A Role of SMS Gateway Server in Mobile Communication

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Abstract – The Short Message Service (SMS) has become vital in today's communication scenario.SMS services include delivering messages, mobile banking, reservation, payments etc. SMS follows a store and forward principle and its implementation is quite easy. Due to the major developments in technology the data sent through the SMS is very minimal. The mobile communication system uses SMS comprehensively for its text communication service. This service allows the exchange of short text messages between cellular phones. Financial services and transactions can now be conducted through mobile phones for which the SMS Gateway server is used.

Index Terms – SMS Gateway server, GSM, SMS, SMSC, SMSGMSC.

1. INTRODUCTION

1.1 Short Message Service (SMS)

Mobile communication has grown over the years and one of the services offered is the Short Message Service (SMS).This service is used to send and receive short text messages between mobile devices .A mobile service provider acts as the medium to transmit messages between mobile phone users. Communication through SMS can happen between mobile devices that support different mobile service providers. A SMS Gateway Server acts as a bridge between cell phone users. A user can send a SMS to a mobile unit via the SMS Gateway Server.

The store and forward principle is followed when the mobile at the receiving end is not within the communication range. When the mobile unit is active, (for instance, being switched on, or within the communication range of the Server) the message will be delivered.

A short message is sent by a mobile phone which gets stored temporarily in a Short Message Service Center (SMSC).from here the message gets forwarded to the destination mobile phone.

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Fig 1. Mobile SMS

The SMSC stores and forwards the text messages to the respective destination through a mobile network. A SME (Short Message Entity) sends and receives messages. This SME, which may be a GSM modem, can be placed in a mobile station nearest to the mobile phone unit.

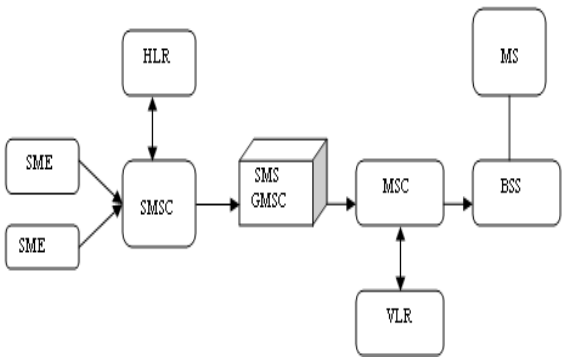

Fig 2. Organization of network elements in a GSM network

1.2 SMS gateway MSC (SMS GMSC)

The SMS Gateway MSC (SMS GMSC) is capable of receiving messages. The SMSGMSC is a gateway MSC, which enables the destination mobile phone to receive its intended messages. It acts as a cell phone network point that makes communication possible with other networks. A SS7 network is used by the GMSC for message reception from the SMC.It uses the Home Location Register to find the current location of the mobile station.

1.3 Home Location Register (HLR)

This register is a primary component in a mobile network. The HLR holds two major information:

- Mobiles' Subscription Profiles
- Subscribers' Routing Information

This information is used to locate the current position of the mobile unit.

1.4 Mobile Switching Center (MSC)

The MSC is an important part in a GSM network. It is used to switch connections either between two mobile stations or mobile station and fixed network.

1.5. Visitor Location Register (VLR)

The primary work of the VLR is to communicate with each of the MSCs .The VLR contains information about the mobile unit which includes the identification of the mobile and the current region where the mobile unit is situated. This information is used by the Mobile Switching Center (MSC) to pass the message to the respective BSS which in turn transmits the message to that mobile unit.

1.6 Base Station Subsystem (BSS)

The Base Station Subsystem (BSS) is composed of transceivers that are responsible for sending and receiving messages using air as the medium of transmission.

The BSS comprises of two parts:

- The Base Transceiver Station (BTS)
- The Base Station Controller (BSC)

The BTS and the BSC communicate across the specified Abis interface (communication between the BSC and MSC happens via this interface).This makes operations between components made by different suppliers possible.

The radio components of a BSS contain four to seven or nine cells. The BSS may have one or more base stations. The BSS uses the Abis interface to coordinate operations between the BTS and the BSC. A high speed line (E1 or T1) is connected from the BSS to the mobile MSC.A separate high-speed line (T1 or E1) is then connected from the BSS to the Mobile MSC.

1.7. Base Transceiver Station (BTS)

The Base Transceiver Station (BTS) contains the radio transceivers. These radio transceivers define a cell and handle the radio link protocols with the MS. Depending on the expanse of an area the number of BTSs can be increased.

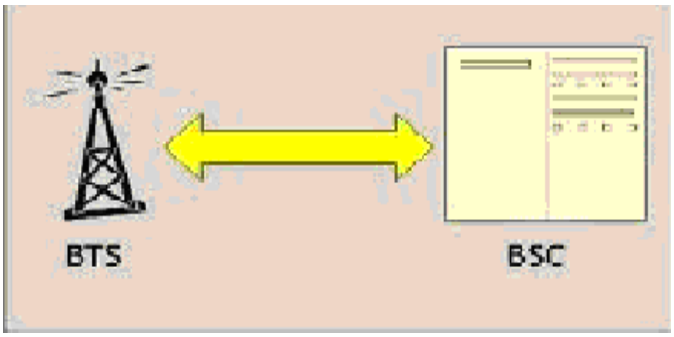

Fig 3. GSM BSS (BTS + BSC)

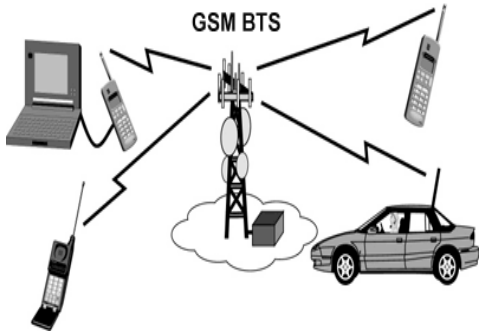

Fig 4.GSM.-BTS

The BTS is usually located in the center of a cell and it corresponds to the transceivers and antennas used in each cell of the network. The transmitting power of the BTS defines the cell size. Each BTS may have one to sixteen transceivers depending on the user density in the cell. Each BTS serves a single cell. It also includes the following functions:

1. Encoding, encrypting, multiplexing, modulating, and feeding the RF signals to the antenna.
2. Transcoding and rate adaptation
3. Time and frequency synchronizing
4. Voice through full- or half-rate services

5. Decoding, decrypting, and equalizing received signals
6. Random access detection
7. Timing advances
8. Uplink channel measurements

1.8. Base Station Controller (BSC)

The Base Station Controller (BSC) is responsible for managing the radio resources for one or more BTSs. It handles

1. radio channel setup,
2. frequency hopping, and
3. Handovers.

The BSC is the connection between the mobile and the MSC.

Fig 5. BSC

1.9 Network switching system (NSS)

The Mobile Switching Center(MSC) has a primary component known as the Network Switching System(NSS).The NSS is responsible for switching calls between mobile units and other mobile network users. Other major mobile services such as authentication are also taken care of by the NSS.

1.10. Potential applications of SMS

There are several applications that make the SMS technology a sought after one. These applications utilize the Mobile Terminated and Mobile Originated SMS .These applications are:

- ✓ Notification Services
- ✓ E-mail Interworking
- ✓ Paging Interworking
- ✓ Information services

2. SMS GATEWAY

Why use SMS Gateway?

The SMSC communication protocol is used individually by organizations for SMS messaging. For instance, CMG has EMI (a SMSC communication protocol).It is impossible to setup communication between two SMSCs unless they share a standard protocol.SMS Gateway is the mediator which bridges two different SMSCs to initiate communication between them. Even if the two SMSCs have different protocols the SMS Gateway can handle the communication between the two.

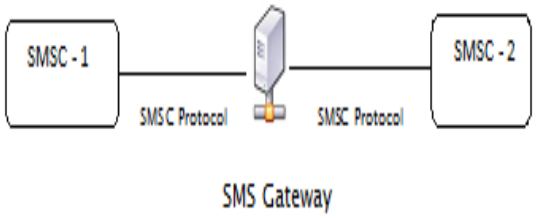

Fig 6. SMS Gateway

SMS Gateways are capable of handling communication between mobile phones and GSM/GPRS. The SMS text messaging application must know how to communicate to the SMS Gateway.

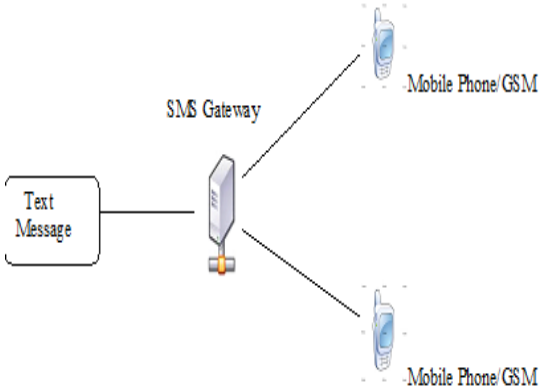

Fig 7. SMS Gateway with GSM

3. SMS GATEWAY SERVER

The SMS Gateway Server is a flexible SMS Gateway application..It has an efficient interface and internal architecture .The SMS Gateway Server can send and receive SMS messages to mobile devices via a server. The application is connected with the GSM Gateway hardware architecture server and the SMS is sent based on the user action. It also transmits transactional SMS messages.

The Communication with the network occurs either over the internet or through a wireless modem. A wireless modem allows computers to connect to a wireless local area network without physical cabling. They use cellular, satellite or Wi-Fi protocols to connect to a WLA N.

SMS messaging is handled by SMSCs. These Short Message Service Centers communicate with mobile phones through the standard GSM protocol. A SMS modem is used by the SMSC to connect to the SMS Gateway. A SMS modem is a standard mobile phone which is some time called a GSM/GPRS modem. The mobile phone can be connected to a computer with a phone to a pc data cable .It can then be used to send and receive SMS messages. This setup is easy to implement and works on all mobile networks. The drawback here is that the number of messages that can be sent through the wireless link is limited. Around 10-15 messages can be sent per minute on a standard GSM link.

Fig 8. SMS Alert Through Gateway

An alternate option would be to connect a SMSC to a SMS Gateway through the internet or a private network connection like VPN (or a leased line).Using this connection we can send our messages to the SMSC using the Internet Protocol (IP). The drawback here is that SMSCs developed by different companies have their own communication protocols to accept IP SMS connections. For example, CMG, a SMSC vendor has implemented an SMSC protocol called UCP/EMI. A good SMS Gateway must be able to implement and support all major protocols.

To setup an IP SMS connection to an SMSC, we need to connect a mobile network operator or an independent SMS service provider. We will now be able to tell the protocol being supported along with an IP address (or hostname), a port number, a username and a password.

This information can be used while setting up an IP SMS service provider connection using the SMS Gateway. The advantage here is that it is fast and is capable of sending several messages per second. The drawback is that it is generally hard to sign an agreement with mobile network operators and usually takes a long time to setup this connection.

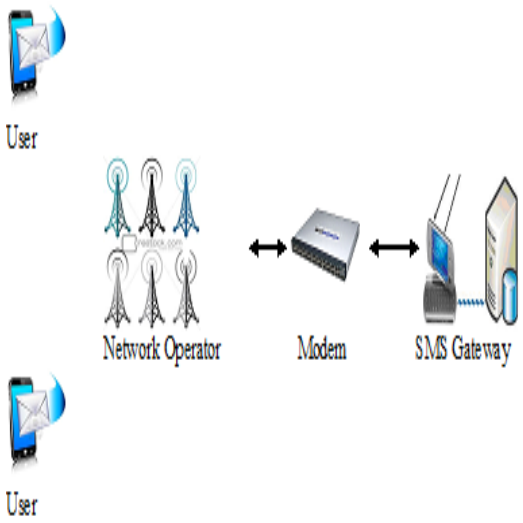

Fig 9. Architecture of SMS Gateway

4. ADVANTAGES SMS GATEWAY SERVER

There are several advantages of implementing the SMS Gateway Server. They are

- End to End Ownership
- Direct operator connectivity leading optimum performance
- GEV Redundancy
- Flexibility

5. CONCLUSION

In the near future the SMS Gateway server could be used as powerful network security mechanism to prevent unauthorized and unauthenticated sessions. Intrusion detection methods can be further strengthened using the SMS Gateway Server. When intrusion occurs an alert can be raised via the SMS instead of the traditional notifications. Security concerns raised in sectors like banking and finance can benefit from this mechanism. ATMs where heavy cash transactions occur pose a lot of security threats. Any mishaps in the ATMs are generally resolved by studying the images captured by the hidden cameras in the ATMs. These images can be sent via SMS immediately thus providing a platform to address security violations immediately and provide a chance to the authorities to nab the culprits who are a party to the fraudulent transactions.

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