Module 1

- Compute :- Converts one format to another format
- Base station :- mobile towers
- HLR :- Home location Register
- VLR :- Visitor location Register
- WLL :- Wireless landline

⇒ PCS Architecture

- PCS is Personal ~~Architecture~~ Communication Service is a type of wireless & mobile service with advance service coverage and direct delivery service at a more personal level.

- It mainly refers to the modern mobile communication that increase capability of conventional cellular network and its fixed client telephonic network as well.

Usage :- mobile phone, fixed lines.

A PCS architecture works similar to a cellular network in basic operation but require more service providers, infrastructure to cover a wider geographical area. It generally includes

(i) Mobile PBX
(ii) Paging
(iii) Wireless Communication.
(iv) Wireless Radio.
(v) Satellite Communication System.

- Two of the most popular Cellular System are

1.) High tier digital cellular System (eg Mobile phones)

(a) Gsm : Global System for mobile communication

(b) CDMA : Basic digital advanced mobile phone service (~~DAS~~ DAMPS)

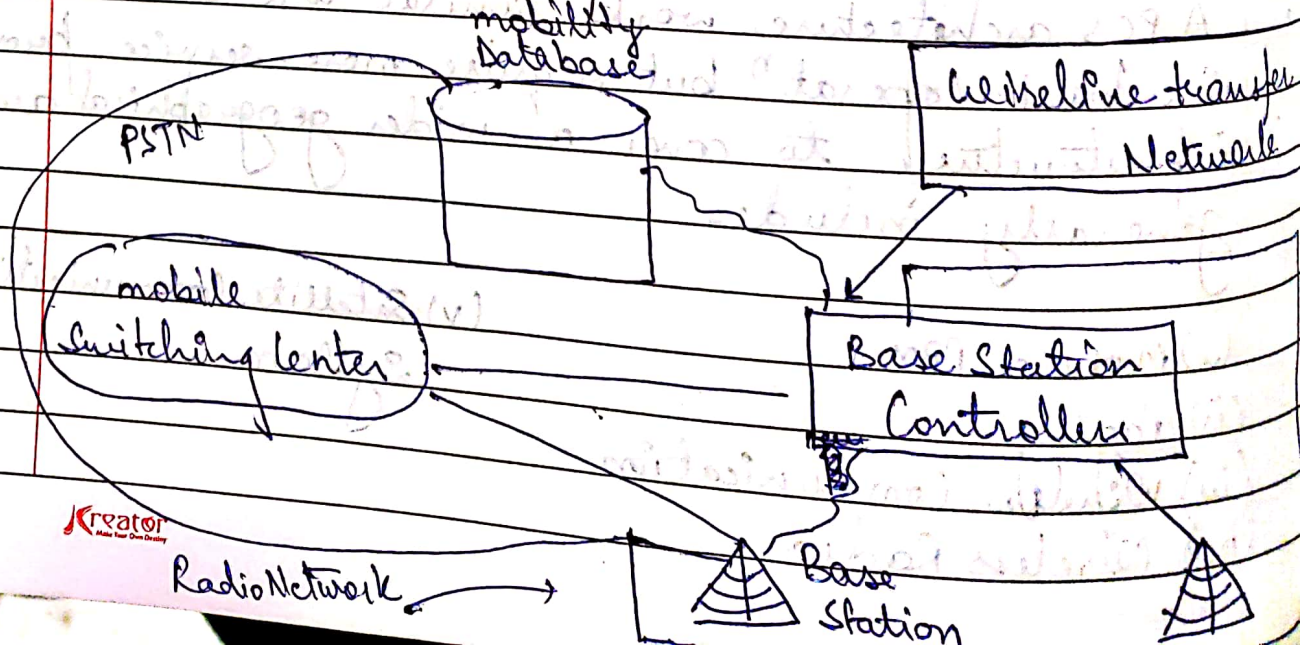
(c) PB C : Personal digital cellular

(d) IS95 : CDMA based CDMA 1 systems

2.) Low tier Residential business and public cellular access

(a) Cordless telephones
(b) Digital Enhanced Cordless telephone
(c) Personal access communication System
(d) Personal handy System.

→ Basic Architecture of PCS



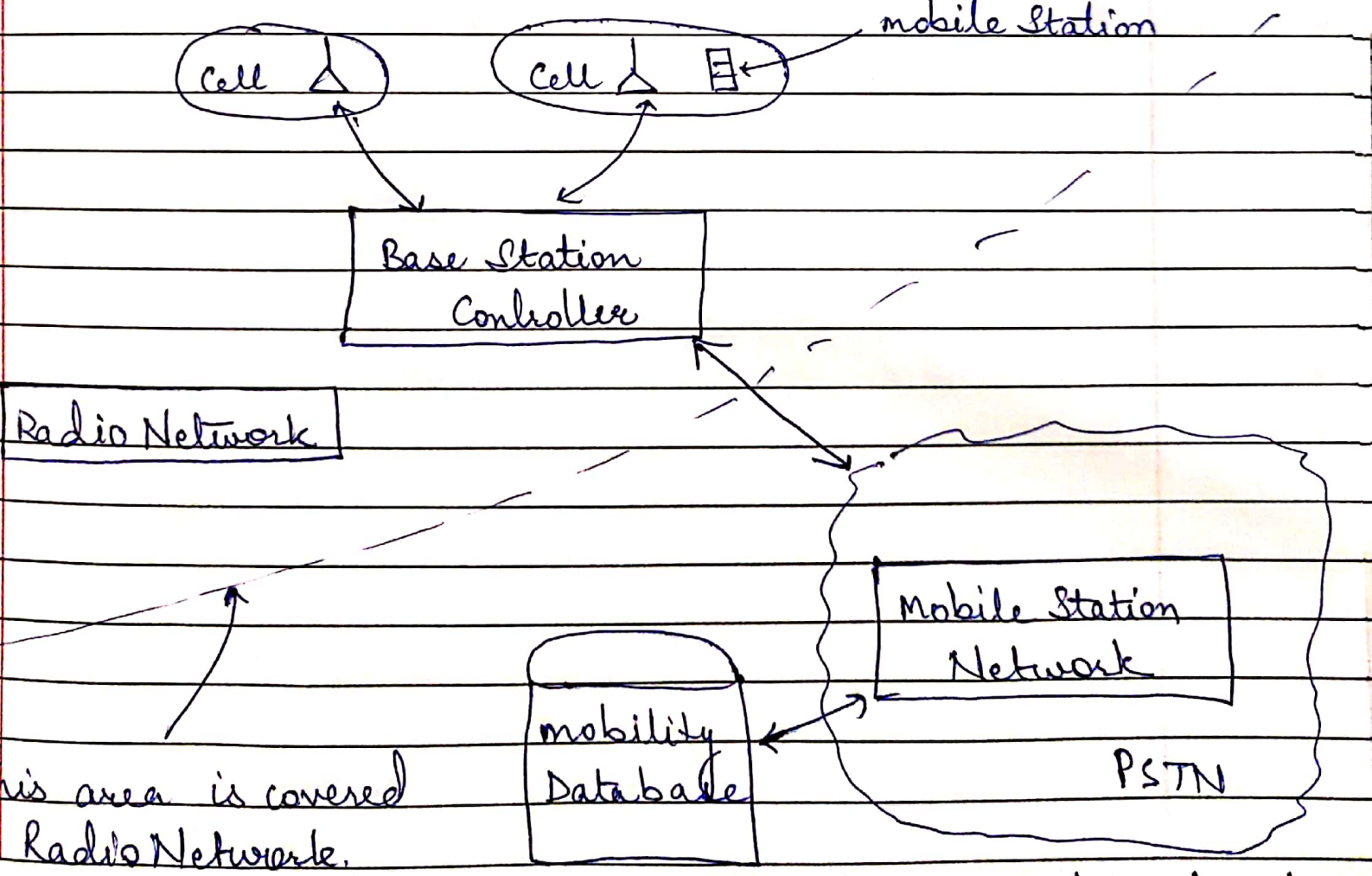
Base Station Controller : Exchange office

Mobility database : It selects which area to connect mobile to.

Mobile switching center : Mobility database identifies the mobile base station and will give signal to mobile switching center.

Base station : will provide the required signal from mobile switching center.

Basic PCS Network architecture



is area is covered Radio Networks.

over the air remotely.

Handsets can also be remotely monitored by the system maintainance and diagnostics capabilities.

⇒ Mobility management

- It is a function that facilitates mobile device operation in gsm, UMTS networks.
  ↳ universal mobile Telecommunication system

Q1 Diff b/w GSM and CDMA. ? (Homework)

(contd)

- It is used to track physical user and subscriber loc^n to provide mobile phone services.

- Basic mobility management opera^n include loc^n update as mobile unit move around and loc^n lookup as mobile unit are wanted.

⇒ Mobile Issues

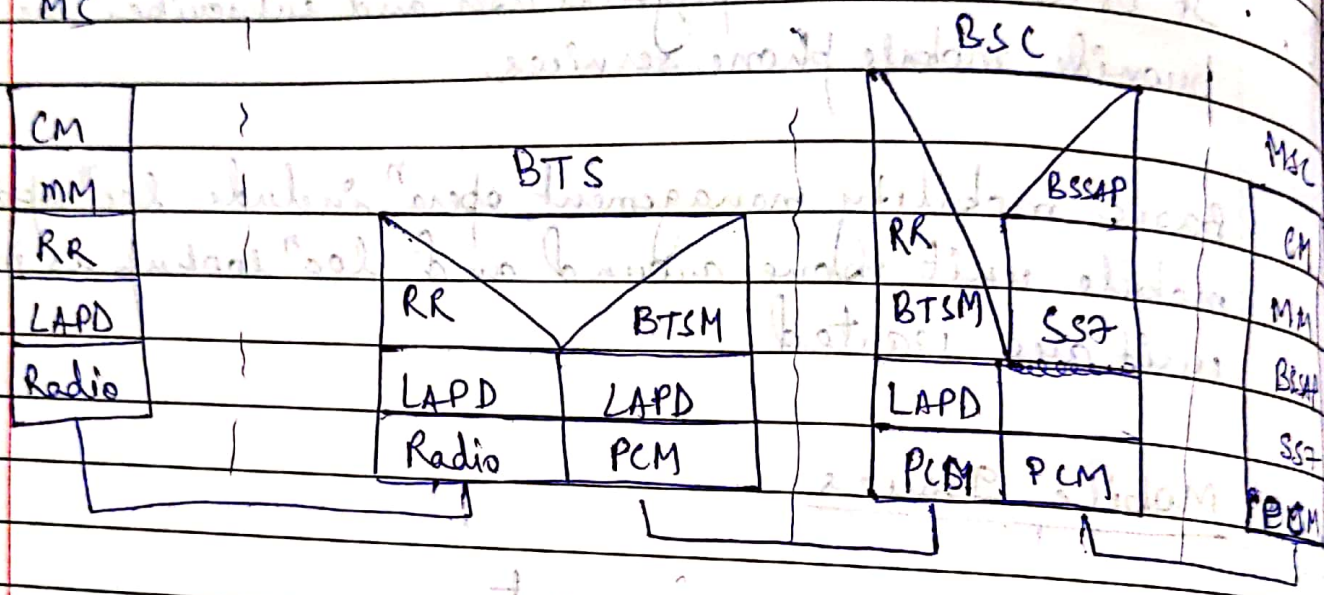
1.) Radio Resource mangement
2.) Location Information management
3.) Security
4) Temporary loss of connectivity with movement
5.) Low battery power.
6) React to sudden change in environment due to bandwith and other resource change.

⇒ location Management

- loc^n mangement scheme is based on user ~~to~~ mobility and calls characteristics.

=> Network Signalling

- SS7 is an international telecommunication standard that define how Network elements in a PSTN exchanging info over a digital signalling Network



PCM (Pulse Code modulation): It is the standard for digital audio or video in a device.

SS7 (Signaling service 7):

LAPD (link Access procedure. Dchannel): It is a protocol protocol in the ISDN protocol. This is second layer

RR (Radio Resource): Functions relating to the development of physical connection for the purpose of transmitting call related signalling information

MM (Mobility Management): function related to handover, loc^n update and loc^n lookup

CM (connection Management):

⇒ GSM – Global System for mobile computing

→ History of wireless communication

① 1932 – CEPT start to develop cell structure
② 1986 – Basic GSM radiotransaction technique chose
③ 1988 – The telecommunication standard institution instruction (ISI) define GSM
④ 189 – Expansion in finished for GSM Generation 1
⑤ 1991 – First call in GSM.
⑥ 1992 – First GSM network in the world
⑦ 1993 – GSM network reached 32 Countries
⑧ 1994 – First GSM network in Africa.
⑨ 1995 – GSM network reached 117 countries
⑩ 1998 – 120 million users in the world
⑪ 1999 – First ~~GSM~~ GPRS was introduced.
⑫ 2002 – 863 million users in the world.
⑬ 2004 – 3G world congress
⑭ 2007 – 2.4 billion users in the world.
⑮ 2010 – GSM standards served 80% of mobile market in compassing more than 5 billion people and more than 212 countries
⑯ 2012 – 4G introduced.

→ 1st generation of GSM

- Start to use in 1989
- Call forwarding
- No answer
- Unreachable
- Outgoing calls vary
- Global Roaming

→ 2nd Generation GSM

- Finished process in 1995
- SMS
- Multiparty calling
- Call waiting
- Mobile Data Service
- Mobile Fax services
- Cell broadcast

→ 2+ Generations

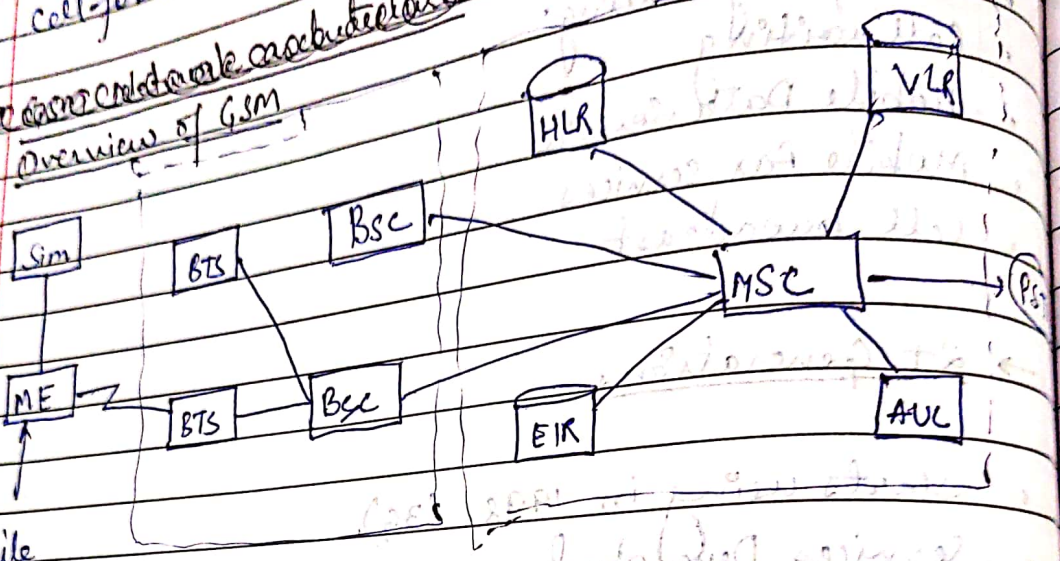
- Starts using in 1998 (3G).
- Services Developed
- GSM
- VPN
- Packet Radio
- SMS Development
- Multimedia Services
- ~~Mobile Cellular~~

⇒ Mobile Radio Cellular Communication

- Cellular communication system uses a large no. of low power wireless transmitters to create cell.
- Variable power level allow cells to be size according to subscriber density and demand within a area
- A mobile user travels from cell to cell, their conversation are handoff b/w cell

• Channels used in one cell can be reused in another cell for some distance.

→ Overview of GSM



Base station Subsystem. - Network Subsystem

(i) MSC:→ mobile switching center has several db that perform call validation, call routing to PSTN, roaming validation.

(ii) BSC:- manages radio resource for one or more BTS like channel setup, handover, etc.

(iii) BTS:- Radio transfer and receiver of the cell and handles the radio link protocols with the mobile device.

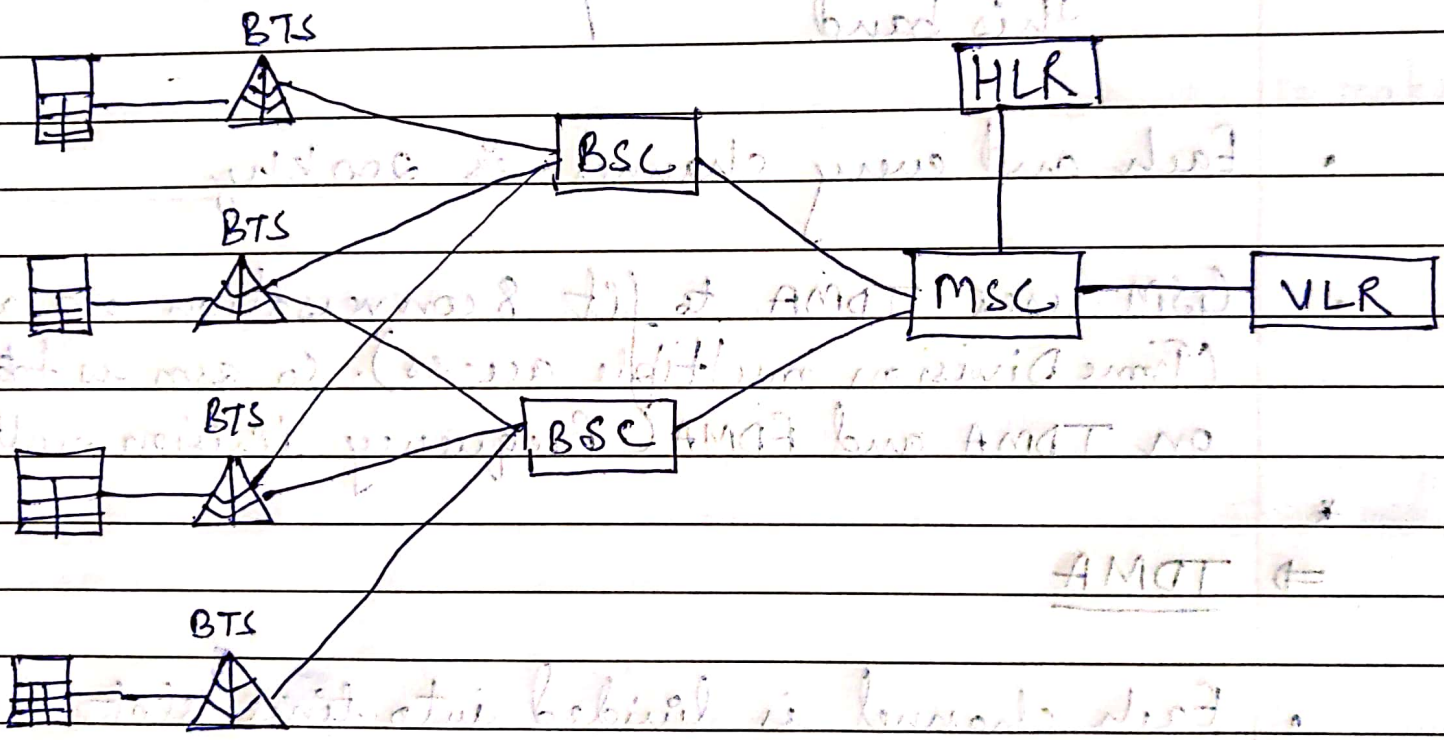
(iv) HLR: Database of all users + current locations

(v) VLR: Database of roaming users.

EIR :- Equipment Identification Register stores mobile device informations

AUC :- Authentication center holds the special key for encription of each subscriber.

GSM Archeteecture



⇒ Radio Frequency

- Operates in the 1850 Mhz band and from
  (i) 1850 – 1910 Mhz mobile to base
  (ii) 1930 – 1990 Mhz base to mobile

Note:- There are 300 forward and reverse channels in this band

- Each and every channel is 200 khz
- GSM uses TDMA to fit 8 conversation on a channel (Time Division multiple access). So gsm is totally based on TDMA and FDMA (Frequency division multiple access)

⇒ TDMA

- Each channel is divided into time slot. Each conversation uses 1 time slot.
- Many conversations are multiplexed into a single channel.
- Used in GSM.

⇒ FDMA

- It is the division of the frequency band, allocated for wireless cellular telephone communications, into 30 channels.

Kreator

(AMPS)

It is a basic technology in Analoga advance mobilephone service. The most widely installed cellular phone system installed in North America.

It is also used in the total access communication system (TACS)

GSM Burst Periods.

Since GSM is TDMA based it uses burst periods to make upa frame.

(i) 8 burst periods = 1 frame

A burst is like a slot of a ~~frame~~ frame.
A burst period is when a phone gets to send ~~physical~~ ~~information~~. digital information. (bits).

14 bits = 1 burst.
However a burst period only lasts 0.577 ms. Phone are only bursting information at 1700 times a second. 8000 times a second for landline phone. due to wired ~~800~~ transmission.

GSM Frames