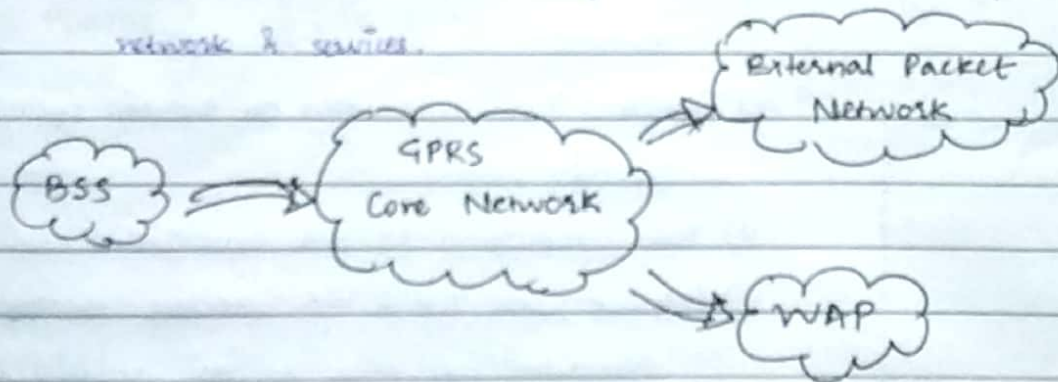


# GPRS - (General Packet Radio Service)

it provides mobile users to access to value added WAP services & different external packet switched network.

The network can be Internet or corporate <sup>Intranet</sup> ~~intranet~~

- It is a mechanism to transport highspeed data over GSM.
- It provides data rates of 56-114 KB/s.
- The GSM-BSS provides the radio-interface & the GPRS core network handle mobility & access to external packet network & services.

→ Services of GPRS -

GPRS upgrades GSM data services providing:

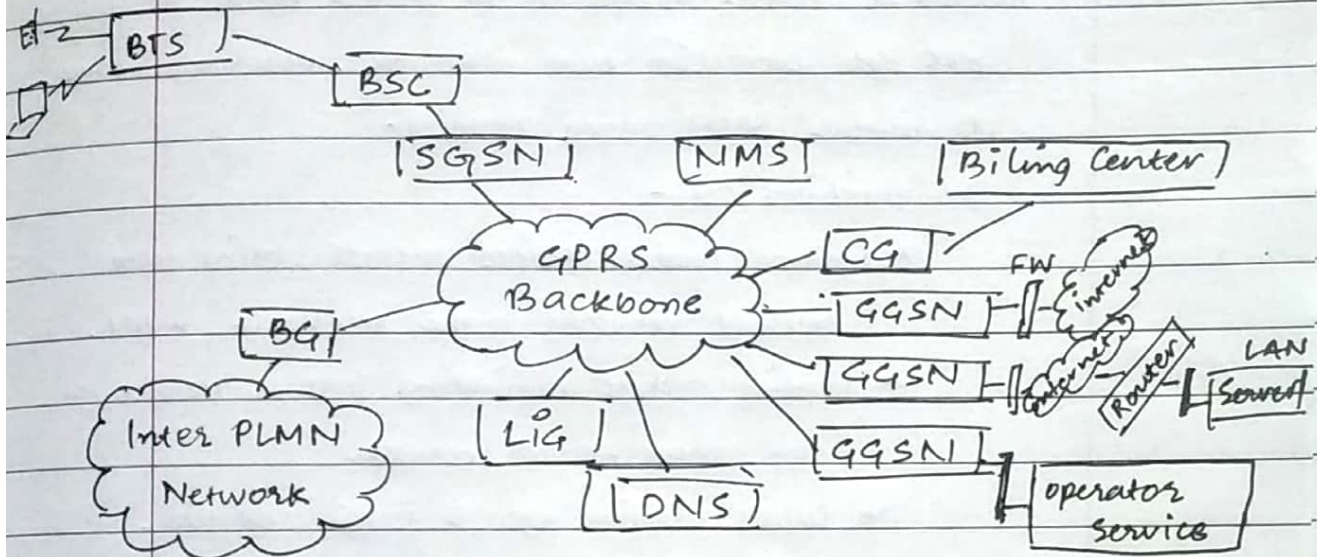
- Multimedia messaging services (MM's)
- Short message service (SM's)
- Push to talk over cellular (P.O.C/P.T.T)
- Internet applications for smart devices through wireless application protocol (WAP) (IP)
- Point-to-point (PTP) service: Inter-networking with the Internet
- Future Enhancements: flexibility to add new functions, such as more capacity, more users, access, protocols, etc.

## → Functions of GPRS -

GPRS must provide all the functionality of GSM network for packet switched network, & a traditional packet switched computer network. This function are listed below:

- i) Capability to separate circuit switched & packet switched traffic from mobile station
- ii) Radio Resource Management i.e. allocation of radio resource to GPRS subscriber across the air interface
- iii) Authenticate subscriber request for packet switched resource.
- iv) Encrypted data transmitted on the air interface for security purpose
- v) Data compression for data transmitted over air interface.
- vi) Interact with HLR & VLR ~~interface~~ database containing subscriber info such as IMI, security data, & subscriber's info.
- vii) Mobility management as in GSM
- viii) Location management as in GSM
- ix) Handover as a GPRS subscriber move within a coverage area.
- x) Power control to minimize the transmitted power by user.
- xi) Network management that facilitates.
- xii) Generation & collection of network performance statistics.
- xiii) Generation & collection of billing information
- xiv) Signaling link between the GPRS network element.



# GPRS ARCHITECTURE -

Border  
BG - Business Gateway

SGSN - Serving GPRS Support Node

GGSN - Gateway GPRS Support Node

NMS - Networks Management System

CG - charging Gateway

FW - Fire Wall

LIQ - Lawful Interception Gateway

DNS - Domain Name Search

PLMN - Public Client Mobile Network.

- **SGSN** - it is the most important part of GPRS network.

SGSN of GPRS networks is equivalent to the MSC of the GSM networks. There must at least be one SGSN in the GPRS network. There is a coverage area associated with SGSN as the network expands & no. of subscribers increases, there may be more than 1 SGSN in the network.

- **GGSN** - It is the gateway to external networks. Every connection to a fixed external data network has to go through a GGSN. It acts as an anchor point in a GPRS data connection even when the subscriber moves to another SGSN during roaming.

The functions are -

- \* Routing mobile-destined packets coming from external networks to the relevant SGSN.
- \* Routing packets originating from a mobile to the correct external network.
- \* Collects charging data & traffic statistics.
- \* Allocates dynamic or static IP addresses to mobiles
- \* Involved in the establishment of tunnels with SGSN & with other external networks & VPN.

- **BG** - It is a router that can provide a direct GPRS tunnel between different operator's GPRS networks. (inter PLMN network) It will commence operation once the GPRS roaming agreements between various operators have been signed.

GPRS users have to be charged for the use of the network.

- **CG** - It collects all those records, sorts them, processes it, & passes it on the billing center.

## # WLAN -

It is LAN without wires. The goal of WLAN is to replace office cabling to enable quicker access to internet & to higher flexibility communication.



## → WLAN Application -

WLAN are best suited for dynamic environment. The applications are -

- Cross Building Interconnect - used to connect LAN's in nearby building using a point-to-point wireless link.
- Nomadic Access - It is a wireless link between LAN hub & mobile data terminal equipped with an antenna such as laptop or notepad computer.
- Ad-Hoc Networking - is a peer-to-peer network setup temporarily to meet some immediate need.

## → WLAN Requirements -

- Throughput - MAC Protocol should make as efficient use as possible of wireless medium to maximize capacity.
- No. of nodes - need to support <sup>100's</sup> ~~100's~~ of nodes across multiple cells.
- Connection to backbone LAN - an interconnection structure is required.
- Service area - coverage area diameter of 100 to 300 cm
- Handoff / Roaming - should enable MS's to move from one cell to another.
- Licence for operation - can buy & operate without a secure licence for frequency band.
- Dynamic Configuration - should permit dynamic <sup>& automated</sup> ~~configuration~~ addition, deletion & relocation of end systems without disruption to other users.

### → WLAN Advantages -

- Mobility
- Low implementation cost
- Installation speed & simplicity
- Network Expansion
- Reliability
- Scalability
- Usage of ISM Band.

### # IEEE 802.11 -

It specifies the most famous family of WLAN's in which many ~~products~~ products are available.

Primary goal: the specification of a simple & robust WLAN which offers time bounded & asynchronous services.

### → IEEE SERVICES -

IEEE 802.11 defines the following services that need to be provided by WLAN.

- **Distribution** - It is primary service used by stations to exchange MAC frames when the frame must traverse the DS to get from a station in one BSS to a station in another BSS.
- **Integration** - enables transfer of data between a station on an IEEE 802.11 LAN & a station on an integrated IEEE 802.X LAN.
- **Association** - Before a station can transmit or receive frames on a WLAN, its identity & address must be



known. For this, a station must establish an association with an AP within a particular BSS.

(AP access point)

- **Reassociation** - enables an established association to be transferred from one AP to another, allowing a mobile station to move from one BSS to another.
- **Disassociation** - A notification from either a station or an AP that an existing association is terminated.
- **Authentication** - it is used to establish the identity of stations to each other, who wish to communicate.
- **Deauthentication** - This service is invoked whenever an existing authentication is terminated.
- **Privacy** - used to prevent the contents of message from being read by other than the intended recipient.

### → PROTOCOL ARCHITECTURE -

802.11 MAC MANAGEMENT			MAC LAYER
Frequency hopping	Direct Sequence	Infrared	PLCP Sublayer
			PMD Sublayer

Protocol architecture consists of 2 layers

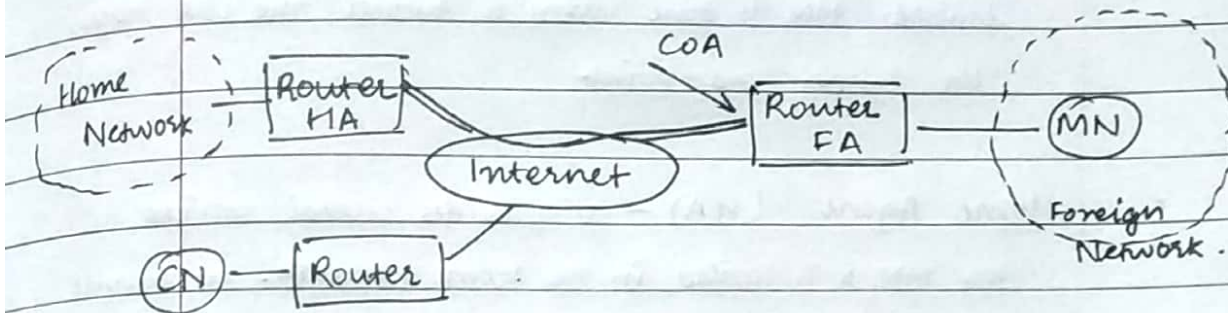
- Physical layer
- MAC layer

- **Physical Layer** — It is subdivided into :
  - **Physical layer convergence Protocol (PLCP)** —  
it provides carrier sense signal called clear channel assessment. It delivers the incoming frame from wireless medium to MAC protocol Data Unit for data transfer.
  - **Physical medium dependent Sublayer** — it handles modulation & encoding or decoding of signals. It provides the actual transmission & reception of physical layer entity between MS through wireless medium.
- **MAC Layer** — It is responsible for controlling the access medium, roaming, authentication, power conservation, etc. the basic services provided by MAC layer are
  - mandatory asynchronous data service.
  - optional time bound service.



# MOBILE IP-

It supports the mobility of host in internet.



- **MN - (Mobile <sup>Node</sup> ~~Network~~)** - It is an end system or router that can change its point of attachment to the internet using mobile IP.
- **CN (Correspondent Node)** - at least one partner is needed for communication. CN can be a fixed or mobile node.
- **Home Network** - It is the <sup>subnet</sup> ~~subnet~~, the MN belongs to with respect to its IP address. No mobile IP support is needed within the home network.
- **Foreign Network** - it is the current subnet the MN visits & which is not the home network.
- **Foreign Agent (FA)** - it can provide several services to the mobile node during its visit to foreign network. They also provide security services and are not necessarily needed.

- **COA (Care Of Address)** - It defines the current location of the MN from an IP point of view. Packet delivery towards MN is done using a tunnel, the COA marks the tunnel end-point.
- **Home Agent (HA)** - It provides several services for the MN & is located in the home network. The tunnel for packets towards MN starts at HA. It maintains a location registry that contains info of MN's location by current COA.