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GPS → (Global Positioning System)

- GPS is a navigation system based on satellite.
- GPS mainly used in positioning, navigation, monitoring & surveying applications.
- The major advantage of satellite navigation are real time positioning & timing synchronization.
- A complete Operational GPS space segment contains 24 satellite in Medium Earth Orbit
- These satellite are made into six group so that each group of four satellite is called as one constellation
- The Orbital period of each satellite is approximately equal to 12 hrs
- Hence all satellite revolve around the earth two times on every day

GPS Code & Service →

- Each GPS satellite transmit two signals L_1 & L_2 are of different frequencies
- Trilateration is a simple method for finding the position (Latitude, Longitude, Elevation) of GPS reciever. By using this method, the position of an unknown point can be measured from three known points

GPS Code ← Coarse Acquistion Code or C/A Code
Precise Code or P Code

① C/A Code → The signal L_1 is modulated with 1.023 Mbps pseudo random bit sequence. This code is called C/A Code.

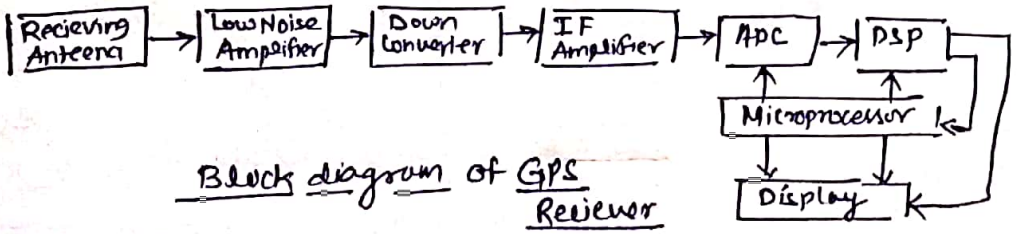
② Precise Code or P Code → The Signal L_2 is modulated with 10.23 Mbps pseudo random bit sequence. This code is called Precise Code or P Code

GPS Service → Two type of Service

(1) Precise positioning Service → Keep tracking of both C/A Code & P Code on two signal L4 & L2.
(2) Standard positioning Service → Keep tracking of only C/A code on Signal L_1.

GPS Reciever →

There exist only one way transmission from satellite to user in GPS system; Hence the individual user does not need the transmitter but only a GPS receiver. It is mainly used to find the accurate location of the Object. It perform the task by using the signals recieved from satellite.



Block diagram of GPS Reciever

- Recieving Anteena → recieves the satellite signals, it is circularly polarized anteena.
- Low Noise Amplifier → amplifies the weak recieved signal.
- Down Converter → convert the frequency of recieved signal to an intermediate frequency signal.
- IF Amplifier → amplifies the intermediate frequency (IF) signal.
- ADC → performs the conversion of analog signal which is obtained from IF amplifier to digital
- DSP → Digital Signal Processing generates the C/A code.
- Microprocessor → Performs the calculation of position & provide the timing signals in order to control the operation of other digital blocks.
- Display → It recieve the signal from DSP & Microprocessor & display the output on screen.

GSM → (Global System for Mobile Communication)

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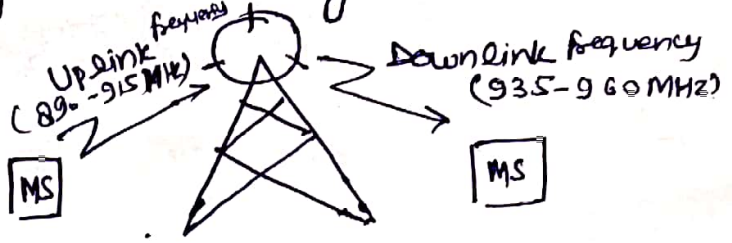
- It is called 2G or Second generation Technology.
- There are various GSM Standards are GSM 900, EGSM 900 GSM 1800 & GSM 1900.
- It is a digital cellular technology used for transmitting mobile voice & data services
- GSM uses Gaussian Minimum Shift Keying (GSMK) modulation method.

- **Frequency Band** → The uplink frequency ranges specified for GSM is (890–915 MHz) & Downlink frequency ranges specified for GSM is (935–960 MHz)
- **Channel Spacing** → The spacing between adjacent carrier frequencies are 200 KHz
- **Duplex Frequency** → The frequency difference between uplink & downlink 45 MHz.



MS → Mobile Station
BTS → Base transciever Station
BSC → Base Station Controller
MSC → Mobile Switching Center
HLR → Home Location Register
VLR → Visitor Location Register
EIR → Equipement Identity Register

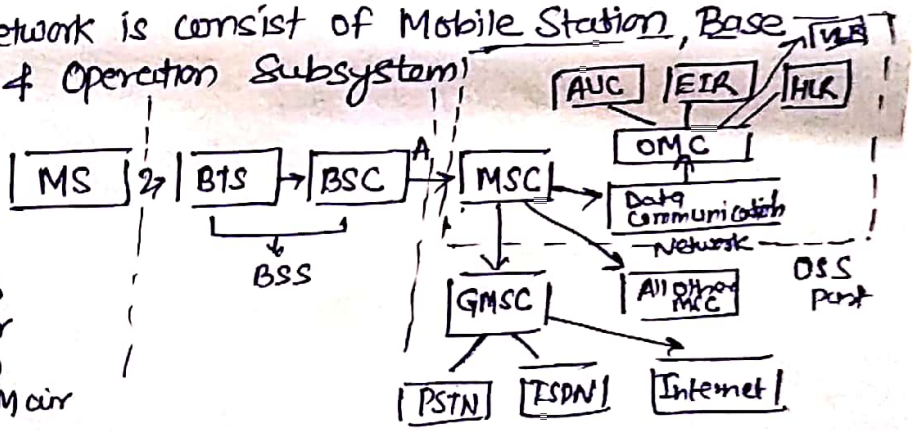
- Uplink → MS to BTS
- Downlink → BTS to MS

MS → Mobile Station
BTS → Base Transciever Station

- **GSM Architecture** → GSM Network is consist of Mobile Station, Base Station Subsystem & Network & Operation Subsystem)

(1) **Mobile Station (MS)** → consist of Mobile phone equipement & SIM

(2) **BSS** → (Base Station Subsystem) → consist of BTS & BSC. It recieves the information from MS & transfer to the MSC. BSS take care of radio control related function & provide GSM air interface for GSM Mobile phones to connect with GSM Network. All the BTS are interfaced with one BSC.



BLOCK Diagram of GSM Network Architecture

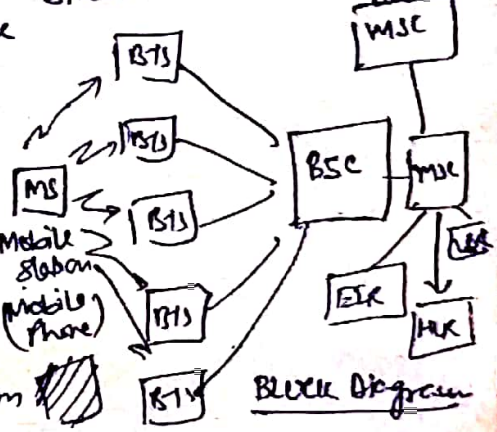
(3) **MSC** → (Mobile Switching Center) → Mobile switching system recieve the information from BSS. A Interface between BSC & MSC & SS7 (SS7) interface between MSC & PSTN. MSC are connected to all other MSC & the Data Communication Network.
MSC are connected to all other MSC, Data communication Network & GMSC (Gateway Mobile switching Center)

(4) **HLR** → (Home Location Register) it store the permanent & temporary subscriber related information.

(5) **VLR** → (Visitor Location Register). it stores visitor subscriber related information about its facilities, the network it is subscribed to and its home location & so on.

(6) **AUC** → (Authentication Center) used to authentic activities in the system. It holds encryption (A5 Key) and authentication key (A3 keys) in both HLR & VLR.

(7) **EIR** (Equipement Identification Register) it helps in security as its keeps track of equipement type available in Mobile Station or terminal.



Block Diagram