GSM (GLOBAL SYSTEM FOR MOBILE COMMUNICATION) TECHNOLOGY

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Introduction

GSM (Global System for Mobile Communication) is a standard set developed by the ETSI(European Telecommunication Standards Institute). GSM stands for Global System for Mobile Communications. Just like computers, mobile phones have evolved over time. There were first generation mobile phones in the 70's, there are 2nd generation mobile phones in the 80's and 90's, and now there are 3rd gen phones which are about to enter the Indian market. GSM is called a 2nd generation, or 2G communications technology.

Now, GSM makes use of two principles. The first called Time division Multiplexing is very simple. Let's say that one of your friends possesses the new and sleek Apple's I Phone. Everyone wants to try a hand at your new accessory. What do you'll do? You lend it to your friend Tim for some time, then you let John listen to music on it, then you let Linda check her e-mails on it, and finally you let Nancy search on Google. So what did you do ? You allowed each of your friends to share your Phone for some time. That is, you allowed you I Phone to be shared in time.

Description

The radio frequency say 890 Mhz is shared by different users in time. This means if user A, B, C and D all talk at the same time. You assign the 890 Mhz frequency to A for some time and allow him to talk, then you assign 890 band to B for some time to speak, then to C , and finally to D, before coming back to A. So the process continues in a round robin fashion, as long as A, B, C, and D want to talk. This way many users talk at same time on the same frequency. This has to be done, because as we now frequency or Bandwidth is a scarce resource and is not available in plentiful, so it be shared.

Now the second principle that GSM uses is Frequency Division Multiplex. In Frequency Division Multiplex, users A, B, C and D, all use different frequency say 890, 900, 910 , 920 for their respective communications. A very good example of this is Radio broadcasting. Because all the radio operators like Red FM, Go FM, and Radio Mir chi want to operate in the same area, they use different frequencies for communication 91.0FM, 93.5FM, 94.6 FM, 108FM. So to listen to different communications, you have to tune in the receiver set to different frequencies.

Now, GSM uses a combination of TDMA and FDMA. This means that users A and B are not only sharing the channel in time but also frequency. This means that user A is on the channel 890Mhz for 2 seconds, then jumps to 900Mhz channel for the next to seconds, then jumps to 910Mhz for the next 2 seconds and so on... Thus, each user is uses a different frequency at different time slots. This is called Frequency Hopping.

Services provided by GSM

From the beginning, the planners of GSM wanted ISDN compatibility in terms of the services offered and the control signaling used. However, radio transmission limitations, in terms of bandwidth and cost, do not allow the standard ISDN B-channel bit rate of 64 kbps to be practically achieved.

Using the ITU-T definitions, telecommunication services can be divided into bearer services, teleservices, and supplementary services. The most basic teleservice supported by GSM is telephony. As with all other communications, speech is digitally encoded and transmitted through the GSM network as a digital stream. There is also an emergency service, where the nearest emergency-service provider is notified by dialing three digits (similar to 911).

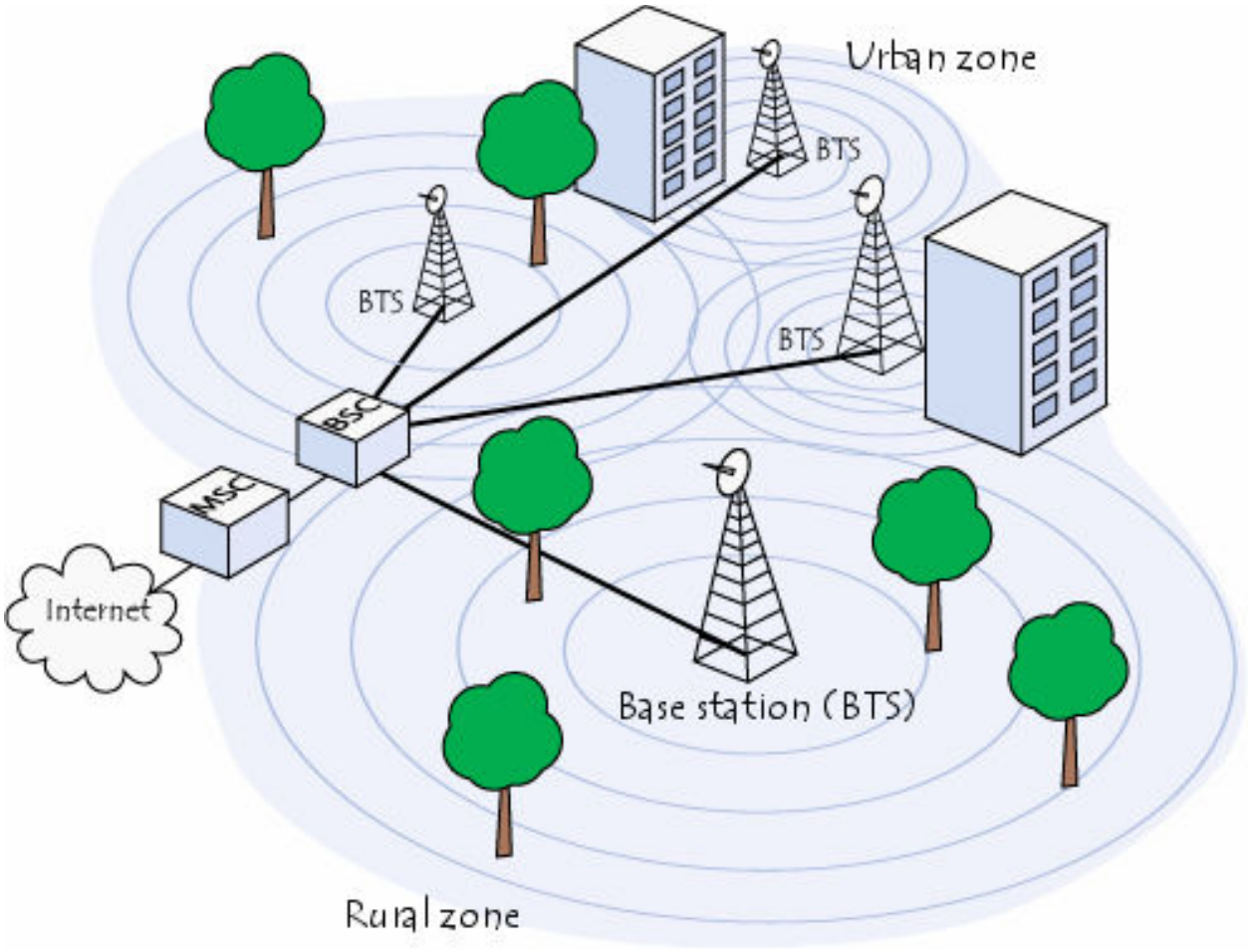
A variety of data services is offered. GSM users can send and receive data, at rates up to 9600 bps, to users on POTS (Plain Old Telephone Service), ISDN, Packet Switched Public Data Networks, and Circuit Switched Public Data Networks using a variety of access methods and protocols, such as X.25 or X.32. Since GSM is a digital network, a modem is not required between the user and GSM network, although an audio modem is required inside the GSM network to interwork with POTS.

Other data services include Group 3 facsimile, as described in ITU-T recommendation T.30, which is supported by use of an appropriate fax adaptor. A unique feature of GSM, not found in older analog systems, is the Short Message Service (SMS). SMS is a bidirectional service for short alphanumeric (up to 160 bytes) messages. Messages are transported in a store-and-forward fashion. For point-to-point SMS, a message can be sent to another subscriber to the service, and an acknowledgement of receipt is provided to the sender. SMS can also be used in a cell-broadcast mode, for sending messages such as traffic updates or news updates. Messages can also be stored in the SIM card for later retrieval.

Supplementary services are provided on top of teleservices or bearer services. In the current (Phase I) specifications, they include several forms of call forward (such as call forwarding when the mobile subscriber is unreachable by the network), and call barring of outgoing or incoming calls, for example when roaming in another country. Many additional supplementary services will be provided in the Phase 2 specifications, such as caller identification, call waiting, multi-party conversations.

Architecture of the GSM network

A GSM network is composed of several functional entities, whose functions and interfaces are specified. Figure 1 shows the layout of a generic GSM network. The GSM network can be divided into three broad parts. The Mobile Station is carried by the subscriber. The Base Station Subsystem controls the radio link with the Mobile Station. The Network Subsystem, the main part of which is the Mobile services Switching Center (MSC), performs the switching of calls between the mobile users, and between mobile and fixed network users. The MSC also handles the mobility management operations. Not shown is the Operations and Maintenance Center, which oversees the proper operation and setup of the network. The Mobile Station and the Base Station Subsystem communicate across the Um interface, also known as the air interface or radio link. The Base Station Subsystem communicates with the Mobile services Switching Center across the A interface.



Conclusion

Telecommunications are evolving towards personal communication networks, whose objective can be stated as the availability of all communication services anytime, anywhere, to anyone, by a single identity number and a pocket able communication terminal. Having a multitude of incompatible systems throughout the world moves us farther away from this ideal. The economies of scale created by a unified system are enough to justify its implementation, not to mention the convenience to people of carrying just one communication terminal anywhere they go, regardless of national boundaries.