GPRS and 3G Wireless Systems

Seminar Report

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Master of Technology
by

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Abstract

The Mobile Cellular Systems have evolved very rapidly in the past few years. Starting from the First Generation Systems which supported only speech we now have systems which offer varied kind of services like audio-video, Internet access, facsimile etc. In this report, fist of all an introduction to Mobile cellular concepts is presented. This is followed by discussion of GPRS and UMTS (Third Generation) Cellular Systems in greater detail. The architecture of both the systems is discussed in detail.

Acknowledgements

I would like to thank my guide Prof. Sridhar Iyer for his invaluable guidence for this seminar. I would also like to thank all the Mobile Computing Project group members at KReSIT and in particular Dr. Leena Chandran Wadia for helping me out in finding the appropriate material for study on this topic.

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Chapter 1

Introduction to Cellular Systems

1.1 Introduction

The wireless technology has come a long way since its inception. Last decade has seen an impressive growth in the number of wireless users all over the world. The use of wireless technology is now not just limited to wireless telephony but there is now a huge demand of wireless technology for many types of applications like Internet and web browsing, video and other text and multimedia based application. In this report we give an overview of the first and second generation wireless technologies and then we finally discuss the GPRS and 3G Wireless Networks in details.

1.2 General Cellular Concepts

In a cellular system the hand-sets carried by the users are called Mobile Stations (MS). The Mobile Stations communicate to the Base Stations (BS) through a pair of frequency channels, one for up-link and another for down-link. All the base stations of a Cellular systems are controlled by a central switching station called Mobile Switching Center (MSC) or Mobile Telephone Switching Office (MTSO). The MSC is responsible for all kinds of network management functions such as channel allocations, Handoffs, billing, power control etc. The MSC is also connected to the Public Subscriber Telephone Network (PSTN) or Public Land Mobile Network (PLMN) so as to allow the MS to talk to a Land Line telephone or vice versa.

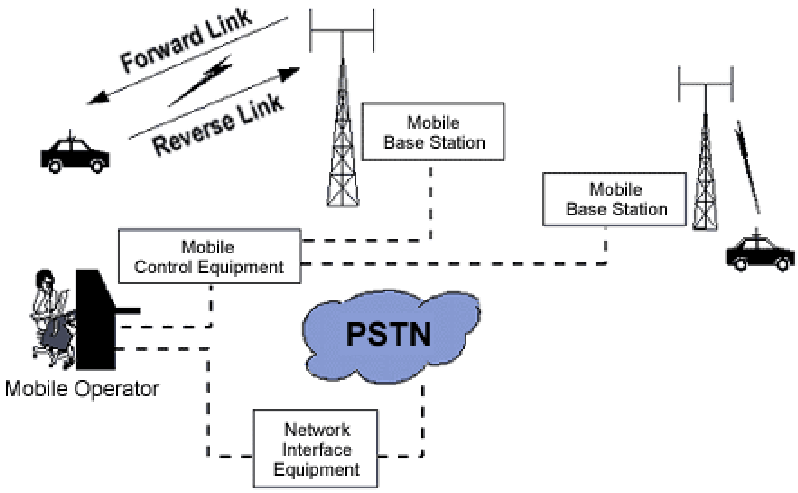

Figure 1.1: Cellular Architecture (Source:www.iec.org)

Generally two range of frequencies are allocated to Mobile Cellular Systems one for up-link channels and other for down-link channels. This range of frequencies is divided into many channels so as to allow many MS to talk simultaneously. This technique of multiplexing several users over a given spectrum is called Frequency Division Multiple Access (FDMA). Other techniques like Time Division Multiple Access (TDMA) and Code Division Multiple Access (CDMA) are also employed by modern cellular systems. To support a large number of users in a given area a technique called "Frequency Reuse" is used by cellular systems. Under this technique the available channels are divided into smaller groups and a group of channels is allocated to a small region called "cell", typically of Hexagonal shape. In this way the whole range of frequency channels is used over a small group of cells and this group of cells is called "cluster". Typical cluster sizes are 4,7,9,12 and 19.

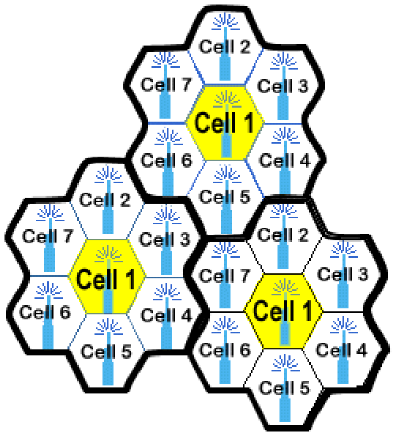

Figure 1.2: Frequency Reuse with Cluster size of 7 (Source:www.iec.org)

Another important feature of Mobile Cellular System is "Handoff". When a MS goes from one cell to anther then it needs to change to the BS of current cell cite and probably needs to be assigned different set of frequency channels. This phenomenon is called "Handover" or "Handoff" (HO). The HO decision may be taken entirely by controlling station or may be coordinated by MS.

1.3 Generations of Wireless Systems

1.3.1 First Generation

The First Generation cellular systems in general used the FDMA technique and functioned more or less exactly as described above. These systems used analog modulation techniques like FM. The examples of first generation cellular systems are AMPS(Advance Mobile Telephone System), NMT (Nordic Mobile Telephone) system etc. These systems suffered from limitations like low service quality,long call setup time,inefficient use of bandwidth, susceptible to interference, bulky and expensive equipments, support only for speech,insecure transmission etc.

1.3.2 Second Generation

The Second Generation cellular systems employ the digital modulation techniques and advance call processing methods. Some of these systems use combination of TDMA and FDMA technique to increase the number of channels. One such example is GSM (Global System for Mobile) which has gained wide popularity and is used in most of the European countries. Some of the other systems like IS-95 (used in USA) also use CDMA technique. These systems provided better service quality than that of the first generation cellular systems and use the given bandwidth more efficiently. These systems support data, speech and facsimile services and use the encryption mechanisms to protect the data and speech. They also use advance mobility management and support power control.

1.3.3 Third Generation

The Third Generation Systems will provide both speech and data at the very high speed. Though the second generation system provide with data transmission, the data rate offered is quite low and is unsuitable for today's needs. The third generation systems promise to integrate all kind of services like speech, data, audio, video, facsimile etc. through the mobile handsets. These systems will provide much better service quality than the second generation systems and will provide much smaller call set up delay. They will be suitable both for bursty and streamed data and will give much better utilization of channels. The users will be billed based on the utilization of channel rather than the time of call. This is very important for today's service demands like Internet and mail services. Therefore the goal of the third generation cellular systems is to provide better service quality at low cost, smaller call set up time, user friendly billing and access to a wide variety of services through wireless.

1.4 Organization of Report

The report will discuss various features of Mobile Cellular Systems beyond second generation. In the chapters ahead we will briefly discuss the architecture of GSM system in order to understand the current system implementations since the newer systems are greatly influenced by its design. Finally we discuss the architecture of GPRS (also termed as 2.5G) and 3G systems in greater detail in the coming chapters.

Chapter 2

GPRS: General Packet Radio Service

2.1 Introduction

The introduction of second generation cellular mobile systems witnessed an impressive growth in the number of mobile subscribers. The most popular second generation systems are GSM and IS-95. The GSM system is based on FDMA-TDMA technology and is widely used in Europe, many parts of Asia and Africa. The IS-95 system is based on CDMA technology and is used in North America. With the increasing popularity of these systems there was an increasing demand for the data services over the wireless. These systems were designed for supporting circuit switched voice data and supported packet data on limited basis, but could not meet of today's traffic requirements. In future it is expected that the wireless systems would be able to provide various kind of services like Internet access over wireless, streaming audio and video, text and multimedia messaging services.

Existing cellular systems do not fulfill the current data needs. The data rates are slow, the connection setup time is long and the services are too expensive. The reason for this is that these systems are designed primarily to handle circuit switched voice data and a channel is dedicated to a single user for the entire duration of the call. This leads to inefficient channel utilization for the packet switched data since it is bursty in nature and many calls could utilize same channel. If packet switched bearer service is provided, the channels can be allocated to the users when needed, leading to sharing of the physical channel (Statistical multiplexing) and thus efficient channel utilization.

The General Packet Radio Service (GPRS) has been developed to address the above inefficiencies and to simplify the wireless access to packet data network. It applies packet radio principles to efficiently transfer data between GSM mobile stations and external packet data network. GPRS supports both X.25 and IP (IPv4 as well as IPv6) networks. GPRS offers session establishment time below one second and data rates up to several tens kbit/s. It also provides for user friendly billing since the billing is based on the amount of transmitted data as against GSM where user is billed based on the duration of the call. This is suitable for applications with bursty traffic (e.g. web browsing) where user can be "online" for longer period of time but will be billed based on transmitted data volume.

2.2 System Architecture

In order to understand the GPRS system architecture it is helpful to first understand the architecture of GSM system. We therefore discuss the architecture of GSM system prior to discussing the architecture of GPRS.

2.2.1 GSM System Architecture

In GSM system the mobile handset is called Mobile Station (MS). A cell is formed by the coverage area of a Base Transceiver Station (BTS) which serves the MS in its coverage area. Several BTS together are controlled by one Base Station Controller (BSC). The BTS and BSC together form Base Station Subsystem (BSS). The combined traffic of the mobile stations in their respective cells is routed through a switch called Mobile Switching Center (MSC). Connection originating or terminating from external telephone (PSTN) are handled by a dedicated gateway Gateway Mobile Switching Center (GMSC). The architecture of a GSM system is shown in the figure 2.1 below.

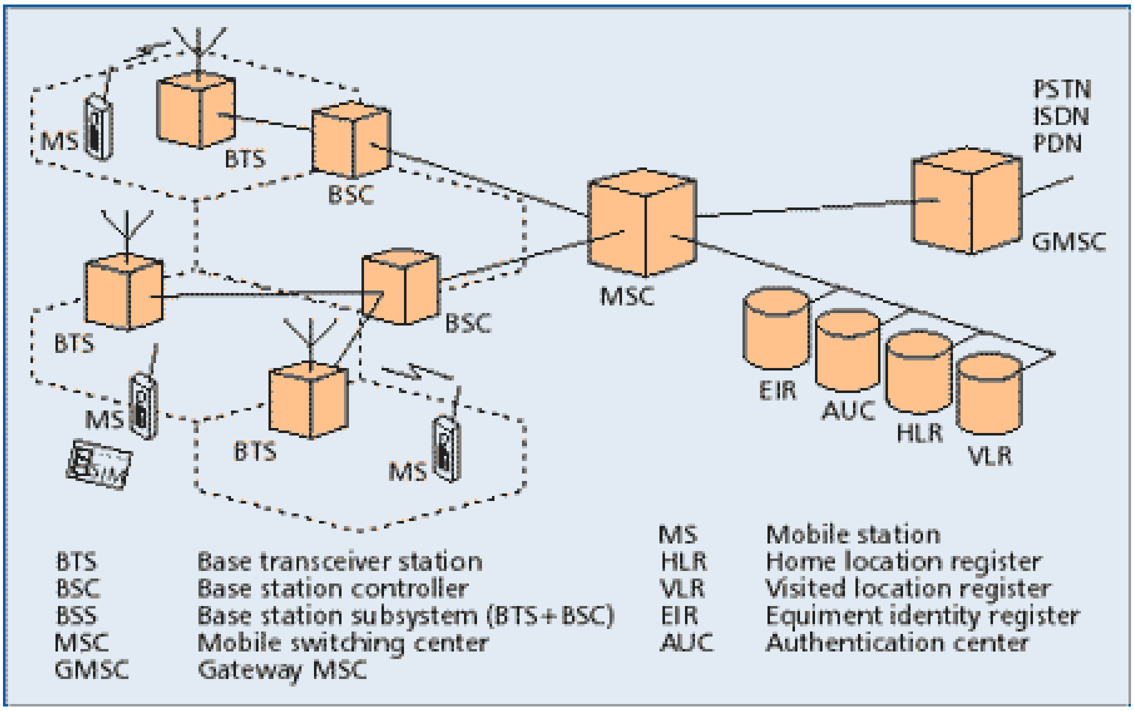

Figure 2.1: GSM Architecture (Source: Bettstetter et. all)

In addition to the above entities several databases are used for the purpose of call control and network management. These databases are Home Location Register (HLR), Visitor Location Register (VLR), the Authentication Center (AUC), and Equipment Identity Register (EIR).

Home Location Register (HLR) stores the permanent (such as user profile) as well as temporary (such as current location) information about all the users registered with the network. A VLR stores the data about the users who are being serviced currently. It includes the data stored in HLR for faster access as well as the temporary data like location of the user. The AUC stores the authentication information of the user such as the keys for encryption. The EIR stores stores data about the equipments and can be used to prevent calls from a stolen equipments.

All the mobile equipments in GSM system are assigned unique id called IMSI (International Mobile Equipment Identity) and is allocated by equipment manufacturer and registered by the service provider. This number is stored in the EIR. The users are identified by the IMSI (International Module Subscriber Identity) which is stored in the Subscriber Identity Module (SIM) of the user. A mobile station can be used only if a valid SIM is inserted into an equipment with valid IMSI. The "real" telephone number is different from the above ids and is stored in SIM.

2.2.2 GPRS System Architecture

The GPRS is an enhancement over the GSM and adds some nodes in the network to provide the packet switched services. These network nodes are called GSNs (GPRS Support Nodes) and are responsible for the routing and delivery of the data packets to and form the MS and external packet data networks (PDN). The figure 2.2 below shows the architecture of the GPRS system.

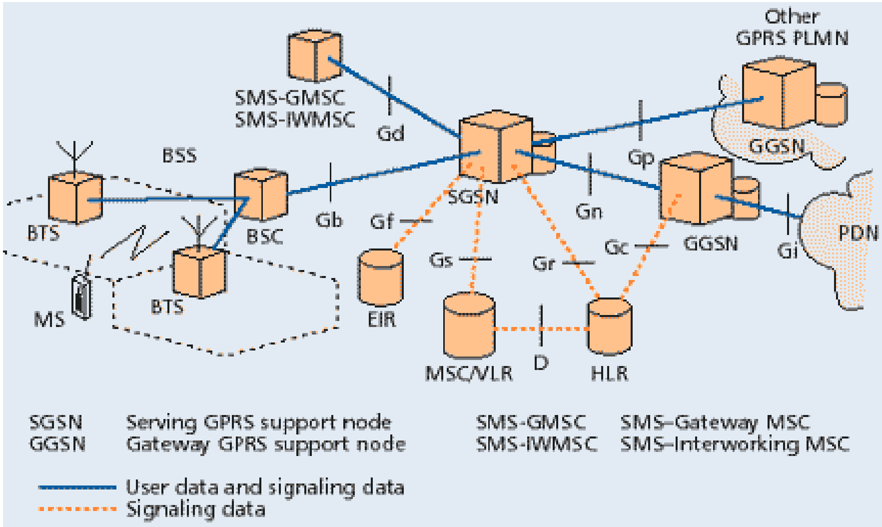

Figure 2.2: GPRS Architecture (Source: Bettstetter et. all)

The most important network nodes added to the existing GSM networks are:

- SGSN (Serving GPRS Support Node).
- GGSN (Gateway GPRS Support Node).

The serving GPRS support node (SGSN) is responsible for routing the packet switched data to and from the mobile stations (MS) within its area of responsibility. The main functions of SGSN are packet routing and transfer, mobile attach and detach procedure (Mobility Management (MM)), location management, assigning channels and time slots (Logical Link Management (LLM)), authentication and charging for calls. It stores the location information of the user (like the current location, current VLR) and user profile (like IMSI addresses used in packet data networks) of registered users in its location register.

The gateway GPRS support node (GGSN) acts as interface between the GPRS backbone and the external packet data network (PDN). It converts the GPRS packet coming from the SGSN into proper packet data protocol (PDP) format (i.e. X.25 or IP) before sending to the outside data network. Similarly it converts the external PDP addresses to the GSM address of the destination user. It sends these packets to proper SGSN. For this purpose the GGSN stores the current SGSN address of the user and his profile in its location register.The GGSN also performs the authentication and charging functions. In general there may be a many to many relationship between the SGSN and GGSN. However a service provider may have only one GGSN and few SGSNs due to cost constraints. A GGSN proved the interface to several SGSNs to the external PDN.

2.2.3 GPRS Interfaces

Different network components of the GPRS are connected together by well defined interfaces. Some new interfaces to GSM have been added in GPRS to support packet switched data mainly between GGSNs, SGSNs and other network components. The following interfaces have been defined:

- Um interface between MS and BTS is very similar to GSM and defines the modulation type, error correction/detection technique, power control information etc.
- A interface between BTS and BSC defines the channel allocation, power measurement information etc.

- Gb interface connects BSCs to SGSN.
- Gn interface is used between GSNs of same PLMN to exchange user profile when the user moves from one SGSN to another.
- Gp interface is defined between two GSNs of different PLMN for exchanging the user profile and other signaling information between a SGSN and GGSN of another area.
- Gf interface is used between SGSN and EIR to query the IMEI information if a MS tries to register with the network.
- Gr interface between SGSN and HLR is used to get the user profile, the current SGSN address and the PDP address(es) for each user in PLMN.
- Gc interface between GGSN and HLR is used by GGSN to query user's location and profile to update its location register.
- Gi interface connects GGSN to external PDN (e.g. X.25 or IP).
- Gs interface between SGSN and MSC/VLR is used to perform paging request of circuit switched GSM call for combined attachment procedure.
- Gd interface between SMS-Gateway (SMS-GMSC) and SGSN is used to exchange short message service (SMS) messages.

All GSNs are connected over a GPRS backbone network over IP. Within this backbone the GSNs encapsulate and transmit PDN packets by using GPRS Tunneling Protocol (GTP). This backbone network is of two types:

- Intra-PLMN backbone connects the GSNs of same PLMN and are therefore private IP based networks of the service provider.
- Inter-PLMN backbone connects the GSNs of different PLMNs if there is a roaming agreement is between them. The gateways between these PLMNS are called border gateways and perform security functions apart from regular functions to protect the private information against unauthorized usage.

2.3 Services

The bearer services of GPRS offer end-to-end packet switched data transfer. Of the two types of bearer services offered by GPRS only the point-to-point (PTP) service is available now and the point-to-multipoint (PTM) service will be made available in future releases of GPRS.

The PTP service offers transfer of data packets between two users. It is offered in both connectionless mode (PTP connectionless network service (PTP-CLNS), e.g., for IP) and connection-oriented mode (PTP connection-oriented network service (PTP-CONS), e.g., for X.25).

The PTM service offers transfer of data packets from one user to multiple users. There exist two kinds of PTM services:

- Using the multicast service PTM-M, data packets are broadcast in a certain geographical area. A group identifier indicates whether the packets are intended for all users or for a group of users.
- Using the group call service PTM-G, data packets are addressed to a group of users (PTM group) and are sent out in geographical areas where the group members are currently located.

It is also possible to send SMS over GPRS. In fact the 160 character limit in GPRS is not applicable in GPRS as in GSM. It is also planned to have other supplementary services like call forwarding unconditional (CFU), call forwarding on mobile subscriber not reachable (CFNRc), and closed user group (CUG).

Moreover, a GPRS service provider may provide a number of other non-standardized services built over IP like access to databases, messaging service, electronic monitoring and surveillance systems, whether forecast, traffic information broadcast etc.

GPRS also provides the facility to use both packet and circuit switched services simultaneously depending upon the class of the MS. Class A can use both services simultaneously, class B can register for both but use only one at a time whereas class C can at a time attach for only one type of service.

2.4 Session, Mobility and Location Management

Before MS can use any type of GPRS services it must "attach" to network. Attach involves registration and authentication with network. Similarly it performs "detach" when it no longer needs the service. Before the Mobile station can talk to any external PDN it must get a PDP context after an attach. PDP context contains the IP address of MS, requested QoS and address of serving GGSN. PDP can be static (IP address assigned permanently by PLMN) or dynamic (address allocated by visited network). The figure 2.3 below shows the PDP activation procedure.

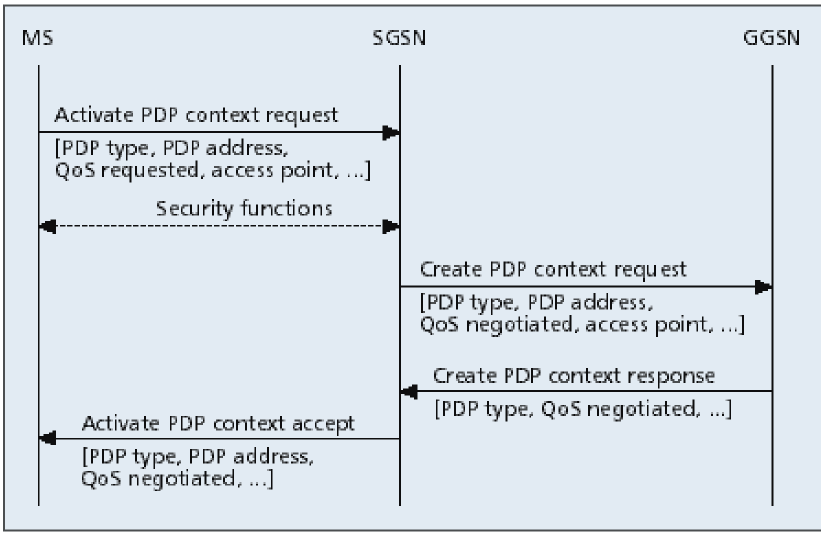

Figure 2.3: PDP Context Activation (Source: Bettstetter et. all)

The MS requests to SGSN with message "activate PDP context request". The SGSN after the authentication forewords this request to affected GGSN. The GGSN responds with "create PDP context response" message to SGSN which updates its PDP context table and confirms to MS with "activate PDP context accept" message.

The purpose of location management is to keep track of MS so that the incoming packets can be routed to it without "paging". But there is trade off of battery power Vs the frequency of location update and a compromise is the good solution. For this reason the MS maintains it state in one of the three states as shown in figure 2.4. The location update frequency is dependent upon the state of MS.

In IDLE state the MS is not reachable and no location update is performed. After an "attach" the MS gets into READY state and may perform "detach" to go back to IDLE state. The STANDBY state is reached when the MS does not send any packets for a long time, and READY timer expires.

In READY state the MS sends Location update information to SGSN every movement to a new cell. For location management in STANDBY state GSM location area is divided in several Routing Areas (RA) consisting of several cells. Whenever a MS moves from one RA to another, it

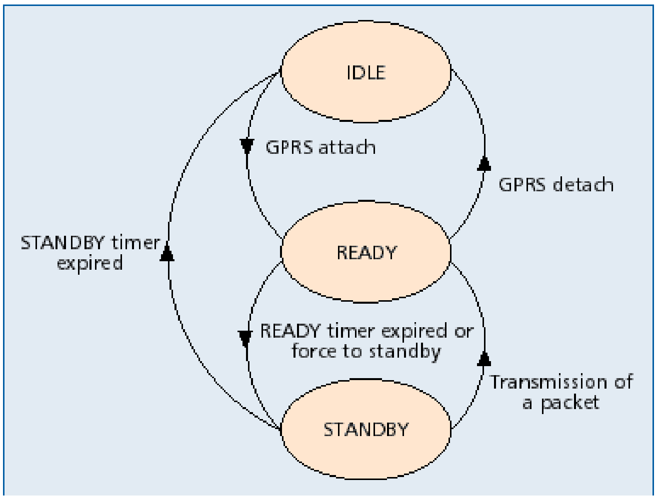

Figure 2.4: Mobile Station States in GPRS (Source: Bettstetter et. all)

sends a "routing area update" to the associated SGSN. Inter SGSN and Intra SGSN RA updates are possible. Sometimes RA is combined with GSM LA.

2.5 Radio Resource Management and Logical Channels

GPRS uses the same frequency spectrum as GSM i.e. 890-960MHz for up-link and 935-960MHz for down-link. There are 124 channels of 200kHz each and one channel is left as guard band. Some of these channels are allocated to GPRS arbitrarily. The channel allocation in GPRS is much more flexible than GSM. The channel is allocated to MS only when it needs to send data. More than one slot can be given to a single MS leading to maximum data rate of 172kbit/s.

GPRS uses similar logical channel structure as the GSM. The channel can be divided in two categories: traffic channels and signaling channels. The different channels are:

- PDTCH (Packet Data Traffic Channel) is used for user data transfer.
- PBCCH (Packet Broadcast Control Channel) is unidirectional point-to-multipoint signaling channel from BSS to MS. It is used by BSS to broadcast control information to all MS in cell.
- PCCCH (Packet Common Control Channel) is bidirectional point-to-multipoint signaling channel which transports the signaling information for network access management.
- PRACH (Packet Random Access Channel) is used by MS to request one or more PDCH.
- PAACH (Packet Access Grant Control Channel) is used to allocate one or more PDTCH to MS.
- PPCH (Packet Paging Channel) is used by BSS to find out the location of a MS (paging) prior to down-link packet transfer.
- PNCH (Packet Notification Control Channel) is used to inform the MS of incoming PTM message (multicast or group call).
- PACCH (Packet Associated Control Channel) is used for sending signaling information related to one particular MS (e.g. power control information).
- PTCCH (Packet Timing advance control Channel) is used for adaptive frame synchronization.

2.6 Channel Coding

GPRS employs different channel coding to achieve different error correcting capabilities and achieving different data rates. The different data rates used and their performance is shown in table 2.1 below.

Coding Scheme	Pre-Code USF	Info bits without USF	Parity Bits BC	Tail Bits	Output conv encoder	Punctured bits	Code Rate	Data Rate
CS-1	3	181	40	4	456	0	1/2	9.05
CS-2	6	268	16	4	588	132	2/3	13.4
CS-3	6	312	16	4	676	220	3/4	15.6
CS-3	12	428	16	-	456	-	1	15.6

Table 2.1: Channel coding schemes for logical traffic channels in GPRS (Source: Bettstetter et. all)

On the PDTCH one of the above coding schemes can be chosen, depending on quality of channel. Under very bad channel conditions, we may use CS-1 and get a data rate of 9.05kbit/s per GSM slot with very reliable coding. Under very good channel conditions we transmit without convolutional coding and achieve a data rate of 21.4kbit/s. With eight time slots we achieve a maximum data rate of 172.2kbit/s.

After encoding, codewords are interleaved into a block interleaver of depth 4. On the receiver side, the codewords are de-interleaved. The decoding is performed by Viterbi Algorithm.

2.7 Summary

The GPRS is a very important step in the evolution of second generation mobile systems towards third generation systems. It offers packet switching of packet data along with the conventional circuit switching of voice data. The billing is friendly, the data rates are high and call setup time is very low. The system is optimized for packet switched data and is transition from the circuit switched cellular network to totally packet switched cellular networks.

Chapter 3

UMTS: The Third Generation Cellular System

3.1 Introduction

The cellular networks have evolved considerably over the period. The early cellular networks suffered from many limitations and carried only speech. Today's the cellular systems like GPRS, carry packet switched data and support various type of application like Internet browsing, email access etc. In modern days the emphasis is on integration of all kinds of services like web access, file transfer and facsimile with the traditional voice services. The cellular networks are now heading towards all IP based network and it is likely that in future all services will be made available over IP. The 3G (Third Generation) cellular system is a step towards standardization of the next generation mobile cellular networks.

The third generation systems will support high speed packet switched data (up to 2Mbps) and will be next step beyond the GPRS. In fact GPRS is considered to be a transition step from second generation cellular systems to third generation cellular systems. The 3G systems are expected to be accepted world-wide and the subscriber would be able to get the mobile services from anywhere in the world without replacing his handset or SIM card. The subscriber would also get same environment and services in the visiting network as in his home network also being independent of the terminal. Apart from this, the modern generation cellular systems will provide with the framework to build various kind of services (like VPN and conferencing) on the top of core cellular networks.

Currently the 3G cellular systems are being evolved from the existing cellular networks. Despite the efforts of standardization, UMTS (Universal Mobile Telecommunication System) and CDMA-2000 are the two main networks which are likely to exist. Both these systems use CDMA technology. The UMTS system is being promoted by ETSI (European Telecommunication Standards Institute) and is a successor of GSM. CDMA-2000 is successor of IS-95 and is expected to be used in North America. In this report we will consider the features and architecture of UMTS system.

3.2 Overview of UMTS system

UMTS is the third generation system promoted by ETSI and provides vital link between today's multiple GSM systems and the ultimate single worldwide system for all mobile telecommunications, International Mobile Telecommunications-2000 (IMT-2000). It is also referred to as wideband code division multiple access (W-CDMA) and is one of the most significant advances to the evolution of telecommunications into 3G networks. It will address the the growing demands of the mobile and Internet applications in the overcrowded mobile communications sky. It will increase the network speeds to 2Mbps per mobile user and establishes a global roaming standard.

3.3 UMTS Architecture

UMTS system uses the same core network as the GPRS and uses entirely new radio interface. The new radio network in UMTS is called UTRAN (UMTS Terrestrial Radio Access Network) and is connected to the core network (CN) of GPRS via Iu interface. The Iu is the UTRAN interface between the Radio network controller RNC and CN. The figure 3.1 shows the UMTS architecture.

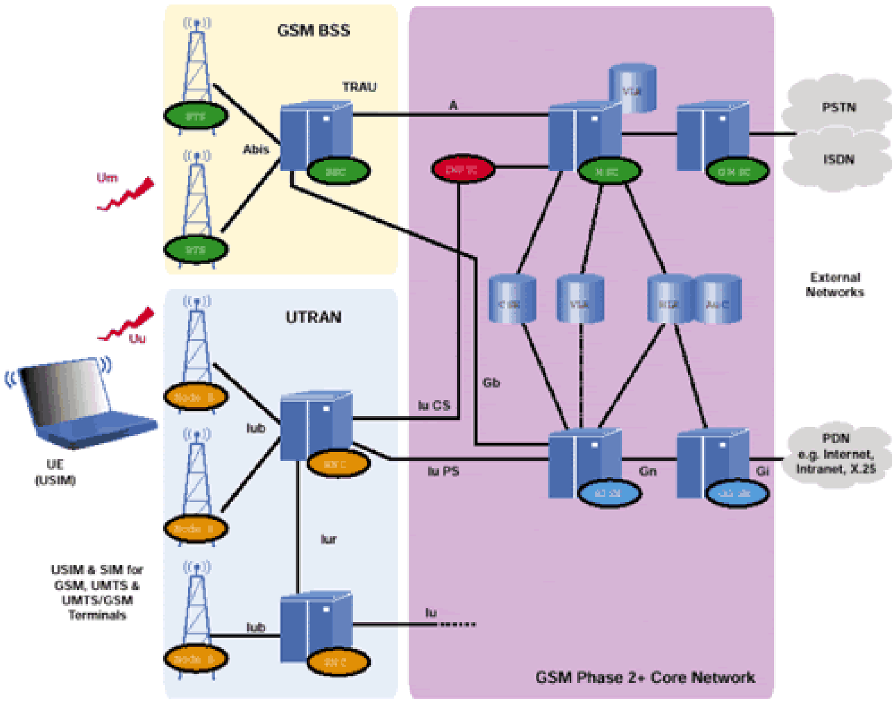

Figure 3.1: UMTS Architecture (Source:www.iec.org)

The mobile terminal in UMTS is called User Equipment (UE). The UE is connected to Node-B over high speed Uu (up to 2 Mbps) Interface. The Node-B are the equivalent of BTS in GSM and typically serve a cell site. Several Node-Bs are controlled by a single RNCs over the Iub interface. The RNCs are connected to CN through Iu interface. The packet switched data is transmitted through Iu-PS interface and circuit switched data is transferred over Iu-CS interface. One of the new interfaces in UTRAN is Iur interface which connects two RNCs and has no equivalent in GSM system. The Iur interface facilitates handling of 100 percent of RRM (Radio Resource Management) and eliminates the burden from CN.

UMTS also supports GSM mode connections in which case the MS connect to the CN through Um interface to BSS and BSS connects through A (Gb interface in GPRS) interface to CN.

3.4 UMTS Interfaces

The Core Network of UMTS is same as that of GPRS. The air interface is totally different. We therefore only discuss the air interface. The air interfaces in UMTS are listed below:

- Uu: UE to Node B (UTRA, the UMTS W-CDMA air interface
- Iu: RNC to GSM Phase 2+ CN interface (MSC/VLR or SGSN)
  - Iu-CS for circuit-switched data

– Iu-PS for packet-switched data

- Iub: RNC to Node B interface
- Iur: RNC to RNC interface, not comparable to any interface in GSM

The Iu, Iub, and Iur interfaces are based on ATM transmission principles.

3.5 UTRAN

The UTRAN is the new Radio interface of UMTS. Its constituting element are RNC, Node-B and UE. These elements are described below.

3.5.1 RNC

The RNCs enables autonomous radio resource management (RRM) by UTRAN. The RNC and its associated Node-Bs form Radio Network Subsystem (RNS). The UTRAN consists of several such RNSs. RNCs also assist in Soft Handover of the UEs when a UE moves from one cell to another. In soft Handover, the UE is in communication with more than one Node-Bs and RAKE receiver technique can be used to achieve micro diversity, thus eliminating the fading. This is one of several features arising out of CDMA modulation technique. Other advantages of using CDMA technique are higher bandwidth, scalability in the number of users served, power control and easier logical link control (since Time slots are eliminated). The figure 3.2 below shows the RNC functions along with a soft Handoff scenario.

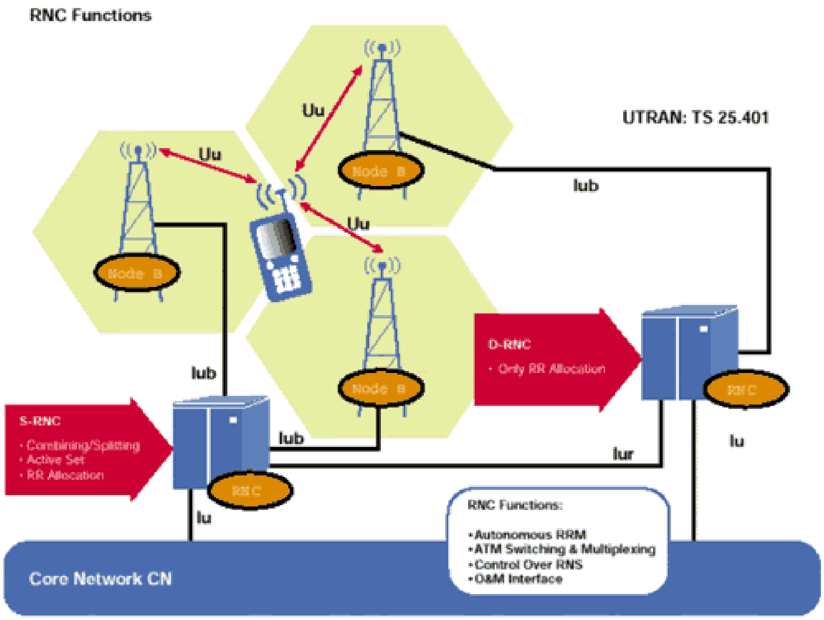

Figure 3.2: RNC Function (Source:www.iec.org)

3.5.2 Node-B

The Node-B is physical unit of radio transmission/reception with cells. It can support both TDD and FDD modes and can be colocated with GSM BTS to reduce implementation costs. It connects to UE via Uu W-CDMA radio interface and RNC via Iub ATM interface. The figure 3.3 below shows the Node B connected to UE and RNC.

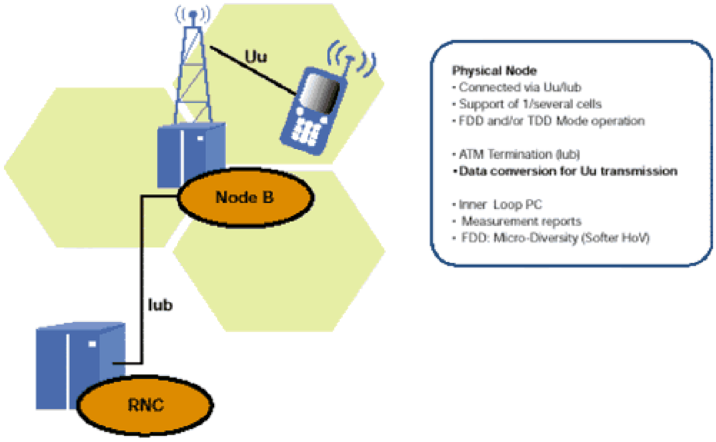

Figure 3.3: Node B (Source:www.iec.org)

The main task of Node B is the conversion to and from the Uu radio interface, including forward error correction (FEC), rate adaptation, W-CDMA spreading/despreading, and quadrature phase shift keying (QPSK) modulation on the air interface. It measures quality and strength of the connection and determines the frame error rate (FER), transmitting these data to the RNC as a measurement report for Handover and macro diversity combining. The Node B is also responsible for the FDD softer Handover. This micro diversity combining is carried out independently, eliminating the need for additional transmission capacity in the Iub.

The Node B also participates in power control, as it enables the UE to adjust its power using down-link (DL) transmission power control (TPC) commands via the inner-loop power control on the basis of up link (UL) TPC information. The predefined values for inner-loop power control are derived from the RNC via outer-loop power control.

3.5.3 UE

The UMTS UE is based on the same principles as the GSM MS-the separation between mobile equipment (ME) and the UMTS subscriber identity module (SIM) card (USIM). Figure 3.4 shows the user equipment functions. The UE is the counterpart to the various network elements in many functions and procedures.

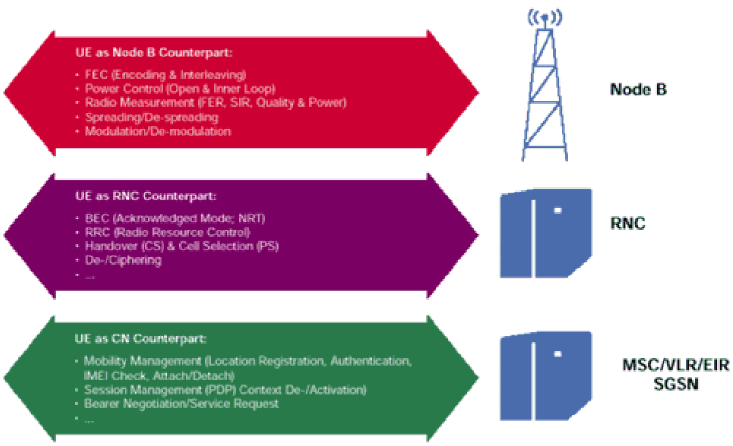

Figure 3.4: UMTS UE (Source:www.iec.org)

3.6 UMTS Open Service Architecture

One of the important features of UMTS is Open Service Architecture (OSA). OSA is a framework which aims at building various kinds of services on the top of UMTS core Network. The OSA will provide APIs to access the network functions like authentication and authorization of the user. The APIs are guaranteed to be secure, independent of vendor specific solutions and also independent of programming language by use of Object Oriented techniques like CORBA, SOAP etc. Various services like VPN, conferencing and many more unknown services can be implemented with the help of these APIs.

3.7 Summary

The UMTS is the mobile system of future with many promising features like universal access, soft Handoff high bandwidth etc. The air interface in UMTS has been completely revamped to support higher data rates and uses CDMA principles. One of the remarkable features of UMTS is OSA which allows many miscellaneous services to be built on the top of communication network and promises exciting opportunities.

Bibliography

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