

A
Seminar report
On

GSM

Submitted in partial fulfillment of the requirement for the award of degree
Of Mechanical

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Preface

I have made this report file on the topic GSM Based Vehicle theft Control System I have tried my best to elucidate all the relevant detail to the topic to be included in the report. While in the beginning I have tried to give a general view about this topic.

My efforts and wholehearted co-corporation of each and everyone has ended on a successful note. I express my sincere gratitude towho assisting me throughout the preparation of this topic. I thank him for providing me the reinforcement, confidence and most importantly the track for the topic whenever I needed it.

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Index

- Introduction
- What is GSM
- What does GSM offer?
- Why GSM?
- Services provided by GSM
- History
- Architecture
- GSM Network along with added elements
- GSM network areas
- Advantages
- Disadvantages
- Conclusion
- References

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Introduction

At the beginning of the 1980s it was realized that the European countries were using many different, incompatible mobile phone systems.

At the same time, the needs for telecommunication services were remarkably increased.

Due to this, CEPT (Conférence Européenne des Postes et des Télécommunications) founded a group to specify a common mobile system for Western Europe.

This group was named "Groupe Spéciale Mobile" and the system name GSM arose.

This abbreviation has since been interpreted in other ways, but the most common expression nowadays is Global System for Mobile communications.

At the beginning of the 1990s, the lack of a common mobile system was seen to be a general, world-wide problem.

For this reason the GSM system has now spread also to the Eastern European countries, Africa, Asia and Australia.

The USA, South America in general and Japan had made a decision to adopt other types of mobile systems which are not compatible with GSM.

However, in the USA the Personal Communication System (PCS) has been adopted which uses GSM technology with a few variations.

History

- Driving Factors:
 - Incompatibility of the European analog cellular systems
 - Reaching of capacity limits
 - Costs of the equipment
- 1982, Conference of European Post and Telecommunications formed Group Speciale Mobile (GSM)
- 1987, 15 operators from 13 countries signed Memorandum of Understanding (MoU)
- 1991, Finland's operator Radiolinia launched first GSM network in July 1991
- 1992, Massive deployment of GSM started
- By 2000 GSM became the most popular 2G technology worldwide
- GSM standard still evolving and enriched with new features and services

What is GSM?

GSM (Global System for Mobile communications) is an open, digital cellular technology used for transmitting mobile voice and data services.

What does GSM offer?

GSM supports voice calls and data transfer speeds of up to 9.6 kbps, together with the transmission of SMS (Short Message Service).

GSM operates in the 900MHz and 1.8GHz bands in Europe and the 1.9GHz and 850MHz bands in the US. GSM services are also transmitted via 850MHz spectrum in Australia, Canada and many Latin American countries. The use of harmonised spectrum across most of the globe, combined with GSM's international roaming capability, allows travellers to access the same mobile services at home and abroad. GSM enables individuals to be reached via the same mobile number in up to 219 countries.

Terrestrial GSM networks now cover more than 90% of the world's population. GSM satellite roaming has also extended service access to areas where terrestrial coverage is not available.

Why GSM?

The GSM study group aimed to provide the followings through the GSM:

- Improved spectrum efficiency.
- International roaming.
- Low-cost mobile sets and base stations (BSs).
- High-quality speech.
- Compatibility with Integrated Services Digital Network (ISDN) and other telephone company services.
- Support for new services.

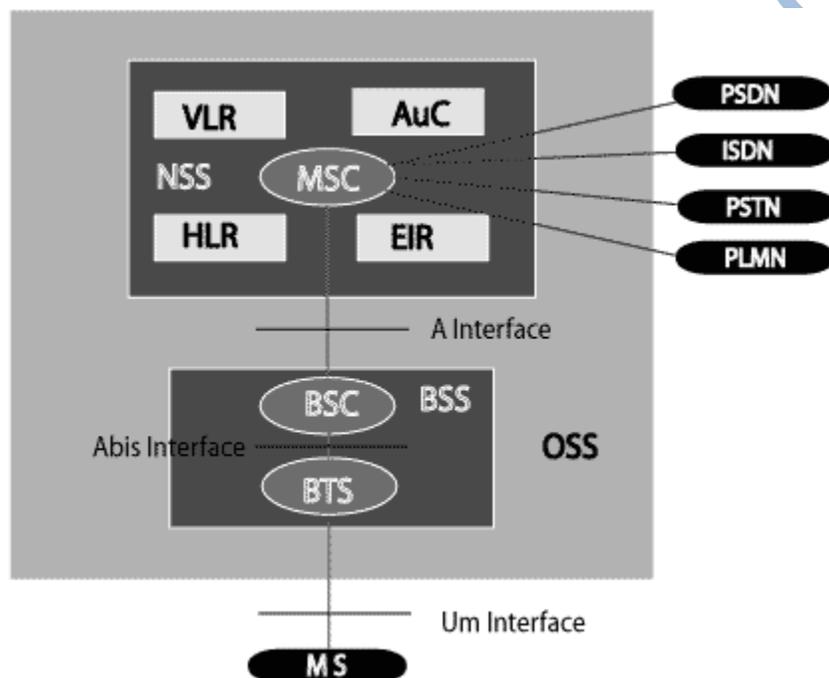
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Architecture

A GSM network consists of several functional entities, whose functions and interfaces are defined. The GSM network can be divided into following broad parts.

- The Mobile Station (MS)
- The Base Station Subsystem (BSS)
- The Network Switching Subsystem (NSS)
- The Operation Support Subsystem (OSS)

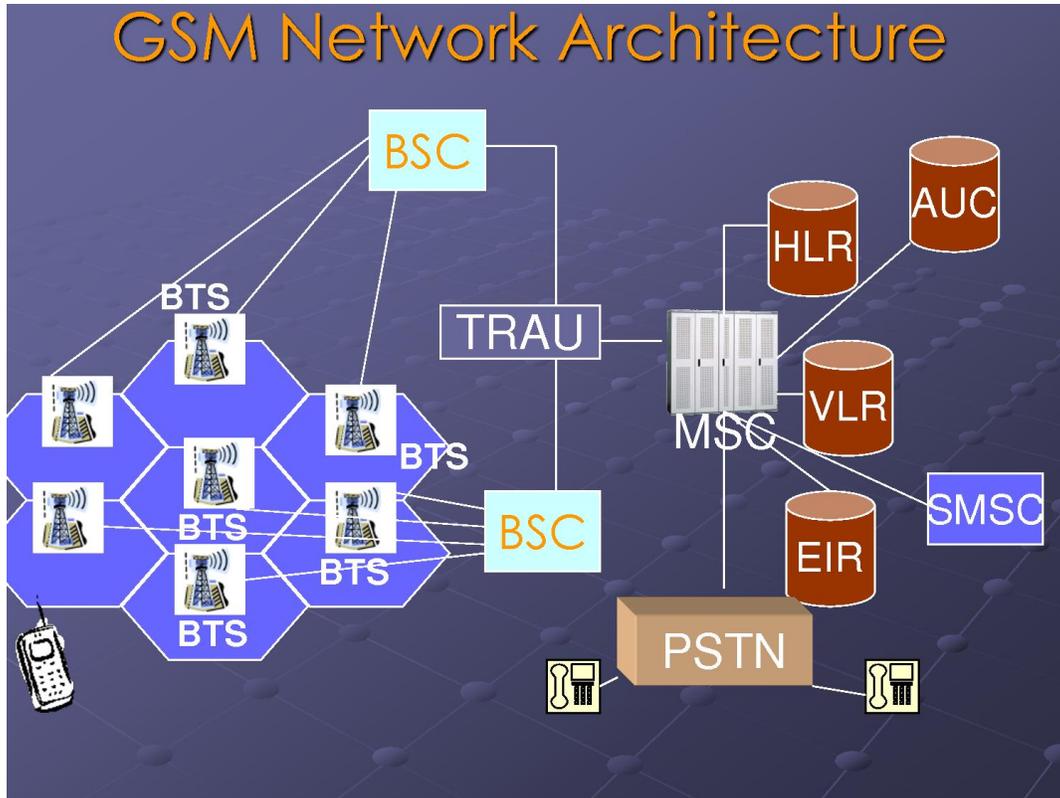
Following is the simple architecture diagram of GSM Network:



The added components of the GSM architecture include the functions of the databases and messaging systems:

- Home Location Register (HLR)
- Visitor Location Register (VLR)
- Equipment Identity Register (EIR)
- Authentication Center (AuC)
- SMS Serving Center (SMS SC)
- Gateway MSC (GMSC)
- Chargeback Center (CBC)
- Transcoder and Adaptation Unit (TRAU)

Following is the diagram of GSM Network along with added elements:



The MS and the BSS communicate across the Um interface, also known as the air interface or radio link. The BSS communicates with the Network Service Switching center across the A interface.

GSM network areas:

In a GSM network, the following areas are defined:

- Cell: Cell is the basic service area: one BTS covers one cell. Each cell is given a Cell Global Identity (CGI), a number that uniquely identifies the cell.
- Location Area: A group of cells form a Location Area. This is the area that is paged when a subscriber gets an incoming call. Each Location Area is assigned a Location Area Identity (LAI). Each Location Area is served by one or more BSCs.
- MSC/VLR Service Area: The area covered by one MSC is called the MSC/VLR service area.
- PLMN: The area covered by one network operator is called PLMN. A PLMN can contain one or more MSCs.

GSM open-source software

Several open-source software projects exist that provide certain GSM features:

- gsmd daemon by Open moko
- Open BTS develops a Base transceiver station
- The GSM Software Project aims to build a GSM analyzer for less than \$1,000
- OsmocomBB developers intend to replace the proprietary baseband GSM stack with a free software implementation

Issues with patents and open source

Patents remain a problem for any open-source GSM implementation, because it is not possible for GNU or any other free software distributor to guarantee immunity from all lawsuits by the patent holders against the users. Furthermore new features are being added to the standard all the time which means they have patent protection for a number of years.

The original GSM implementations from 1991 may now be entirely free of patent encumbrances, however patent freedom is not certain due to the United States' "first to invent" system that was in place until 2012. The "first to invent" system, coupled with "patent term adjustment" can extend the life of a U.S. patent far beyond 20 years from its priority date.

It is unclear at this time whether Open BTS will be able to implement features of that initial specification without limit. As patents subsequently expire, however, those features can be added into the open-source version. As of 2011, there have been no lawsuits against users of Open BTS over GSM use.

➤ **Advantages:-**

- GSM is more suitable network with robust pitfall.
- Low signal inside the building and house.
- The subscriber globally creates much better in network effect for GSM handset maker's carries and end users.
- It can be use repeaters.
- A customer has been better voice quality and low cost amount in alternatives to making calls like (sms) etc.
- It is easy to implement.
- International roaming is not a big problem.
- GSM allows network operation to after roaming service so that customer can use whole over the world.

Disadvantages:-

- Many of the technology are patented and should be license from qualcomm.
- When customers using particular sites going up and the range of the sites goes down.
- Manufactures are not release IS-95 devices due to the lack of the big market and it come in late in market.
- IS-95 is normally installed in small tower.
- Gsm has fixed max call sites range up to 35 km that is very limited.

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Conclusion

In the analog communication systems the voice quality was poor and in the GSM networks we find good voice quality and the frequency range is also increased. The transformation has been going and the third generation networks are being used and it has higher frequency ranges and data rates.

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