



Integrated Signaling Gateway (ISGW) Technical Specifications

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FMG 2015/02/04 VER 2.3.3

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Document Information

Purpose

This document contains the system description for the Integrated Signaling Gateway (ISGW) software. The document is divided into two sections, namely:

Section A:

- Detail the ISGW features and capabilities that the baseline provides.
- Lists the specifications that the baseline ISGW adheres to.

Section B:

- Lists the additional requirements.
- Provides specifications that the ISGW adheres to.

Audience

This document is intended to be used by a carrier to ascertain the capabilities of ISGW software supplied by Flash Media Group (FMG).

Section A

This section details the features and capabilities that the baseline ISGW provides. It also lists the specifications that the baseline ISGW adheres to.

General

The ISGW provides the following general features:

1. Act as a data Short Message Service Centre (SMSC), and not just store and forward short messages like traditional SMSC platforms.
2. Act as a short message router and be suitable for data applications utilizing Short Message Service (SMS).
3. Allow generic deployment capabilities over Global System for Mobile communication (GSM) specification compliant networks.
4. Provide parameter enabled store and forward functionality for backward compatibility.
5. Provide the following GSM Mobile Application Part (MAP) (GSM 09.02) operations:
 - a. Routing Information Request: this operation queries the Home Location Register (HLR) and obtains the International Mobile Subscriber Identity (IMSI) and current location of the specified subscriber in order to determine the serving Mobile Switching Centre (MSC) for the mobile station at the time of the delivery attempt.

- b. Point-to-Point Short Message Deliver: this operation enables the ISGW to transfer a short message to the MSC, which is serving the addressed mobile station.
 - c. Short Message Waiting Indication: this operation allows the ISGW to request of the HLR that it should be informed when a subscriber who has a short message waiting, re-registers on the network.
 - d. Service Centre Alerts: the HLR uses this operation to inform the ISGW that a particular mobile station is now recognized by the network as being accessible. It triggers the network to deliver a waiting message to the relevant mobile station.
6. Enable the basic SMS of store and forward as well as confirmation of message delivery to message originators or third parties.
7. Allow integration of Intelligent Network (IN) nodes by means of a Short Message Peer-to-Peer Protocol (SMPP) 3.4 or higher interface.
8. Provide flexible user defined retry schedules.
9. Provide acknowledgment and scheduling of messages.
10. Provide support for Unified Messaging (UM).
11. ISGW accommodates multiple message modes.
12. ISGW is parameter driven, and it is able to run with different behaviour SMSC on different timeslots when using Time-division Multiplexing (TDM)-based signaling. For example:
 - a. Timeslot one may be configured to be store & forward with a retry module.
 - b. Timeslot two may be dedicated to a 3rd party application
 - c. Timeslot three may be configured to carry data and unified messaging (UM) within one hardware platform.
13. Provides Unstructured Supplementary Service Data (USSD) enabling a variety of applications.
14. USSD implementation as defined within the GSM standard in the documents GSM 02.90 (USSD Stage 1) and GSM 03.90 (USSD Stage 2).
15. Getting location information using MAP using Any Time Interrogation (ATI) or Provide Subscriber Information (PSI) and returns Location Information (MCC, MNC, LAC and Cell_Id including AOL).
16. Provide a monitoring process that keeps track of the ISGW software and hardware status, and send an alert upon detecting an error.
17. Provide a XMLRPC API interface.
18. Acts as an MMSC which incorporates relay, server and user database elements that provide enabling aspects to:
 - a. Receive Multi Media Service (MMS) messages and transmit them to their destinations.
 - b. Convert the content of a message, where supported, to suit the capabilities of the destination device.
 - c. Generate the data records needed to bill subscribers for service usage and content.

More specifically these aspects are:

- Phone-to-phone messaging.
- Automatic content adaptation: The server modifies message content depending on the capabilities of the receiving terminal.
- Integrated Email-to-MMS and MMS-to-Email gateway.
- Support for persistent storage of messages for subscribers.
- Inter-MMSC message exchange (MM4 interface).
- Capability to fetch the routing information (MM5 Interface). This is achieved by interfacing between the MMSC and other network elements like the HLR or MAP Request for Routing Information (RRI).
- Support for MMS Value Added Service Providers using MM7 protocols (SOAP or EAIF).
- Support for integration with subscriber database to enable smart handling of handsets that do not support MMS, handsets not provisioned, etc.
- Support for flexible billing structure through billing/CDR plug-in architecture.
- Bearer (data) technology neutral: Works with GSM/CSD or GPRS.

Protocol Compliance

The ISGW complies with the following protocol and interface standards:

SIGTRAN

RFC 271

SS7

ISGW provides a SS7 protocol stack, control and implementation domain. In the SS7 domain the following standards are complied with:

TDM-based signaling

- MTP2 Level and MTP3 Level: ITU Q.702 – Q.707
- SS7 Routing, Flow Control and Error Correction
- SCCP: ITU Q.711 – Q.714
- SS7 Dialogue Multiplexing
- TCAP: ITU Q.771 – Q.775

GSM

The ISGW adheres to the following GSM specifications:

- Mobile Application Part (MAP): GSM 09.02
- Technical realization of the Short Message Service (SMS): GSM 03.40

Open Standards

The ISGW adheres to the following open protocol and interface standards:

- Short Message Peer-to-Peer Protocol: SMS Forum SMPP 3.4, Issue 1.2
- Simple Network Management Protocol (SNMP v2c): IETF RFC 2578
- Wireless Application Protocol (WAP): 209
- Open Mobile Alliance (OMA): MMS v1.2, UAPProf v1.1
- 3rd Generation Partnership Project (3GPP): TS 23.140

Functional Segmentation

It is possible to license and deploy the ISGW in the following functional segments:

- SMS-C Mobile Terminating (MT).
- SMS-C Mobile Originating (MO).
- SMS-C SMPP Interface.
- USSD Phase 2+.
- Location Based Services (LBS).
- MMS-C Person-to-Person (P-to-P).
- MMS-C Application-to-Person (A-to-P).

Functional Capabilities

The ISGW provides the following additional functional capabilities:

Short Message Resends

- The ISGW includes a parameter driven Resend Module that provides the network with a short message retry functionality.
- It is possible to activate or deactivate this module, as per the operator's requirements.
- When the resend module is deactivated, ISGW runs in enhanced messaging mode and acts as a pure peer-to-peer router, immediately notifying the message originator on delivery failure.

Status Reports

The ISGW Mobile Originated (MO) report functionality provides the following capabilities:

- Handset Dependant Success/Failure Reports
- When sending a message to the SMSC with the phone's report flag enabled, ISGW notifies a successfully message delivered or, when it has failed, will not be retried.
- Handset Independent Descriptive Status Reports.
- It is able to keep all subscribers, irrespective of their handsets, updated with descriptive message status reports.

Billing

- The ISGW have the ability to enable batch orientated billing on SMS for both post-paid and pre-paid subscribers.
- USSD CDR.
- LBS CDR.
- MMS CDR.

System Management and Monitoring

ISGW offers the following system management and monitoring tools:

Test Utilities

1. ISGW supplies test utilities that allows a user to connect directly to the SMSC over TCP/IP and to use the full range of Open Interface Invokes.
2. The test utilities are used for testing the interfaces to the ISGW, and perform very little validation of input.

Manager

The ISGW includes a manager module that allows a system administrator to perform the following operations:

1. Configuration of the ISGW of services.
2. Monitoring of the ISGW services.

Operational Events

The ISGW raises alerts, which concern the internal operation of the system in order to report problems.

Platform Hardware Based

The ISGW inter-operates with the following components:

E1 Hardware:

ISGW is compatible with various SS7 interface cards.

MTP2 Layer:

Compatible drivers for the above SS7 interface hardware may need to be provided.

SIGTRAN ISGW

SIGTRAN ISGW Implementation (Softswitch):

Reliable Internet Protocol (IP) based datagram service and user layer adaptations for SS7 and ISDN: IETF RFC 2719.

Performance

The ISGW exhibits the following performance characteristics:

- Receive and acknowledge up to 2000 messages per second on the SMPP interface.
- Support a peak of throughput of 50 MT short messages per second over the SS7 interface per timeslot.
- The MMSC supports a minimum throughput of 500 messages per second, depending on infrastructure and hardware configuration.

Section B

This section lists additional requirements in preparation for marketing, integration and operation. It also provides specifications that the ISGW comply with after these modifications have been made.

Protocol Compliance

Platform

The ISGW is integrated with the following base platform, and inter-operate with the listed components:

Server

Hardware specification required for ISGW.

Operating System

Linux for Intel processors compatible with drivers of SS7 card as specified in Section A, in the “Platform Hardware Based” section.

Database Server

MySQL 5.1.53, as provided by the Blastwave Freeware site (www.blastwave.org)

Interfaces to Sybase and Oracle exist.

Installation

Solaris Package Management

(<http://docs.sun.com/app/docs/doc/817-0406?l=en>)

Alternatively ISGW can be implemented on any other approved hardware platform.

Glossary of Terms & Abbreviations

Terms:

MAP	Mobile Application Part: GSM 09.02
MTP2	Message Transfer Part Layer 2: ITU-T Q.701 to Q.705
MTP3	Message Transfer Part Layer 3: ITU-T Q.701 to Q.705
SCCP	Signaling Connection Control Part: ITU-T Q.711 to Q.714
SIGTRAN	Reliable datagram service and user layer adaptations for SS7 and ISDN: IETF RFC 2719
TCAP	Transaction Capabilities Application Part: ITU-T Q.771 to Q.775
UM	Unified Messaging: integration of different communication streams into a single unified message store

Abbreviations:

API	Application Programming Interface
AOL	Age of Location
ATI	Any Time Interrogation
CDR	Call Data Record
EAI	External Application Interface
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communication
HLR	Home Location Register
IMSI	International Mobile Subscriber Identity
IN	Intelligent Network
IP	Internet Protocol
ISGW	Integrated Signaling Gateway
ITU	International Telecommunication Union
LAC	Location Area Code
LBS	Location-based Services
MCC	Mobile Country Code
MMS	Multi Media Service
MMSC	Multimedia Messaging Service Centre
MNC	Mobile Network Code
MO	Mobile Originating
MSC	Mobile Switching Centre
MT	Mobile Terminating
OMA	Open Mobile Alliance
PSI	Provide Subscriber Information
RRI	Request for Routing Information
SMS	Short Message Service
SMPP	Short Message Peer-to-Peer Protocol
SMSC	Short Message Service Centre
SOAP	Simple Object Access Protocol
SS7	Signaling System #7
TDM	Time-division Multiplexing
USSD	Unstructured Supplementary Service Data
VAS	Value Added Service
WAP	Wireless Application Alliance

Document Reference

Name	Author
GSM specifications 03.40 and 09.20	GSM, 3GPP http://www.3gpp.org
ITU-T Recommendations Q.701 - Q.707, Q.711 – Q.714, Q.771 – Q.775	ITU http://www.itu.int
RFC 2578, RFC 2719, RFC 3873, RFC 4166, RFC 4666, RFC 4960	Internet Engineering Task Force (IETF) http://www.ietf.org/rfc
Short Message Peer-to-Peer Protocol Specification v3.4	SMS Forum http://www.smsforum.net
Wireless Application Protocol: 209	Open Mobile Alliance (OMA) WAP: http://www.openmobilealliance.org
Open Mobile Alliance (OMA): MMS v1.2, UAPProf v1.1	Open Mobile Alliance (OMA) http://www.openmobilealliance.org
3rd Generation Partnership (3GPP): TS 23.140	3rd Generation Partnership Project Project (3GPP) www.3gpp.org