmx3072m*

Maximum heap size, set in megabytes

## 4.2. JSupported Java Version

GMLC Gateway can run only with Java 7 JRE or JDK. We refered Oracle Java 7 JDK.

## 4.3. Configuring JSLEE http-client RA

Restcomm GMLC acts as a HTTP Client to achieve GMLC pull by sending a HTTP POST/GET request to GMLC gateway. You must configure the HTTP Client JSLEE Resource Adaptor's properties to suit your requirements. Please refer to the SLEE RA HTTP Client User Guide available in *restcomm-gmlc-/docs/slee/RestComm_SLEE_RA_HTTP_Client_User_Guide.pdf*.

## 4.4. Configuring the SS7 Stack

You must configure the SS7 Stack prior to configuring GMLC. For details on configuring the SS7 Stack please refer to the RestComm SS7 Stack User Guide. The RestComm SS7 Stack User Guide lists all available Shell commands and GUI operations to configure SS7. In addition, help files are also available for every Shell command providing all details relevant to the command.

# Appendix A: Revision History