Architecture

Table of Contents

Restcomm SMSC is based on robust and proven Restcomm JAIN SLEE 1.1 Server and Restcomm jSS7 Stack and provides easy integration with any third party communication protocol and platform.

Restcomm JAIN SLEE Server is a highly scalable event-driven application server with a robust component model and fault tolerant execution environment. It provides a set of connectors to a variety of networks elements: SS7 MAP, TCAP, INAP, ISUP, SMPP, XMPP, SIP, MGCP, HTTP, XDM, XCAP, Diameter and many others. It is fully compliant with JSR 240 (JSLEE 1.1).

Restcomm jSS7 is a software based implementation of the SS7 protocol. It provides implementation for Level 2 and above in the SS7 protocol Stack. Restcomm jSS7 Stack User Guide is bundled within and you can refer to the guide for more details on the Stack.

The diagram below depicts a high level design of Restcomm SMSC .

Restcomm SMSC provides six basic services of an SMSC as shown in the figure above. Each of these six services are implemented in the Gateway as a module that can be activated or deactivated based on the needs of an operator. All these services interact with the Cassandra database for storing data (messages not yet sent and an archive for sent/failed to send messages) and retreiving data for messages that are pending to be sent.

Restcomm SMSC can accept SMPP (incoming BIND) from ESMEs or can also initiate SMPP (outgoing BIND) to third party SMSC and hence itself acting as an ESME. Restcomm SMSC provides intelligent routing rules that can route SMS between various SMPP connections or between SMPP, GSM and SIP Network.

Service Modules

Mo (Mobile originated) module

Handles mobile originated SMS.

Mt (Mobile terminated)

Delivers SMS to mobile.

Rx SMPP module

Listens for incoming SMS from ESME/third party SMSC and routes them to Mt module (GSM), other ESME/third party SMSC or SIP Client depending on the routing rule.

Tx SMPP module

Delivers SMS to external ESME/third party SMSC received from Mo Module (GSM), ESME/third Party SMSC or SIP Client.

Rx SIP module

Listens for incoming SMS from SIP Client and routes them to Mt module (GSM), other ESME/third party SMSC or SIP Client depending on the routing rule.

Tx SIP module

Delivers SMS to SIP Client received from Mo Module (GSM), ESME/third Party SMSC or other SIP Client. | |

Administration

CLI

Restcomm SMSC comes with a Command Line Interface (CLI) that provides easy to use commands to manage and monitor the SS7 Stack and the SMSC Gateway.

Web Interface

Restcomm SMSC also includes an easy to use Web Interface administration tool that allows you to manage and monitor the Gateway via a convenient Web console.

Campaign Tool

In addition, future releases will also offer a Web based campaign tool to define and manage campaigns. |

Database Table Structure

Restcomm SMSC stores messages using Cassandra database. The database is used for storing unsent messages, messages successfully sent and messages that failed to be sent.

The Restcomm SMSC creates three tables for every new day with the date suffixed to the names of the tables as `DST_SLOT_TABLE_yyyy_mm_dd`, `SLOT_MESSAGES_TABLE_yyyy_mm_dd` and `MESSAGES_yyyy_mm_dd` where `yyyy_mm_dd` is the date in that format.

Apart from the above tables created everyday, the database also comprises of three other tables namely `CURRENT_SLOT_TABLE`, `SMPP_SMS_ROUTING_RULE` and `SIP_SMS_ROUTING_RULE` created when the SMSC is started for the first time. The former is used for storing system-wide data and the latter two for storing the routing rules.

CURRENT_SLOT_TABLE

Table 1. `CURRENT_SLOT_TABLE`

Column Name	Data Type	Description
ID	INT	Acts as a primary key and is unique for each entry. The value acts as an identifier of content: 0 indicates the current due slot that the SMSC processes now and 1 indicates the last assigned messageId.
NEXT_SLOT	BIGINT	The next slot value.

SMPP_SMS_ROUTING_RULE

Table 2. `SMPP_SMS_ROUTING_RULE`

Column Name	Data Type	Description
ADDRESS	Text	Acts as a primary key and is unique for each entry. Stores the address for which the messages are being routed.
CLUSTER_NAME	Text	The name of the SMPP Cluster.

SIP_SMS_ROUTING_RULE

Table 3. `SIP_SMS_ROUTING_RULE`

Column Name	Data Type	Description
ADDRESS	Text	Acts as a primary key and is unique for each entry. Stores the address for which the messages are being routed.
CLUSTER_NAME	Text	The name of the SIP Cluster. This is not used as of now and all SMS message are routed through a single SIP stack.

DST_SLOT_TABLE_yyyy_mm_dd

This table contains a list of `DUE_SLOT` values for `TARGET_ID` to store the data for this day.

Table 4. `DST_SLOT_TABLE_yyyy_mm_dd`

Column Name	Data Type	Description
TARGET_ID	ASCII	Acts as a primary key and is made up of ADDR_DST_DIGITS+""*ADDR_DST_TON*""+ADDR_DST_NPI.
DUE_SLOT	BIGINT	All new incoming messages will be added into this DUE_SLOT if it is not yet processed. If DUE_SLOT has been processed already or is absent, a new DUE_SLOT will be assigned.

SLOT_MESSAGES_TABLE_yyyy_mm_dd

This table stores the messages that are scheduled for delivery. The messages are not deleted after delivery.

The fields "DUE_SLOT", "TARGET_ID", "ID" together act as the primary key.

Table 5. `SLOT_MESSAGES_TABLE_yyyy_mm_dd`

Column Name	Data Type	Description
ID	UUID	Record Identifier.
TARGET_ID	ASCII	Made up of ADDR_DST_DIGITS+""*ADDR_DST_TON*""+ADDR_DST_NPI.
DUE_SLOT	BIGINT	For which the messages will be loaded for delivering.
IN_SYSTEM	INT	0 - idle state, 1 - delivery in progress, 2 - delivery finished (by success or failure)
SMSC_UUID	UUID	Id of the SMSC session (from start to stop), this is needed to know which session has launched the delivery of a message.
ADDR_DST_DIGITS	ASCII	Destination address digits.
ADDR_DST_TON	INT	SMPP style TON (type of number) of destination address.
ADDR_DST_NPI	INT	SMPP style Numbering Plan Indicator of destination address.
ADDR_SRC_DIGITS	ASCII	Originating address digits.

Column Name	Data Type	Description
ADDR_SRC_TON	INT	SMPP style TON (type of number) of source address.
ADDR_SRC_NPI	INT	SMPP style Numbering Plan Indicator of source address.
DUE_DELAY	INT	Duration (in seconds) after which a new delivery attempt will be done. If the SMS has just arrived in the system, this value is 0.
ALERTING_SUPPORTED	BOOLEAN	The value is 'true' if SMSC was successfully registered at HLR after delivery failure. However this field is currently not being used because this demands extra database access.
MESSAGE_ID	BIGINT	A unique message ID assigned by SMSC (since the SMSC started).
MO_MESSAGE_REF	INT	SMS TPDU Message Reference field.
ORIG_ESME_ID	TEXT	SMSC internal name of origination ESME (empty for MO messages).
ORIG_SYSTEM_ID	TEXT	SMPP name of origination ESME (empty for MO messages).
DEST_CLUSTER_NAME	TEXT	Name of cluster for destination ESME terminated massages (empty for MT messages).
DEST_ESME_ID	TEXT	SMSC internal name of destination ESME (empty for MT messages).
DEST_SYSTEM_ID	TEXT	SMPP name of destination ESME (empty for MT messages).
SUBMIT_DATE	TIMESTAMP	Time when a message was received by SMSC.
DELIVER_DATE	TIMESTAMP	Time when a message was sent from SMSC (null if message failed to deliver).
SERVICE_TYPE	TEXT	SMPP parameter (service_type) for ESME originated messages.

Column Name	Data Type	Description
ESM_CLASS	INT	Indicates Message Mode (Messaging Mode==Datagram, Forward or Store and Forward mode) and Message Type (MessageType==some flags including UDH indicator).
PROTOCOL_ID	INT	Protocol Identifier SMPP parameter (TP-Protocol-Identifier files for GSM).
PRIORITY	INT	SMPP parameter (priority_flag).
REGISTERED_DELIVERY	INT	SMPP parameter (registered_delivery).
REPLACE	INT	SMPP parameter (replace_if_present_flag).
DATA_CODING	INT	data_coding scheme.
DEFAULT_MSG_ID	INT	SMPP parameter (sm_default_msg_id).
MESSAGE	BLOB	Message text in source style that has been received from EMSE or from MS.
OPTIONAL_PARAMETERS	TEXT	TLVs.
SCHEDULE_DELIVERY_TIME	TIMESTAMP	SMPP parameter (schedule_delivery_time) - time when SMSC should start a delivery (may be null if immediate message delivery).
VALIDITY_PERIOD	TIMESTAMP	The validity period of this message. If ESME has not defined (or for MO messages) this field is filled by default SMSC settings.
IMSI	ASCII	From SRI response.
CORR_ID	ASCII	This field is used for keeping of correlationId value for home routing mode. This table will keep this value when StoreAndForward mode for time between storing of message and scheduling it for delivering.

Column Name	Data Type	Description
NNN_DIGITS	ASCII	NetworkNodeNumber = MSC that serves MS – from SRI response.
NNN_AN	INT	
NNN_NP	INT	
SM_STATUS	INT	Error Code value for the last attempt (0==no attempts yet). For more details on Error Codes please refer to Appendix A, Error Codes
SM_TYPE	INT	0-ESME terminated, 1-MT
DELIVERY_COUNT	INT	Delivery attempt count. (this will be==1 if a message was delivered in one go)

MESSAGES_yyyy_mm_dd

This table archives the messages that have been delivered successfully or whose delivery failed.

The fields "ADDR_DST_DIGITS", "ID" together act as the primary key.

Table 6. `MESSAGES_yyyy_mm_dd`

Column Name	Data Type	Description
ID	UUID	Record Identifier.
TARGET_ID	ASCII	Made up of ADDR_DST_DIGITS+””*ADDR_DST_TON*””+ADDR_DST_NPI.
DUE_SLOT	BIGINT	For which the messages will be loaded for delivering.
IN_SYSTEM	INT	Not used in this table.
SMSC_UUID	UUID	Id of the SMSC session (from start to stop), this is needed to know which session has launched the delivery of a message.
ADDR_DST_DIGITS	ASCII	Destination address digits.
ADDR_DST_TON	INT	SMPP style TON (type of number) of destination address.
ADDR_DST_NPI	INT	SMPP style Numbering Plan Indicator of destination address.

Column Name	Data Type	Description
ADDR_SRC_DIGITS	ASCII	Originating address digits.
ADDR_SRC_TON	INT	SMPP style TON (type of number) of source address.
ADDR_SRC_NPI	INT	SMPP style Numbering Plan Indicator of source address.
DUE_DELAY	INT	Duration (in seconds) after which a new delivery attempt will be done - value before the last delivery attempt.
ALERTING_SUPPORTED	BOOLEAN	The value is 'true' if SMSC was successfully registered at HLR after delivery failure. However this field is currently not being used because this demands extra database access.
MESSAGE_ID	BIGINT	A unique message ID assigned by SMSC (since the SMSC started).
MO_MESSAGE_REF	INT	SMS TPDU Message Reference field.
ORIG_ESME_ID	TEXT	SMSC internal name of origination ESME (empty for MO messages).
ORIG_SYSTEM_ID	TEXT	SMPP name of origination ESME (empty for MO messages).
DEST_CLUSTER_NAME	TEXT	Name of cluster for destination ESME terminated massages (empty for MT messages).
DEST_ESME_ID	TEXT	SMSC internal name of destination ESME (empty for MT messages).
DEST_SYSTEM_ID	TEXT	SMPP name of destination ESME (empty for MT messages).
SUBMIT_DATE	TIMESTAMP	Time when a message was received by SMSC.
DELIVER_DATE	TIMESTAMP	Time when a message was sent from SMSC (null if message failed to deliver).
SERVICE_TYPE	TEXT	SMPP parameter (service_type) for ESME originated messages.

Column Name	Data Type	Description
ESM_CLASS	INT	Indicates Message Mode (Messaging Mode==Datagram, Forward or Store and Forward mode) and Message Type (MessageType==some flags including UDH indicator).
PROTOCOL_ID	INT	Protocol Identifier SMPP parameter (TP-Protocol-Identifier files for GSM).
PRIORITY	INT	SMPP parameter (priority_flag).
REGISTERED_DELIVERY	INT	SMPP parameter (registered_delivery).
REPLACE	INT	SMPP parameter (replace_if_present_flag).
DATA_CODING	INT	data_coding scheme.
DEFAULT_MSG_ID	INT	SMPP parameter (sm_default_msg_id).
MESSAGE	BLOB	Message text in source style that has been received from EMSE or from MS.
OPTIONAL_PARAMETERS	TEXT	TLVs.
SCHEDULE_DELIVERY_TIME	TIMESTAMP	SMPP parameter (schedule_delivery_time) - time when SMSC should start a delivery (may be null if immediate message delivery).
VALIDITY_PERIOD	TIMESTAMP	The validity period of this message. If ESME has not defined (or for MO messages) this field is filled by default SMSC settings.
IMSI	ASCII	From SRI response.
CORR_ID	ASCII	This field is used for keeping of correlationId value for home routing mode. This table will keep this value for logging purpose.
NNN_DIGITS	ASCII	NetworkNodeNumber = MSC that serves MS – from SRI response.
NNN_AN	INT	

Column Name	Data Type	Description
NNN_NP	INT	
SM_STATUS	INT	Error Code value for the last attempt (0==no attempts yet). For more details on Error Codes please refer to Appendix A, Error Codes
SM_TYPE	INT	0-ESME terminated, 1-MT
DELIVERY_COUNT	INT	Delivery attempt count. (this will be==1 if a message was delivered in one go)

Reporting

As of now there is no reporting in &THIS.PLATOFORM;SMSC . However you can leverage any external third party tool to dig Cassandra tables as defined above and create reports. The next release of &THIS.PLATOFORM;SMSC will feature a reporting section and also the flexibility to search for a specific SMS based on various search criteria.