

ASSIGNMENT - 1

INTRODUCTION TO MOBILE COMPUTING

1. Explain different generation of wireless technology in brief ?
Following are the various generations of wireless technology :-

1. First Generation of wireless System.

- ✓ It was Developed in 1980's
- ✓ Based on Analog System.
- ✓ Speed up to 2.4 Kbps
- ✓ It uses of FDM A technique.
- ✓ It allows user to make voice calls in only country

2. Second Generation of wireless System (2G)

- ✓ It was Developed in 1990's

- ↳ Based on Digital System
- ↳ Speed up to 64Kbps.
- ↳ Services such as Digital voice, SMS, email and Semi global facility.
- ↳ It has two forms
 - (1.) 2.5G
 - (2.) 2.75G

3. Third Generation of Wireless System (3G)

- ↳ was Developed in 2000's
- ↳ Based on Broadband with CDMA and IP technology.
- ↳ Speed up to 2 mbps.
- ↳ It has High Speed Packet Access (HSPA) Data transmission capabilities.
- ↳ More flexible, because it is able to support the 5 major Radio technologies.

Fourth Generation of Wireless System (4G)

- ↳ Basically an extension in the 3G technology with more Bandwidth and Services that were offered in the 3G.

- It is faster and more reliable.
- Provides High Performance.
- Offers Both Cellular and Broadband Multimedia Services everywhere.

5. Fifth Generation of Wireless System. (5G)

- It has changed the way to use cell phones within very high Bandwidth.
- Supposed to have Speed up to 1 gbps.
- Capacity Supposed to be 10 times more than others.
- Supposed to be faster and Reliable than 4G.

Define Cell, List Different types of Cell,

Cells is the Basic Geographical Unit of the Cellular Communication System,

In Real Cell Can be of any shape. But Generally it is represented in the form of hexagon.

Types of Cells

1. Macro cells

2. Micro cells

3. Pico cells

4. Femtocells

③

Definition of Cell Cluster

Cluster is a group of cells in which cells are arranged such that no frequency channels are reused.

The size of cluster can be defined by no. of cells in a cluster.

Differentiate :- GSM vs CDMA

CDMA

GSM

Stand for Code.

Stands for Global

Division Multiple Access

- Used a CDMA Mechanism For Data

- Transmission Rate is fast

- It is handset Specific

- More Secure Communication Compared to GSM

- Signal Detection is difficult

- Provides Built-in Encryption

- Enables limited Roaming

Standards for Global System for Mobile Communication. Uses TDMA and FDMA Mechanism for Data.

Transmission Rate is slow

It is also SIM Specific

Less Secure Communication Compared to CDMA

Signal Detection is easy

Doesn't Provide Built-in Encryption.

Enables worldwide Roaming

(5) Define HLR, VLR, BS, MSC, BTS, BSC in Brief.

→ Home Location Register (HLR):
The HLR is a Database used for storage and management of Subscription to the HLR. It is considered the most important Database as it stores permanent data about Subscribers.

Y Visitor Location Register:
It is a Database that contains temporary information about subscribers that is needed by MSC in order to service visiting subscribers.

Y Base Station :-
A Radio function in the BS which consists of Base Station Controller and the Transceiver.

It connects Mobile Station with Network and Switching System.

Y MSC :-
Stands for Mobile Switching Service Center.
Perform the Telephony Switching func. of the System.
It controls Call to and from Telephone and Data System.

Y Base Transceiver Station

The BTS handle the Radio Interface to the Mobile Station. The BTS is the Radio equipment needed to service each cell in Network.

Y BSC [Base System Controller] :-

The BSC provides call control functions and physical link between the MSC and BTS.

It is a high capacity switch that provide function such as handover in cell configuration data and control of Radio frequency in BSS.

6) what is LBS ? Explain with example.

A Location Based Service is a Software Application for a Mobile Device that require Knowledge about where the mobile device is located.

A Location Based Service is a Software Application for an IP Capable mobile Device that require Knowledge about where the mobile device is located. Location Based Service can be query - Based and provide the end user with useful information such as locate Nearest ATM, Hotel etc.

b) LBS Require five Basic Components

the Service Provider's Software, Application Mobile Network to transmit Data and Request for Service or Content Provider.

to Supply the end user with geo-specific information, a positioning component and the end user Mobile Device.

By law location Based Services must permission it Based. That means that end user must have permission in order to use it.

The Release of Apple's iPhone and Google's LBS enabled Android Operating System has increase the use of LBS.

7) Describe SIM in Detail
The SIM is installed in every GSM phone and identifies the terminal without the SIM card the terminal is not operational.

- Y Sim Card Contains :
International Mobile Subscriber Identity.
- Y Secret Key for Authentication.
- Y other Security Information.

The SIM card used in GSM Phone are Smart processor Card. These Card posses a processor and a small memory.

By Inserting the SIM Card into the Terminal the user can have access to all the Subscribed Service.

IMEI and IMSI Number are Independent so user can insert SIM card on another phone and easily use

the Service on the Phone.

Q) Draw and Explain GSM Architecture in Brief.

→ The Architecture of GSM consist of following core component

→ The Mobile Station (MS) :-
It include the mobile equipment and SIM.

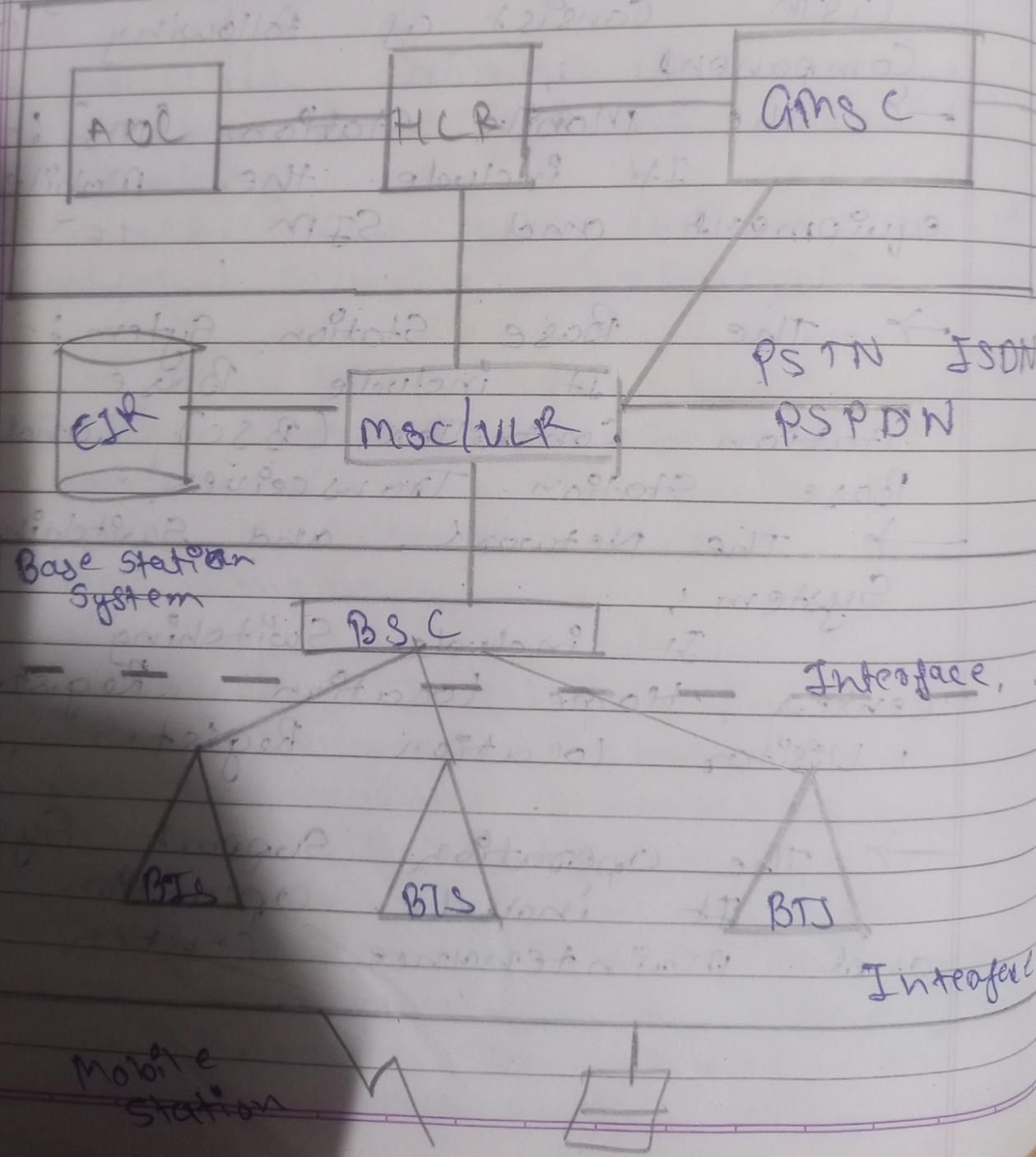
→ The Base Station System :-
It include Base Station Controller (BSC) and Base Station Transceiver.

→ The Network and Switching System :

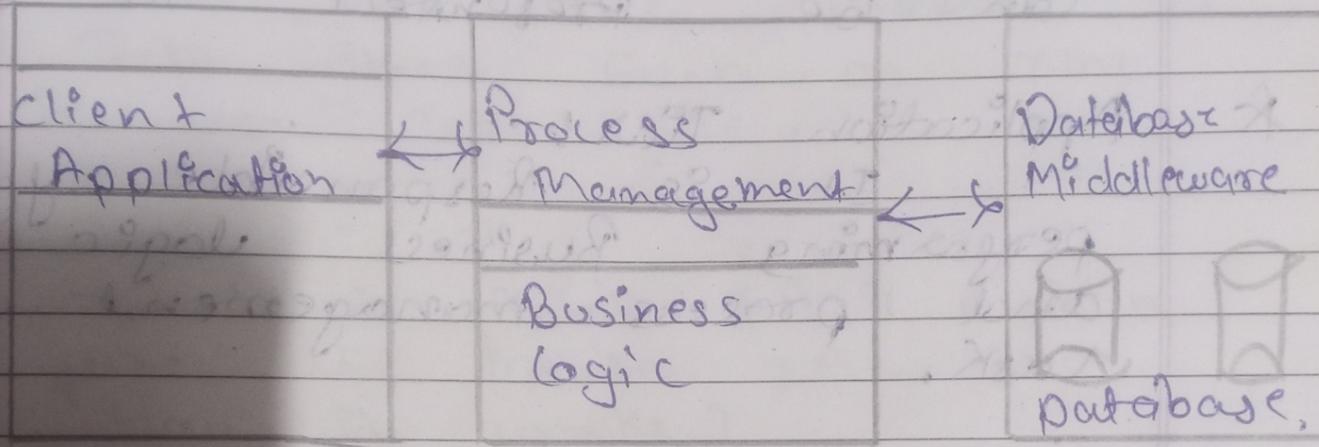
It include Switching Center, Home location Register, Visitor location Register.

→ The Operation Support System
It include Operation and Maintenance center.

5. The Data Structure, 3G
 Include Public Switched Telephone Network, Integrated System Digital Network and, Public Data Network.



Q. Draw and Explain 3 tier Architecture of mobile computing in brief.



The three tiers of mobile computing architecture are,

1. Presentation - tier
2. Application - tier

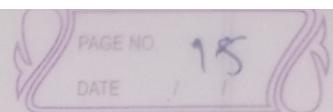
3. Data management tier

* Presentation tier :- First tier of mobile computing

Presentation tier is

It includes various applications that runs on client device.

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- ✓ It is responsible for presenting information from user or information can be collected from user using which can be presented to user.
 - ✓ Application Tier:
 - It is responsible for performing Business logic and process management task.
 - ✓ Business logic is responsible for obtaining info, validating information, processing info, and presenting information to user.
 - ✓ Process Management task can be performed using various Middleware such as message Oriented Middleware.
 - ✓ Data Tier
 - Third tier of Mobile Computing is Data Tier.



It is responsible for storing and accessing data needed by the application. The data can be stored in the database or data store such as XML file or text file.

Q. What is Mobile IP? Explain func. of Mobile IP or How it works?

→ Mobile IP is an Internet Engineering Task Force Standard, Communication protocol that is designed to allow mobile device user to move from one network to another while maintaining a permanent IP address.

How mobile IP works?
* Agent Discovery;

A mobile node discover its foreign and home agents.

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Here the Home and Foreign Agents Advertise their services on the Network. By using ICMP Router Discovery Protocol.

The Mobile Node listens to these advertisements to determine if it is connected to its home Network or foreign Network.

ICMP Advertisement Carry mobile IP extension that determine an Agent is Home Agent, foreign Agent or Both.

Registration

Mobile Node Register its current location with foreign Agent and Home Agent. During this phase, once Mobile Node obtained Care off Address from Foreign Agent it sends the same Registration Request to the Home Agent with Care off Address.

3. Tunnelling :

Here a Tunnel is setup by the Home Agent to the current location of Mobile Node on the foreign Network to Route packet to Mobile Node while Roaming.

Q. What is middleware? List all types of Middleware.

→ Middleware is Software that provides a link between separate Software Application.

It is a layer that lies Between the Operating System and Application.

Types of Middleware :-

- Communication Middleware
- Message Oriented Middleware

- Object Oriented Middleware

- Remote Procedure Call Middleware

- Database Middleware

Transaction
Embedded
Content Control

Middleware

Middleware and

Middleware.

12. Explain functioning of Satellite Phone Network.

A Satellite Phone Network is a communication system that enables individuals in remote locations to make and receive phone calls and send and receive text messages and access the Internet using a satellite link.

Satellite phones work by connecting to one or more satellites in orbit around the earth. When a user makes a call, the signal is transmitted from the phone to a satellite in space. The satellite then relays the signal to a ground station.

which routes the call to its intended recipient.

Similarly when a user receives a call, the signal is transmitted which then relays the signal to the user's satellite phone.

Q13) List different modes used for mobile communication and explain only two.

→ Various Modes for Mobile Communication including:-

1. SMS
2. MMS
3. Voice Calls
4. Video Calls
5. Instant Messaging

* Voice Calls -
Voice calls are a mode of mobile communication that enables user to make and receive phone calls.

using their mobile devices
voice calls can be made
to other mobile devices
landlines and even international
phone numbers.

* SMS →
Mode of communication
that enables users to
Send and receive short
text messages. SMS is
one of the most widely
used forms of mobile
communications, and almost
every mobile device supports
SMS.

Q. Explain Basic Concept of
Satellite Communication

It is a mode of
communication that involves
the use of artificial
satellites in space to transmit
and receive signals between
two or more points on
Earth.

➤ Satellite →

It is an object that is placed in orbit around the Earth.

➤ Transmitter →

It is a device that converts an electrical signal into an electromagnetic signal that can be transmitted to the satellite.

➤ Receiver :- Device that converts the electromagnetic signal to Electrical Signals

➤ Frequency Bands :-

Use different frequency bands for communication. Depend on type of service and location of satellite.

➤ Footprint :-

Footprint of a satellite is the area on the Earth's surface where its signal can be received.

Delay :- It involves certain amount of delay due to distance that signal travels.

Q) List any four advantages of Satellite phone.

Advantages of Satellite Phone

1. Global Coverage
2. Reliable Communication
3. Security
4. Emergency Services
5. Long Battery life
6. Easy to use