

# MOBILE COMPUTING

FOR DIPLOMA STUDENTS

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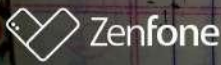
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## Introduction To wireless networks mobile computing:-

### ① What is Network?

- > A network is a communication system that enables computer users to share computer equipments application software, data (info), voice and video transmission.
- > Network are use to transmit info.. by wired or wireless communication media.
- > The wire based technology was used to connecting computers. This technology fall into four categories:
  - (i) LAN (Local Area network)
  - (ii) WAN (wide area network)
  - (iii) PAN (Personal Area network)
- > LAN Support sharing of Application on any other resource with in a small fix boundary
- > WAN covers the boundary of a country for a city area and connects the LANs usually with optical fibre for data transmission.
- > PAN use telephone circuit, leased line, separate line, maximum speed, connective is more and private circuit to support networking globally by using circuit and packet switching networks and protocol.





- (A) Red
- (B) Ni
- (C) T
- (D) Ce
- (E) C
- (F) P
- (G) S
- (H) b

> PAN: - The Personal Area Network is created without connection of the internet.  
> It can be held on through various type of software bluetooth, shareit, Xender etc.  
> Through PAN we can transfer huge no. of data or information with the less no. of time.

### 1.2 Wireless network:-

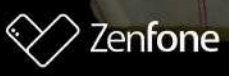
Wireless network is a network of devices - [Computing - which work and done through computer is known as computing] and networking are data are connected logically without wastage.

> It means it is a tele-communication network in which the devices are implemented without the use of operating system (O.S).

> In the wireless communication system the electromagnetic waves are used. Such as:- Radio wave.

> The other examples of wireless technology includes GPS (Units), Garage door opener, Wireless Computer Mouse and Keyboard, Satellite TV, cordless telephone.

> N.B:- Wireless communication involves:-



- (D) Radio Frequency Communication
- (B) Micro wave communication
- (C) Infrared Shortrange Communication

Cellular Phone and Pagers

- (E) GPS (Global Positioning System)
- (F) CODEless Computer Pagers
- (G) CODEless Telephone Set
- (b) satellite T.V.

1.3 Mobile Computing :-

> Mobile Computing is a computing environment over physical mobility.

> The user of a mobile computing environment is able to access to data, info. and logical object in the network while on move.

> MC is allow the user to perform a task from any where using a computing device in Public, Corporate (Business info), and Personal information area (PIA).

> To make the Mobile Computing environment effective it is necessary that the communication barrier is spread both wire and wireless media.





1.4 Characteristic of MC

- (A) User Mobility
- (B) Networks Mobility
- (C) Barrier Mobility
- (D) device Mobility
- (E) session Mobility
- (F) service Mobility

1.5 - Application of Mobile Computing :-

V.S.M.P

- (A) Flight, direction and traffic info.
- (B) Movie listing
- (C) News
- (D) weather forecasting.
- (E) E-mail (Read, send)
- (F) Retailing
- (G) Warehousing
- (H) health care
- (I) Real estate
- (J) Field services
- (K) Field Sell
- (L) Hospitality
- (M) vending.



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## INTRODUCTION TO MOBILE DEVELOPMENT FRAMEWORK

### Client-Server Architecture :-

Client-Server Architecture first network based computing architecture to become commercially available.

> In a Client-Server Model there are two diff. programs residing on separate machines

> One program is said to be the client and the other is said to be the server. Because client generate the request and server serve the client request.

> In the Real world there is one server and more than one client. The main aim of client-server architecture was an application of one of basic principal in software engineering.

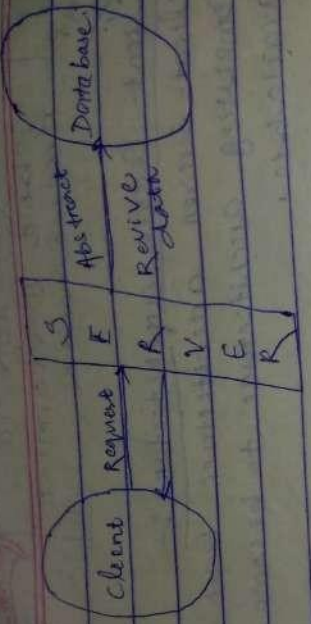
> Modern client-server architecture include data base on the server site.

> These data base can be used by client by using some connectivity protocol

> They not only store data but also hold business logic.







### N-Tier architecture

① What is Tier?

② The breaking down of an application into logical chunks that are called Tiers.

Tiers can exist on the same computer and are connected virtually or logically on diff. machines.

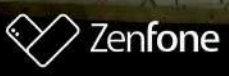
Tiers are classified into three

Categories

- 1-Tier
- 2-Tier
- 3-Tier

### 1-Tier:-

In the one Tier Architecture it is the simplest and single Tier on single user and is the equivalent of running an application on a personal computer.



### 2-Tier:-

The Two-tier architecture supply a basic network bet<sup>n</sup> a client and a server.

> A web browser make a request from a web server which then processes the request and return the device response.

### 3-Tier :-

The three-tier architecture is most commonly used to build web application.

> In this model the browser act like a client, middle ware act as an application server contain the business logic and data base, server handle data function.

> This approach separates business logic from display and data.

### N-TIER :-

> N-tier architecture begin as a 3-tier model and is expanded to

> It provide finer granularity. granularity is the ability of a system in this case application should be broken down into smaller component or granular.





> The former Granularity the Greater the flexibility of a System.

> it can also be refer to as a system Modularity.

The example of entire architecture is WWW (World wide web).

2.4

2.3 N-Tier architecture & WWW:-

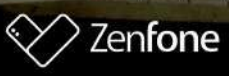
The web is actual a client server mechanism where the client and server communicate through [HTTP].

> The clients are the browser which interface user interface in (HTML) & the client side scripting languages for rendering user interface.

> The Servers are the web server which abstract the client requests coming from HTTP with HTML Response.

> One of the best example entire architecture in web application is the shopping card web application.

> In a shopping card web application the presentation tier display info. related to such services as browsing, purchasing and shopping cart content.





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An N-tier architecture the business logic tier is pulled out from the presentation tier and as its own layer.

> It control an application functionality by performing detailed processing.

2.4 Peer to Peer Architecture:-

It is a type of network in which each work station has equivalent capabilities and responsibilities. This differs from client server architecture.

> In here some computer are dedicated to serving the others.

> Peer to Peer networks are generally simpler but they usually don't offer the same performance under heavy load.

> The peer to peer network itself reside on computer level at the ends of a connection rather than from within network itself.

• Advantages of Peer to Peer Architecture:-

- ① No need for a network administrator.
- ② Network is fast/inexpensive to





Setup and maintain.

- (iii) each pc can make backup copies
- (iv) of the data to the other pc for security.

(iv) easiest type of network to build Peer to Peer. is Perfect for both home & office.

### [2.5] Mobile Agent Architecture:-

Mobile Agent Software System is total diff. from other architecture which have the following property.

> First they are program which hide data and code which are transferred from client and machine to remote for server execution.

> They execute asynchronously.



## CHAPTER - 3

Qual:-

Signals are the physical representation of data.

- Signal are function of time and location.
- Signal parameter represent the data values.
- Data can be analog or digital signal.

Classification

Signal is classified into two category

(I) Analog

(II) Digital

Analog

Representation of Analog:-



- (1) The Simple analog signal is a sine wave
- (ii) A composite analog signal is composed of multiple sine waves.
- (iii) A periodic signal complete a pattern within a time frame is called a period.

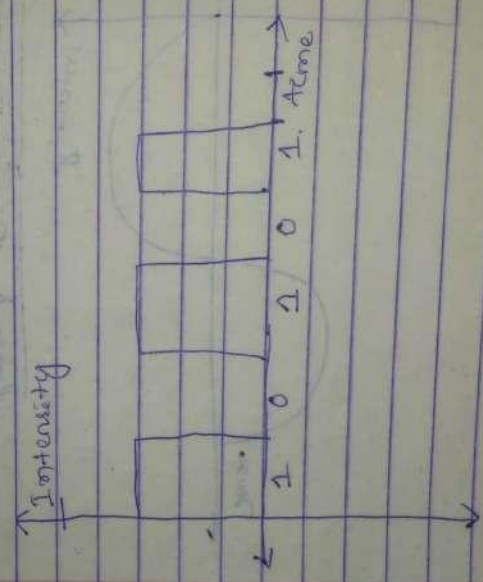


> The completion of one full pattern is called a cycle.

> Analog Signal require much less bandwidth only about 4.5 MHz with a 15 Mbps per data rate.

∴ Telephone voice signal is known as Analog signal.

### Digital Signal:-



Digital Signal are Transmission Signal that carries info. in a discontinuous stream of ON/OFF pulses.

> They consist pulses on digits with discrete levels or val.



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> The value of each PPM pulse is constant but there is an abrupt change from one digit to next.

> Digital signal have two amplitude level called node. The value of node are represent by '1' and '0'.

Digital signal require much high band width as much as 74.25 MHz with a data rate of 1.485 Mbps.

The circuitry required for digital transmission is more complex and the cost may be higher.

### Period and frequency:-

Period:- It refers to amount of time in signal needs to complete one cycle.

Frequency:- It is the measurement of the no. of occurrence of a repeated event for a unit of time.

It is measure in Hertz.

### Bandwidth:-

The range of frequency that a medium can pass is called its bandwidth.

> Example: If a medium can pass frequency bet<sup>n</sup> 1000 and 5000 then the frequency range is





5000 - 1000 = 4000 Hz

## Antenna

### N-B Transducer :-

A device for converting energy from one form to another for measuring of physical quantity or for info. transfer. It is known as the transducer.

### What is Antenna :-

> An antenna is transducer design to transmit or receive radio wave.

> It is known as the Aerial.

> Antenna's use in system such as Radio, TV broadcast, Point-to-point radio communication, Wireless LAN, RADAR, space exploration.

> Antenna usually work in air or Outer Space.

> Antenna are classified into two category.

- (I) Omnidirectional.
- (II) Directional.

Omnidirectional :- > Radiate equally in all direction <sup>Antenna</sup>

Its power in all direction transmit

Directional :- > Radiate more in one direction exclusively

In directional antenna it transmit its power in only one direction.



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Omnidirectional (Wireless LAN/WAN)



Directional

Propagation:-

Signal Propagation:-

it is nothing but travelling

of signal in both wired and wireless medium.

is known as signal propagation.

It is divided into 3 categories

(i) Ground

(ii) Sky

(iii) Line of Sight / LOS

Ground Propagation:-

In ground propagation radio wave travels

through lowest part of atmosphere touching

the earth.

> These low frequency signal are transmitted

in all the direction.

> The greater the power greater the distance

>

>

>

Sky Propagation:-

In sky propagation, higher frequency radio



wave are transmitted. • Upward in the ionosphere. Where they are reflected back to the earth.

> Loss:-

> In the Line of Side Propagation very high frequency signals are transmitted in straight line from antenna to antenna.

3.6 > MULTIPLEXING:-

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> Multiplexing Provide a mechanism to share use of common channel by two or more devices.

> Multiplexing is a technique for sending more than one info. signal, at a time over a single communication path. (e.g) Medium, circuit or channel.

> Multiplexing is sometime loosely refer to as many into one.

> Classification of Multiplexing:-

The Multiplexing is classified '4' category.

- (I) S.D.M (Space division Multiplexing)
- (II) F.D.M (Frequency division Multiplexing)
- (III) T.D.M (Time Division Multiplexing)
- (IV) C.D.M (Code division Multiplexing)



### S.D.M:-

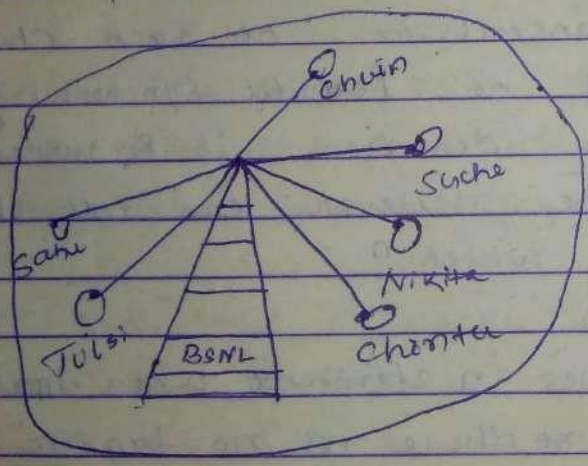
① SDM Means Division of Available Space so that multiple sources can access the medium at the same time channel are assign ~~at~~ on the basis of space.

> The assignment make sure that the transmission doesnot interfere with each other.

> To overcome the overlap. each of the modulated signal by <sup>separated</sup> guard band.

> Which consist of an unused portion available frequency spectrum.

> each user is assign a given frequency band for all time.



> Noise Problem.

### FDM:-

It is a method in which each signal allocate a frequency slot within the overall transmission bandwidth.



> in other word the total available frequency bandwidth on the transmission line with is divided into frequency channels and each info signal occupy one of these channels.

gnd  
The signal will have exclusive use of these frequency slot all the time.

T.D.M | Time Division Multiplexing.

> TDM is a type of multiplexing where two or more channel of info. are transmitted over the same link. by allocating a diff. time interval (slot or slice).

> for the transmission of each channel.

> some kind of Periodic Synchronizing - signal or identifier is required so that the receiver can tell which channel is which?

> TDM becomes inefficient when traffic is less or no there is no traffic because time slot is still allocate even when the channel has no data to transmit.

## C.D.M :- CODE Division Multiplexing :-

CDM is a technique in which each channel transmits its bits as a coded channel-specific sequence of pulses.

> It allows signal from a series of independent sources to be transmitted at the same time over the same frequency band. This is achieved by using codes to spread each signal over a large, common frequency band.

> At the receiving end the appropriate code is used to receive/recover the particular signal intended for a particular user.

> All channels each with a diff. code can be transmitted on the same fibre and asynchronously [d-multiplex].

> The key principle of CDM is 'Spread Spectrum'.



## Sw I. I. [Modulation]

NOTE:-

Signal consist of two components the information signal and the carrier signal.  
> The transmission of any signal over some communication medium usually involves modulation of a carrier..

> For to there transmission the info. signal and carrier signal are combine and the process of combine these signals are called modulation.

> A device that perform modulation is known as a modulator and the device perform inverse operation is known as De-modulator.

> A device that can do both operation of its called modem. modulation is called Modem.

> Classification:-

Modulation is categorized into three category.

- (I) Amplitude Modulation [A.M]
  - (II) Frequency Modulation [F.M]
  - (III) Phase Modulation [P.M]
- Amplitude modulation [AM]

The Amplitude of the carrier wave is varied in proportion to the message signal and other factor like

frequency, phase remain constant  
 [Frequency modulation] F.M  
 The frequency of the carrier wave is varied in proportion to the message signal and other factors like amplitude, frequency remain constant.

[Phase Modulation] P.M.  
 The phase of the carrier wave is varied in proportion to the message signal and other factors like amplitude, frequency remain constant. Here it also affect frequency.

The modulated signal is consist of lower frequency bands, upper frequency band and the carrier frequency components.

[Spread Spectrum]

It is an RF communication system in which the transmit signal bandwidth is intentionally spread over a large bandwidth by injecting a higher frequency signal.

- > The spread spectrum processing gains from 10db to 60db.
- > In spread spectrum the transmission signal bandwidth much higher than the info. bandwidth.
- > All spread spectrum can be viewed as



Two step modulated process.

First - data to be transmitted is modulated.

Second - the carrier modulated is by spreading code, causing it to spread out over a large bandwidth.

> DSSS Spread Spectrum technique distinguishes according to the point system at which.

A Pseudo Random Number (PRN) is inserted in communication channel.

> it is divided into two categories.

- (i) Direct Sequence Spread Spectrum (DSSS)
- (ii) Frequency hopping " " (FHSS)

(i) DSSS :-

(A) DSSS is generally use to transmit digital info.

(B) Digital info channel is mixed with a PRN which bandwidth is much greater than that of the signal itself.

(C) In the DSSS CDMA technique is use.



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### 1) FHSS -

it is a form of spreading in which the frequency of a carrier is altered many times within a fixed time period in accordance with a Pseudo random list of a channel.

The signal jumps from one frequency to another within a frequency range which is given.

> In the FHSS the FDM and TDM technique is used.

### Cellular System:-

This communication system uses a large no. of low power wireless transmitters to create cells - i.e. the service area of a wireless communication system.

> Increasing demand & poor quality of existing service lead mobile service providers to research ways to improve the quality of service and to support more users to their system.

> if cellular network is a radio network made of a no. of radio cells each served by a





transmitter known as cell sight on base station.

- > Advantages of Cellular network:-
- (i) Increase capacity.
  - (ii) Reduce power uses.
  - (iii) Better coverage.

### CH-4 Medium access control

#### HIDDEN EXPOSE TERMINAL PROBLEM:-

-Hidden terminal problem occurs when a terminal is visible for a wireless access point but not from other node communicating with that access point.

> This situation leads the difficulty in Medium access control Sub-layer over wireless networking.

#### > Exposed terminal Problem:-

Exposed node problem in wireless network. ~~the~~ exposed node problem occurs when a node is prevented sending packet to other node because of a neighbouring transmitter.

> The exposed node problem is a major issue in cellular networks.



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it is the power and distance but  
cell's to control to avoid it.

> The basic access method is a carrier  
sense multiple access. It is divided into  
two category.

- (i) CSMA/CA
- (ii) CSMA/CD

Carrier Sense Multiple Access with Collision Avoidance  
(i) Carrier Sense Multiple Access with Collision Detection.

Near Far Terminal :-

The Near Far Problem or hearability problem  
is a situation that is common in wireless  
communication system in particular CDMA.

> In some signal jamming techniques the  
near far problem is exploited to disrupt  
communication.







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## CHAPTER - 5



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A wireless LAN or WLAN is a wireless local area network that uses radio waves as its carrier to give a network connection to all users in surrounding area.

> WLAN transmission formation by three main ways

- (i) microwave
- (ii) spread spectrum
- (iii) infra red

### 5.2 Infra red:-

Infra red is electro magnetic radiation with wave length  $\infty$  longer than visible light but shorter than radio wave.

> infra red radiation is the region of the electro magnetic spectrum bet<sup>n</sup> Microwave and visible light

> in infra red ~~spans~~ infra red communication

an LED transmit <sup>Infrared</sup> ~~LED~~ signal as burst of non visible light. at receive end a photo diode or receptor detect and capture light pulses which are then processed the info retrieve info we want. [Application]

> ex: (i) TV Remote

(ii) head phone

(iii) home security system



- (iv) telephone  
(v) T.V, VCR, Stereo  
(vi) Toys etc.

Radio waves - It refers to (RF) radio waves in which electric magnetic spectrum can be generated by alternating current (A.C) which is fed antenna.

IR Advantages:-

- Low Power Requirement
- Low circuitry cost
- Simple circuitry.
- Portable
- High noise immunity.

> IR Disadvantages:-

- > Line of site is required
- > transmitter & receiver must be almost directly align to communicate.

> Block by common material:

- > short range.
- > light & weather sensitive.

> Speed: Data rate transmission is lower.

5.6

R.F Advantages:-

- > Line of site is not required.
- > Not blocked by common material.





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Lower range.  
Not light sensitive.  
Not as sensitive to weather (not cond?).

RF Disadvantages:-

- > Interference.
- > Lack of Security.
- > Higher cost than infrared.
- > Federal Communication Commission (FCC) license req<sup>d</sup> for some product.
- > Lower Speed.

### 56 WLAN Architecture:-

Network performs many function to transfer info. from source to destination. They are as follows.

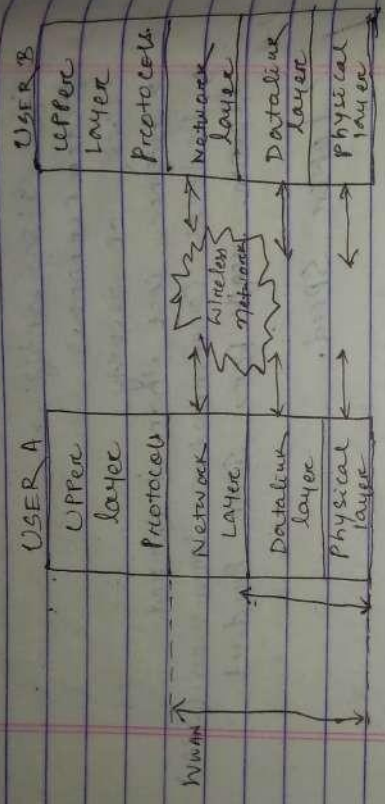
- > The medium provides the path for data to flow.
- > Medium access techniques provide the sharing of a common medium.
- > Synchronization and error control mechanism ensure transfers the data properly.
- > Routing mechanism move the data from the originating source to the destination properly.

Logical Architecture of wireless network:-

Logical architecture define the network's protocol rules by which two parties communicate. The most popular standard logical architecture is 7 layer OSI model. wireless network don't concern with



all 7 OSI layers. They find only within Physical and Datalink layers, which provide the above-mentioned functions.

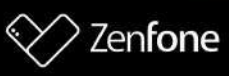


Wireless network (logical architecture)

TYPES OF WLAN:-

- There are two type of WLAN's. They are as follows.
- > Ad-hoc mode.
  - > Infrastructure mode.

The ad-hoc mode includes WLAN cells interacting without connecting to wired networks. i.e. without connection to an access point. No access point is needed and the devices might connect to the internet through wired or other needed and the device might connect to the internet through wired or other wireless techniques.

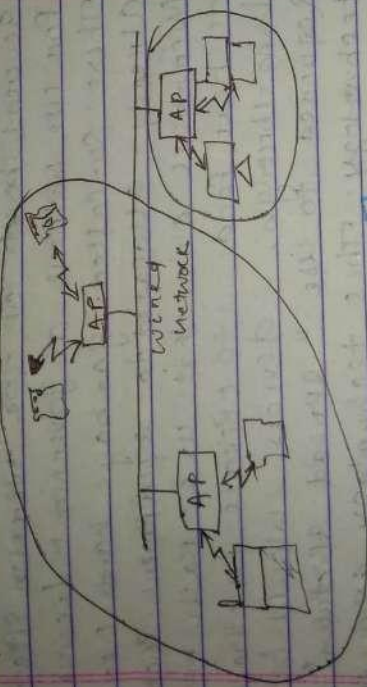






Nodes can only communicate if they reach each other physically.

The infra structure made includes one or several inter connected WLAN cells which are connected to a fixed net through access point wireless access point can be combined with an Ethernet hub or switch and is used to allow computers or other devices with wireless cards to participate in a network. All communication occurs through access point.



### IEEE 802.11 [WIFI]

The IEEE adopted the first standard for WLANs. As the standards no. indicates, this standard belongs to the group of 802.x LAN standards.

This means that the standard specifies the physical and medium access layer adopted to the special type of wireless LANs, but offer the same interface as the

Other to higher layers to maintain interoperability. The primary goal of the standard was the specification of a simple and robust WLAN which offers time-bounded and asynchronous service. More popularly, 802.11 is known as Wi-Fi.

Wi-Fi sprang into existence because of a decision in 1985 by the Federal Communication Commission (FCC) to open several bands of the wireless spectrum for use without a government license.

These so-called garbage bands were already allocated to equipment such as microwave ovens that use radio waves to heat food. To operate in these band-through, devices would be required to use "spread spectrum" technology. This technology spreads a radio signal out over a wide range of frequency making the signal less susceptible to interference, and difficult to intercept.

### MAC LAYER:-

The Medium access control (MAC) is a sub layer of data link layer. This layer defines who can use the network medium. When multiple computers are trying to access it simultaneously.



MAC Layer Functionality: Is reliable data delivery, fairly control access to the shared wireless medium and protect the data that it delivers.

An CSMA/CD a wireless node that wants to transmit perform the following sequence.

1. Listen on the desired channel.
2. If channel is idle (no active transmitters) it sends a packet.
3. If channel is busy (an active transmitter) node waits until transmission stops then a further contention period. (The contention period is a random period after every transmit on every node and statistically allow every node equal access to the media.

4. If the channel is still idle at the end of the contention period the node transmits its packet otherwise it repeats the process defined in 3 above until it gets a free channel.

To improve efficiency additional feature are employed:

1. Positive Acknowledgement (ACK)
2. MAC level retransmission.
3. Fragmentation.

### Security:

The three basic security services defined

by IEEE for the WLAN environment are as follows.

Authentication:- A primary goal of WEP was to provide a security service to verify the identity of communicating client stations. This provides access control to the network by denying access to client stations that can not authenticate properly.

> This service addresses the question "Are only authorized persons allowed to gain access to my network."

Confidentiality:- Confidentiality, or privacy was a second goal of WEP. It was devised to provide "privacy achieved by a wired network". The ping (Passive attack) this service. This service in general address the question "Are only authorized person allows to view my data."

Integrity:- Another goal of WEP was security service devised to ensure that message are not modified in transit bet<sup>n</sup> the wireless client and the access point in an active attack.

> This service addresses the question "Is the data coming into or exiting the network trustworthy has it been tampered with?"



SYNCHRONIZATION:-

Synchronization is the process of the stations in a network getting in step with each other, so that reliable communication is possible.

> Mobile nodes need to maintain synchronization.

The MAC provides the synchronization mechanism to allow support of physical layer that make use of frequency hopping or other time based mechanism where the parameters of the PHY layer change with time. It is achieved by all the stations updating their clock according to access point clock. The access point transmits periodic frames called beacons.

> Time between two intervals is called beacon interval. Beacons contain the value of the access points clock at the moment of transmission. This is the time when physical transmission actually happens and not when the packet was put in the queue for transmission.

Power Management:-

In the case of wireless LANs (Mobile Application), battery power is to be saved. Power saving enables station to go into sleep mode without losing information.

The access point maintains an updated record of all the stations in power saving mode.



Access Point buffers the packets for which are for these stations until either the stations requests for these packets or until the stations change their operation mode. Stations must wake up periodically to receive beacons and buffered data.

Roaming:-

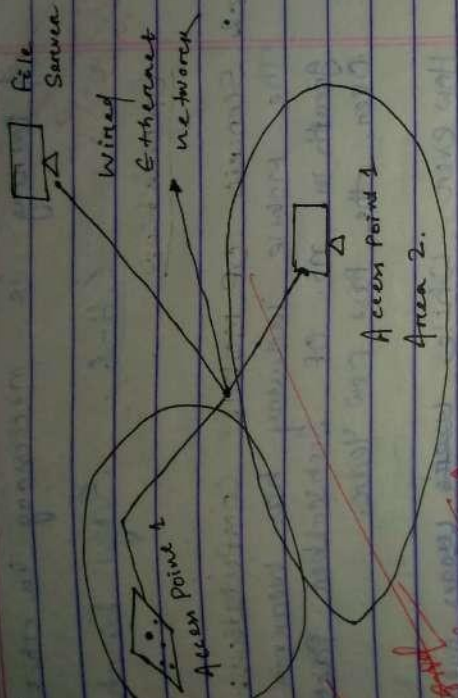
> it is the process of moving from one cell to another cell without losing connection.

A client can switch between access points while physically moving or because of load balancing between access point

> client is not restricted to being stationary. ~~set~~ usually this is completely transparent to the user; they are not aware that a diff. access point is being used from area to area.

Some access point configurations require security authentication when swapping access points, usually in the format of a password dialog box.





### Bluetooth:-

It is an emerging technology and the global initiative and the Global Initiatives taken by Precision, IBM, Intel, Nokia, Toshiba to set a standard for cable free connectivity between mobile phones, mobile PCs, handheld computer and other peripheral.

It uses short range radio links in the 2.4 GHz instrumentation scientific & medical free band.

> In this technology a huge no. of data bases are communicated between one device to another without connection of the wire.

A pairing is necessary in this technology

# CH-6 Saga Fourth Generation

## 6.2 Scenario of Mobile Computation:-

The mobile industry has witnessed explosive growth in no. of subscribers particularly over the past few years.

However while users' usages measured in terms of no. of wireless minutes is increasing, the price per minute per services is falling

> in the mobile industry the charges are classified into two categories.

(1) By adding new services on new user experience for which mobile subscribers are willing to pay.

(1) By redefining operating expenses. A edit at the list is the wireless infra. structure that mobile operators have to maintain regardless of whether they own or leased line.

> There are two primary ecosystem in the wireless industry.

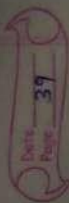
(1) Mobile System for mobile communication (GSM)







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CDMA (code division Multiple access)

Standard body Such as 1G, 2G, 2.5G, 3G, 3G+

1G - Analog voice

2G - Digitized voice

3G+

2.5G - GPRS

3G - broadband

4G - LTE / VoLTE

Universal Mobile tele-communication System.

It is a 3rd generation mobile communication system that provide a range of broadband services to the world of wireless and mobile communication.

The UMTS is design to deliver pictures, graphic, video medias etc.

Advantages of UMTS:-

- > High transmission rate, with GPRS switch & Packet Switching connection.
- > High spectrum efficiency and overall cost improvement.
- > Definition of common radio interfaces for multiple environment.
- > Portable of service in various env.



Suchas indoor - Outdoor, Urban - Rural and Satellite Communication System. satellite Phone.

Question

- ① Explain infrared ?
- ② Explain RF ?
- ③ IR Advantage / dis-advantage.
- ④



## Mobile computing

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### World wide web (WWW)

The WWW architecture provides a very flexible and powerful programming model. Application and content are presented in standard data format, and are browsed by application known as web browser. The web browser is a networked application.

> it sends request for named data objects to a network server and the network server with the data encoded using the standard formats.

> The WWW standards specify many of mechanisms necessary to build a general purpose application environment including

> standard naming model:- All servers and content on the WWW are named with an internet standard uniform resource locator (URL).

> content typing:- All content on the WWW is given a specific type there by allowing web browsers to correctly process the content based on its type.

Standard content format:- These include HTML scripting language (Java Script) and a large

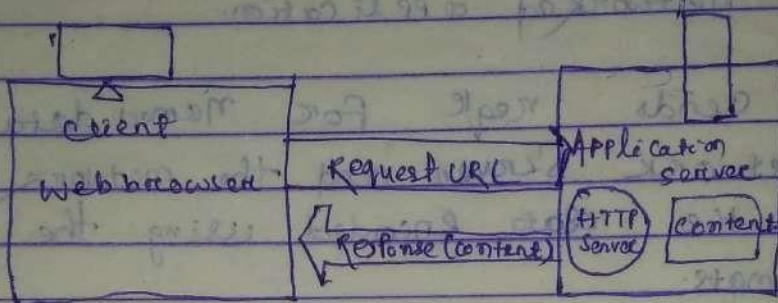
no. of other formats.

standard protocol:-

Standard networking



Protocol allow any web browser to communicate with any web server. The most commonly used protocol on the web is the HTTP, operating on top of the TCP/IP Protocol Suite.



> The wireless markup language (wml) user interface (UI) component map well on to existing mobile phone user interface

Example of WAP use:-

> checking train table info.

> Ticket Purchase

> flight check in.

> viewing traffic info.

> checking weather cond<sup>n</sup>

> looking up stock values.

> Looking up phone no.

> Looking up address

> Looking up Sport results.



Need OF WAP:-

Having the Performance and data transfer Capacities OF the common desktop Computer in mind, the web designer constructed the Internet technology for device as powerful as those computers. hand-held wireless devices have less powerful CPU's low battery life, less memory, restricted Power consumption, smaller displays and diff. input devices.

> Similarly wireless data networks have less bandwidth more latency, less connection stability and less predictable availability than conventional wired network.

Benefit OF WAP

- > it is device independent.
- > it is network independent.
- > wap utilization standard Internet Markup language technology, XML.
- > optimizing the content and air link protocols.

Example OF WAP:-WAP Architecture:-

WAP is designed in a layered fashion, so that it is extensible, flexible and Scalable.



Zenfone

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As a result, the WAP Protocol Stack is divided into five layers.

### Layer of WAP Protocol

#### Application Layer:-

Wireless Application Environment (WAE). This layer is of most interest to content developers because it contains among other things, device specifications, and the content development programming languages, WML, and WML Script.

#### Session Layer:-

Wireless Session Protocol (WSP). Unlike HTTP, WSP has been designed by the WAP Forum to provide fast connection suspension and reconnection.

#### Transaction Layer:-

Wireless Transaction Protocol (WTP). The WTP runs on top of a datagram service, such as user datagram protocol (UDP) and is part of the standard suite of TCP/IP protocols used to provide a simplified protocol suitable for low bandwidth wireless stations.

#### Security Layer:-

Wireless Transport Layer Security (WTLS). WTLS incorporates security features.





based upon the established transport layer security (TLS) Protocol Standard.

> it includes data integrity checks, privacy, service denial and authentication services.

### Transport Layer:-

Wireless Datagram Protocol (WDP). It allow waf to be bearer independent by adapting the transport layer of the underlying bearer.

The waf Protocol architecture is shown below along side a typical internet Protocol Stack.



### WML:-

> it stand for wireless markup language (wml) based on xml. is a now-obsolete markup language. intended for devices that implement the wireless Application Protocol (WAP) Specification, such as mobile phone.

> it provide navigational support, data input, presentation of text and image presentation, and



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forms, much like HTML.

> wmc document is known as "DECK". Data in the deck is structured into one or more "cards". Each of which represent a single interaction with the user.