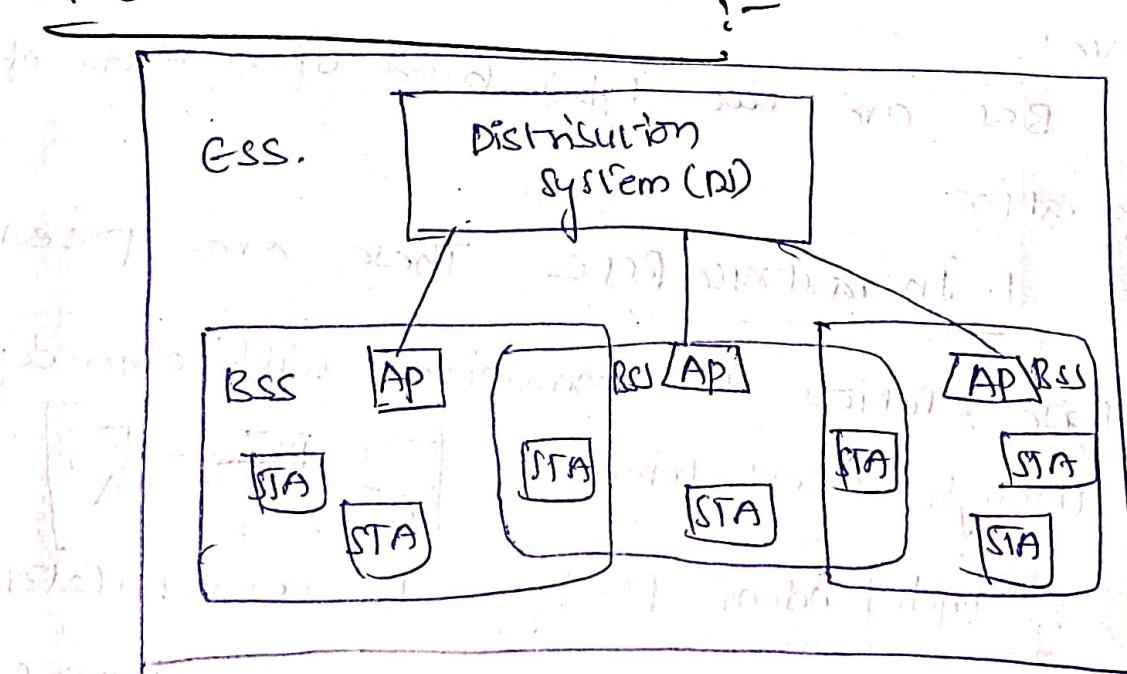


MC SK-Sandhani-av
1. Explain IEEE 802.11 Architecture and protocol

stack of IEEE 802.11?

- a) IEEE 802.11 standard, popularly known as WiFi, lays down the architecture and specification of wireless local area networks (WLAN's).
- ⇒ WiFi (or WLAN's) uses high-frequency radio waves instead of cables for connecting the devices in LAN.
- ⇒ User connected by WLAN's can move around within the area of network coverage.

IEEE 802.11 architecture



The components of an IEEE 802.11 architecture as follows

Stations (STA):- Station consists of all devices and equipment that are connected

To WLANs. A station can be of two types

- wireless access point (WAP) or WPS.

Simply access points (AP) are generally wireless routers that forms the base stations or access.

- Client - clients are workstations, computers, laptop, printers, smart-phones etc.

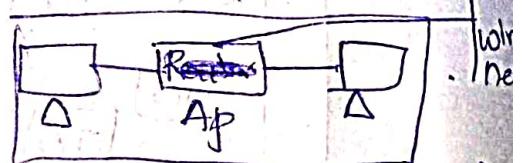
→ each station contains a wireless network interface controller.

Basic Service Set (BSS) - It is a set of group of stations communicating at the physical layer level.

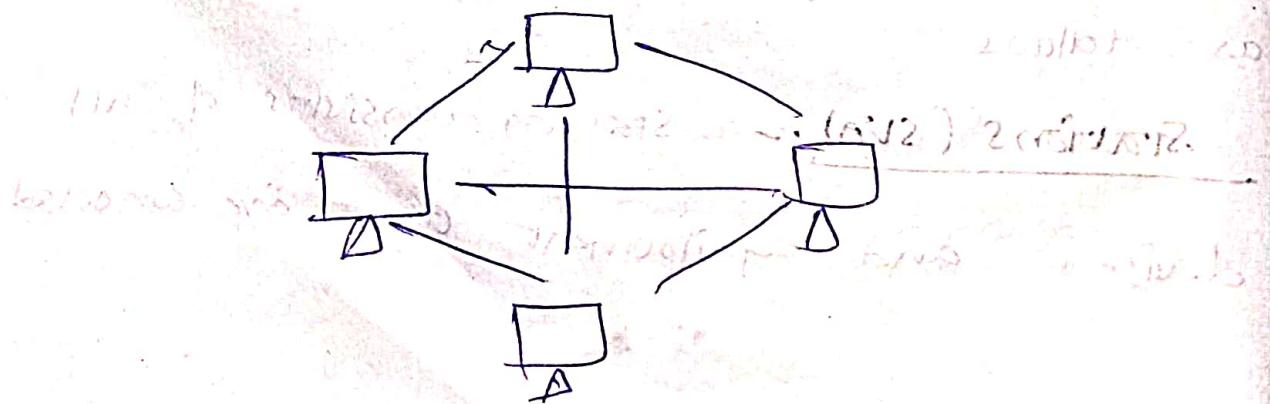
BSS are two types based upon mode of operation

1. Infrastructure BSS - These are presented

base stations to communicate with other devices through access points.



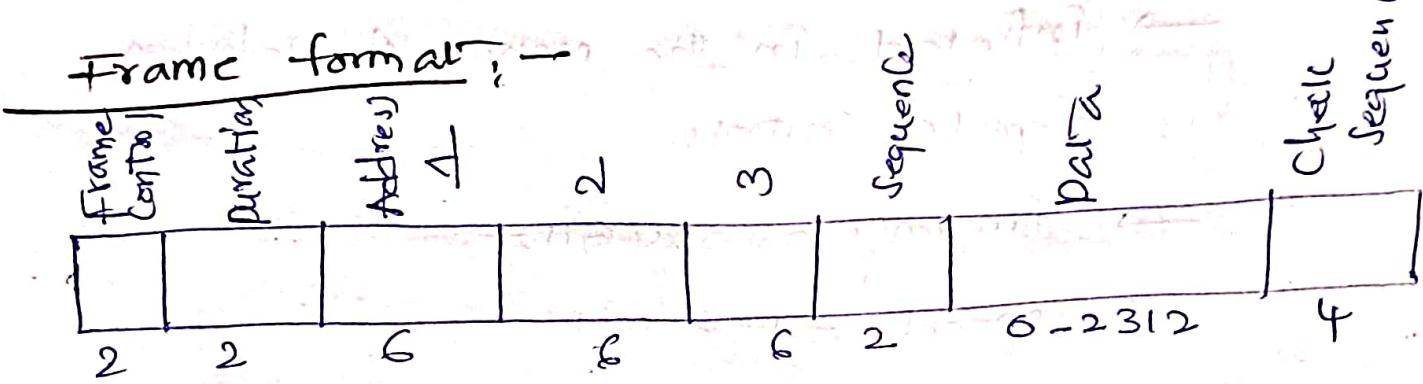
2. Independent BSS - It communicates in peer to peer manner. It uses adhoc manner.



Extended Service Set :- It is set of all connected BSS.

Distribution System :- It connects access points in ESS.

Frame format :-



bytes

Protocol stack :-

⇒ The protocol stack IEEE 802.11 (Data link layer)

⇒ The data link layer in 802.11 is split into two in all the 802 protocols as well as more sub layers

1. MAC

2. LLC

MAC :-

This sublayer determines who gets to transmit

is allocated, that is,

MAC

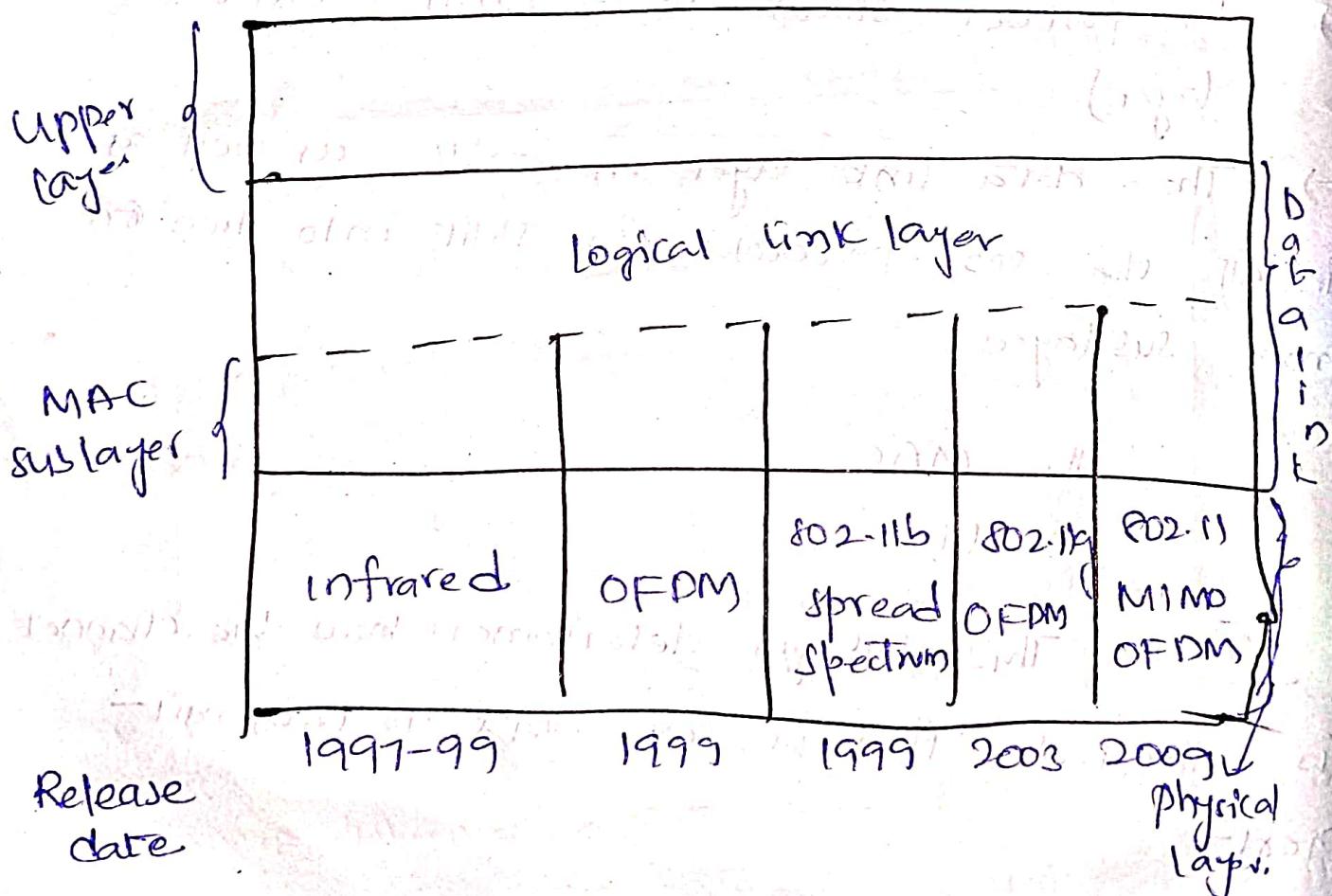
it hide the differences between the different 802 variants technologies.

different

→ Several transmission techniques have been added to the physical layer as 802.11 has evolved since its first appeared in 1997.

- Infrared in the manner of Televisions
- Remote Controls
- frequency = 2.46 GHz
- speed = $1-2 \text{ Mbps}$

The 802.11 protocol stack :-

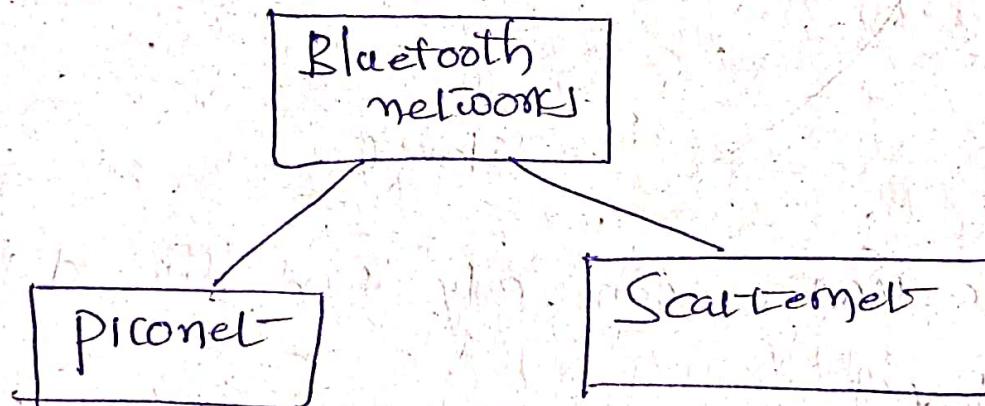


MIMO :- Multiple Input / Multiple Output

Orthogonal Frequency division multiplexing

Bluetooth

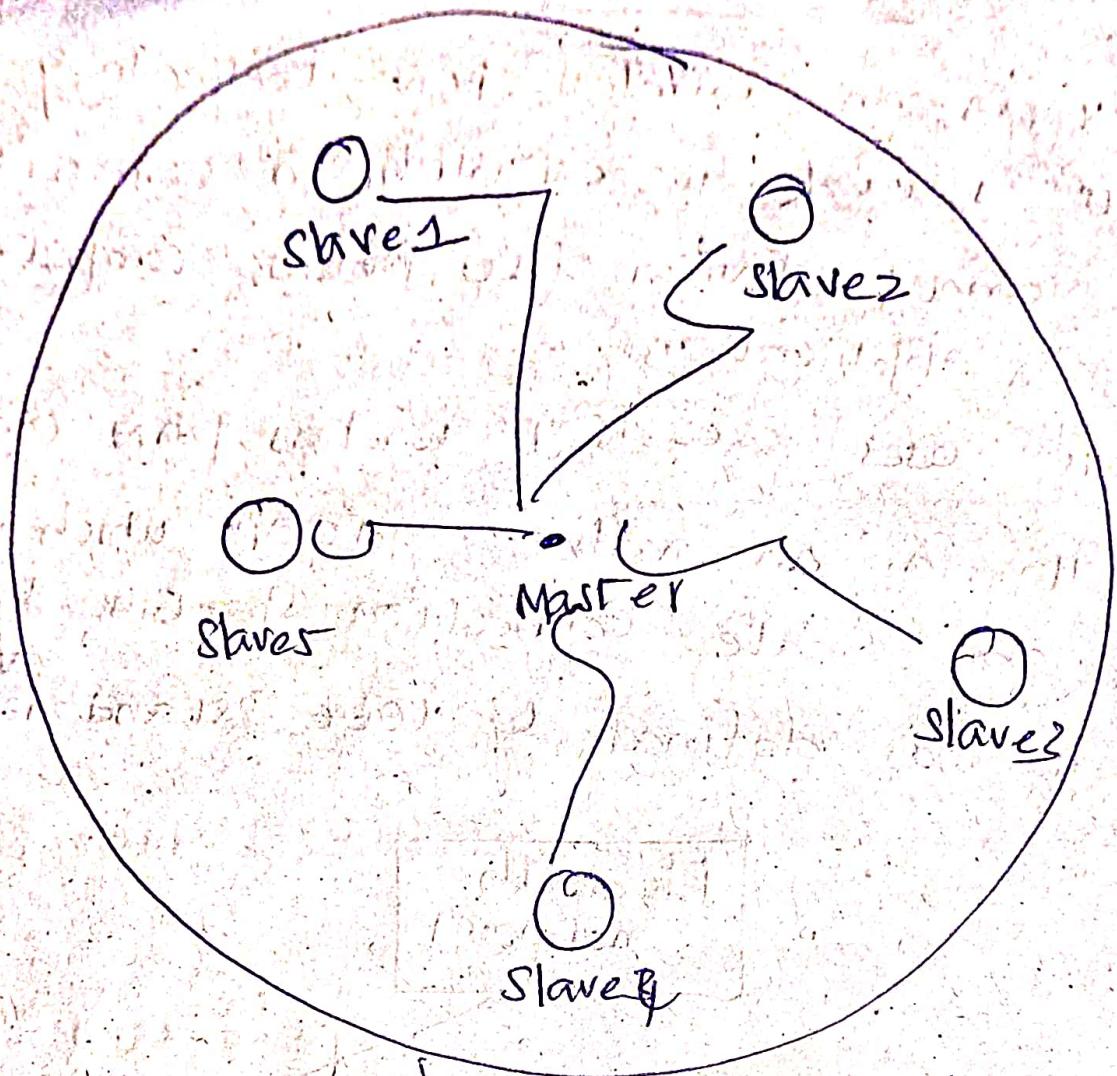
- It is an wireless PAN technology
- It is used to establish connection to various devices like phones, computer, home applications etc.
- It uses 802.15.1 wireless PAN configuration
- It is an adhoc network which means we can create connection spontaneously
- ⇒ It was defined by IEEE standard 802.15



Piconet

- In piconet there is one master and 7 slaves are available.
- It means the piconet has maximum of 8 stations.
- ⇒ The master station is called primary station and slave station is called secondary.

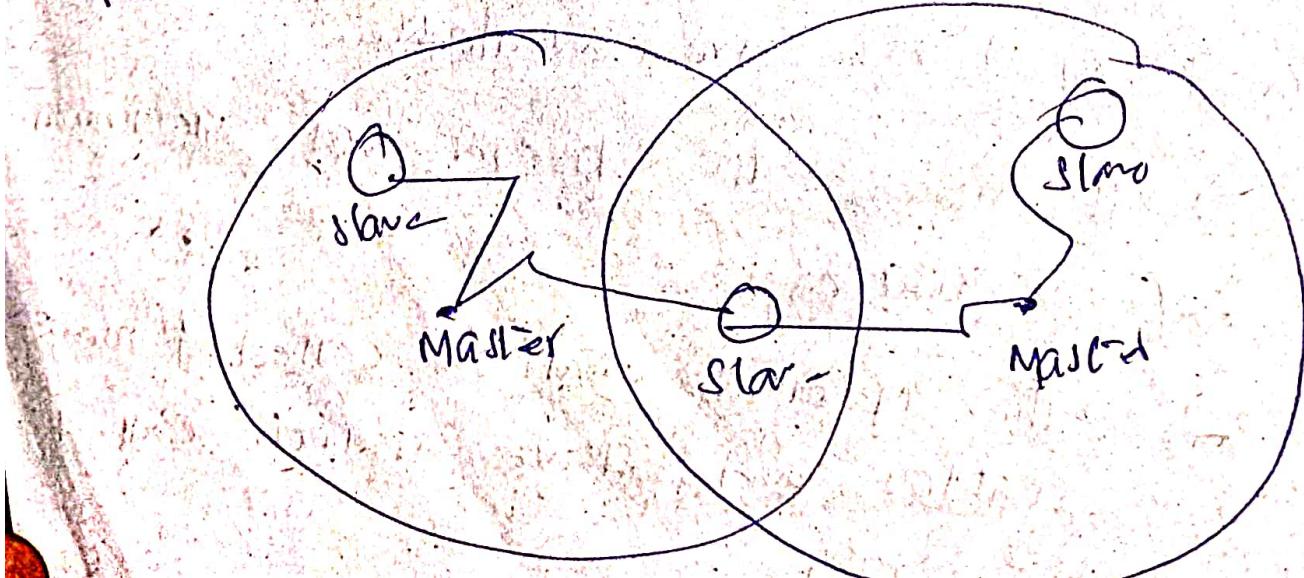
Piconet



The Master can only send the data to the Slaves

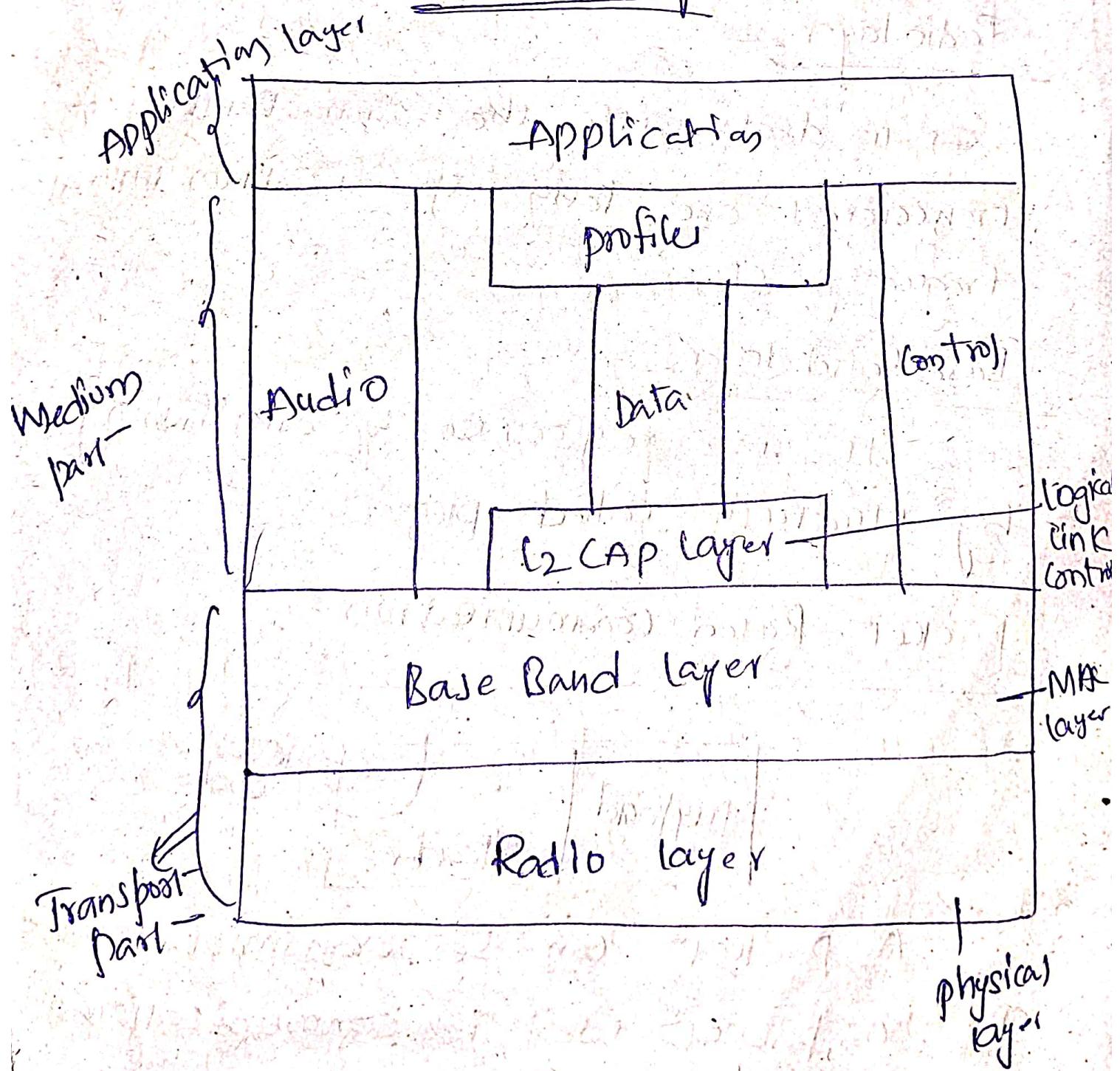
2. Scatter net

The combination of two (or more) piconets forms Scatter net



The main problem in the scatter net is a single slave can able to establish connection between two masters and they sending the data / transfer will difficult.

Bluetooth Layer



Operational states -

unconnected state

connecting state

Inquiry

Scan

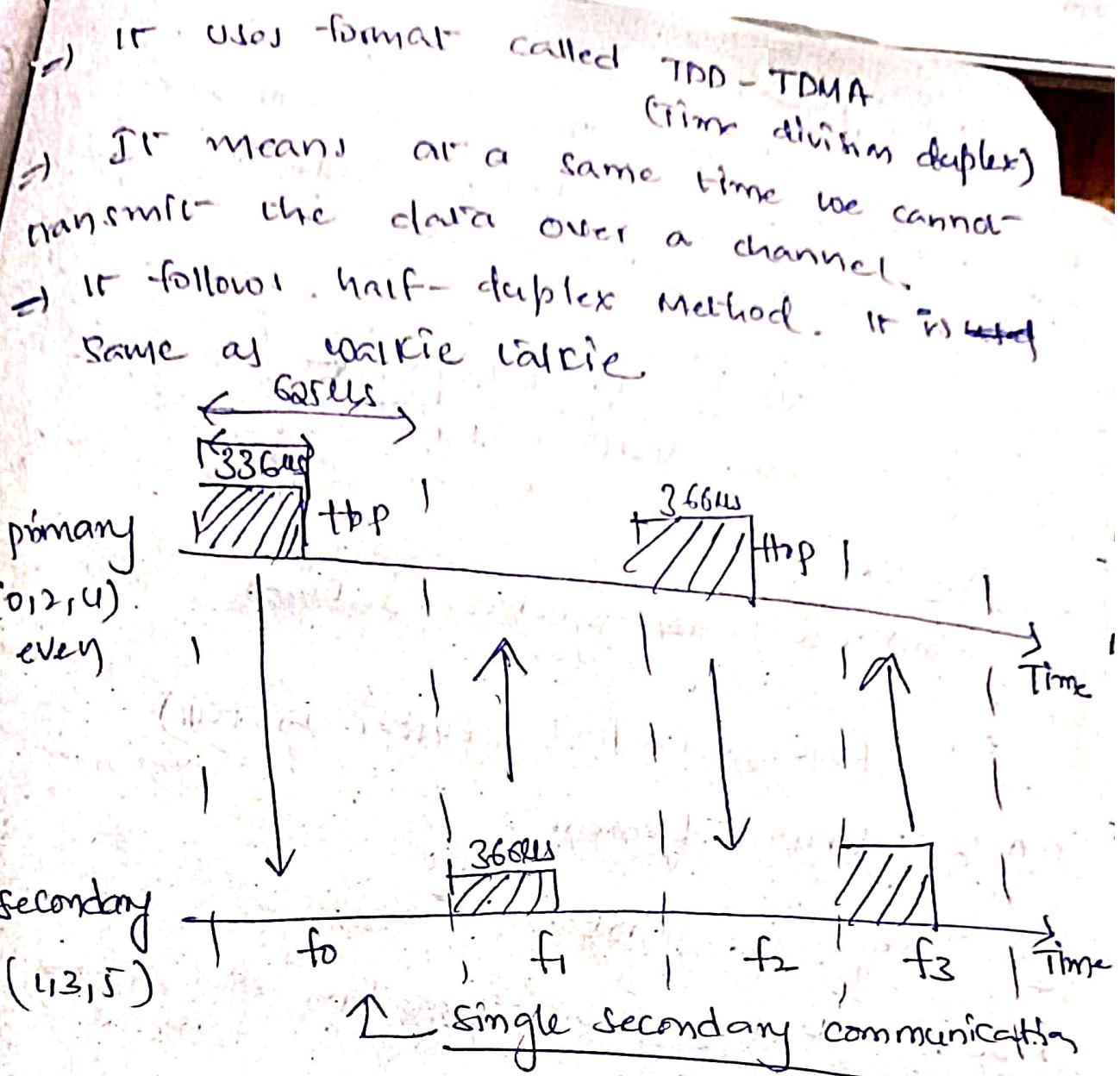
Page

Transmit

Active states

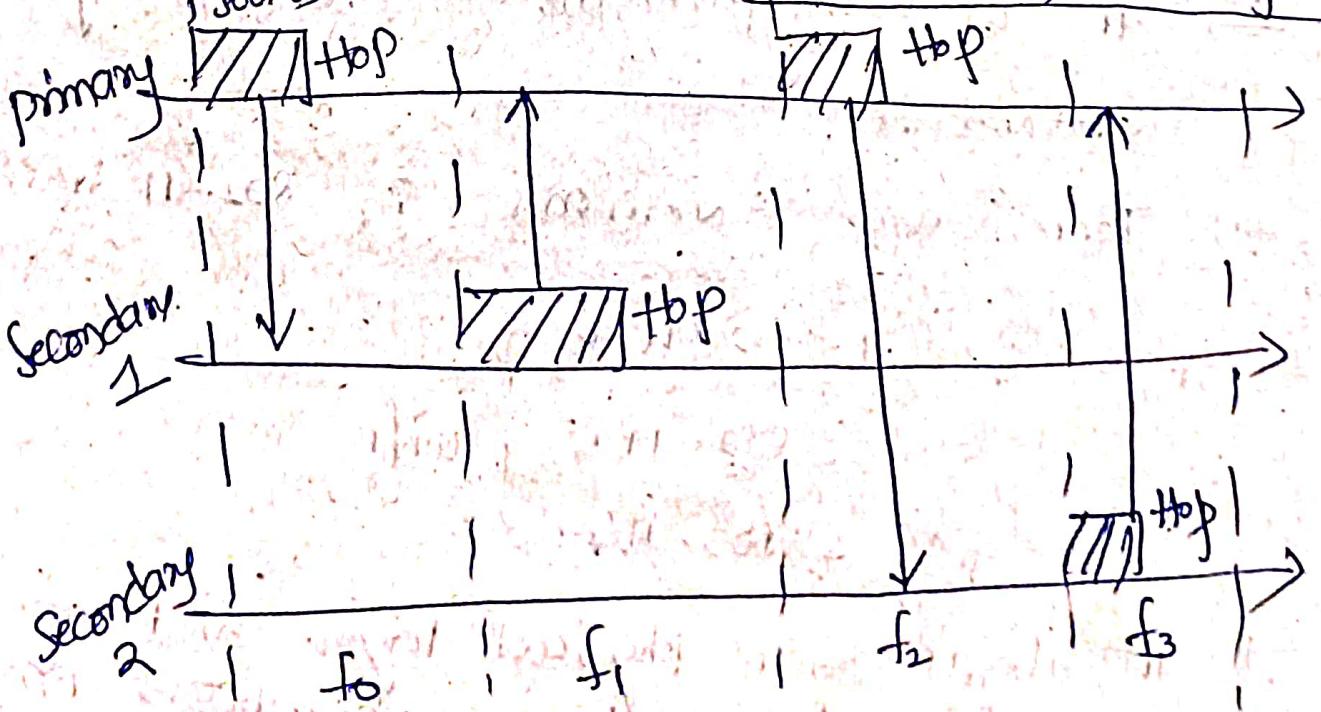
Connected

\Rightarrow It is similar to MAC sublayer
 \Rightarrow The access method in TDMA
 \Rightarrow The length of an channel is 6 bits



Multiple Secondary

primary → secondary 1
 secondary 1 → primary
 primary → secondary 2



frame format

P2 511 34591 010 N 54

Access code

Header

Data

Address	Type	F	A	S	HBC
355H	4511	1	1	1	1

355H 4511 1 1 1 1

2) Concept of Bluetooth, and Home RF (17)

A) Home RF:-

→ It stands for Home Radio frequency.

It is primarily used for home devices.

→ works only for home network.

→ its network is slow and work in a limited range but it is cheap.

→ Range of communication = 50 meters.

Technology:-

→ This technology comes under adhoc networking.

which an area such as enclosed home or office building in a workshop.

→ communication in home called the shared wireless access protocol (swap) has been developed.

→ Some common applications targeted are:-

1. access to public network telephone &

internet

2. Entertainment networks

→ Connection can be shared for both voice + data among devices at same time.

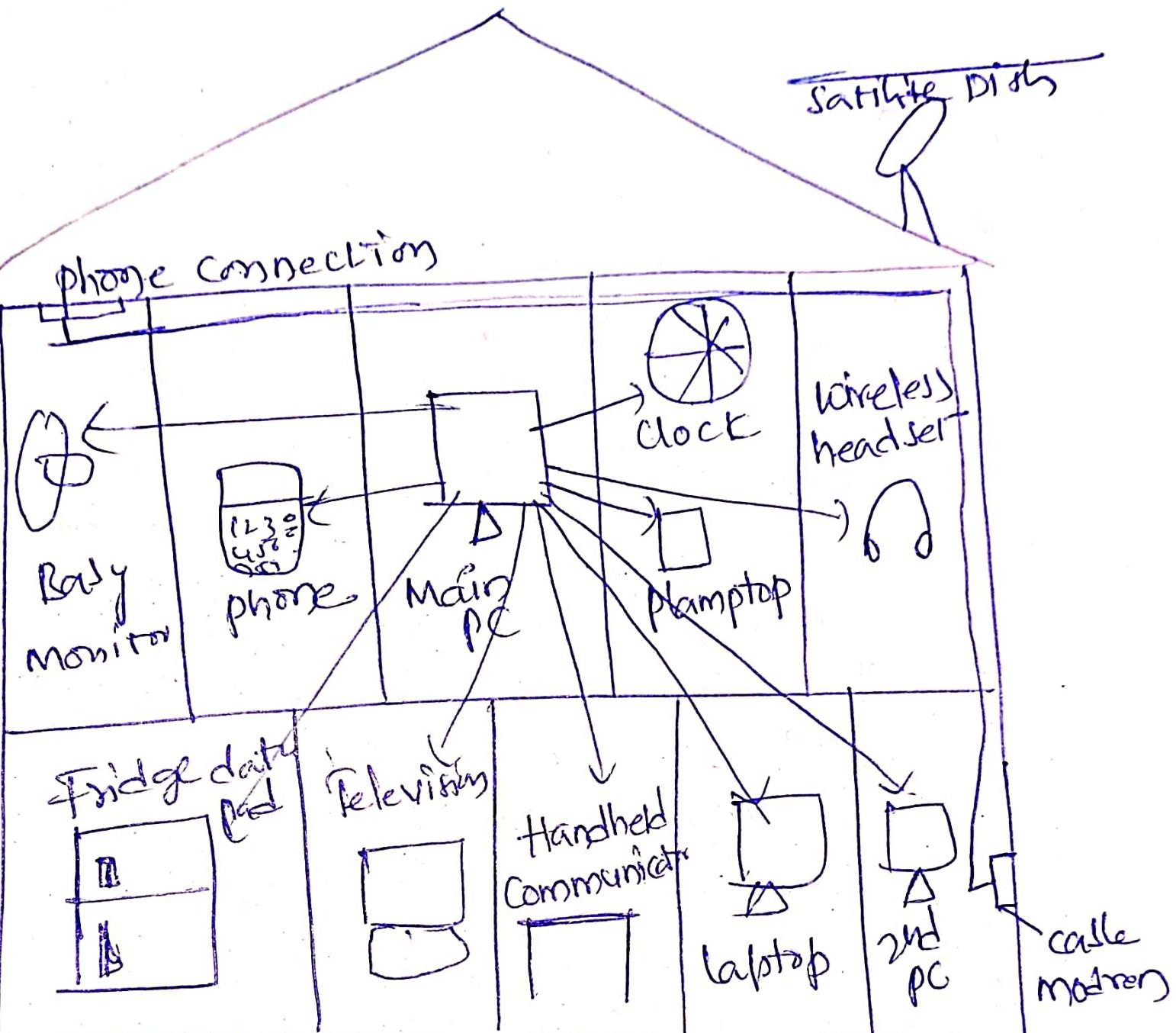
→ Frequency = 2.4 GHz

→ Data rate = 2mbps to 1mbps

→ Supports both centralized communication &

→ Subports both centralized communication &

Home RF



Mobile Computing

Wireless LAN's and PAN's.

1. LAN's:-

local wireless networks (WLANs) contain different types of versions i.e

- (i) 802.11 a
- (ii) 802.11 b } wifi
- (iii) 802.11 g

→ These all comes under the wireless local area networks.

→ These are used for wifi configuration.

2. personal area network (WPAN), -

It contains various different categories

- 1. 802.15.4a / 802.15.4b
- 2. 802.15.5
- 3. 802.15.2a / 3b
- 4. 802.15.1

These 802.15.1 is used for the Bluetooth communication.

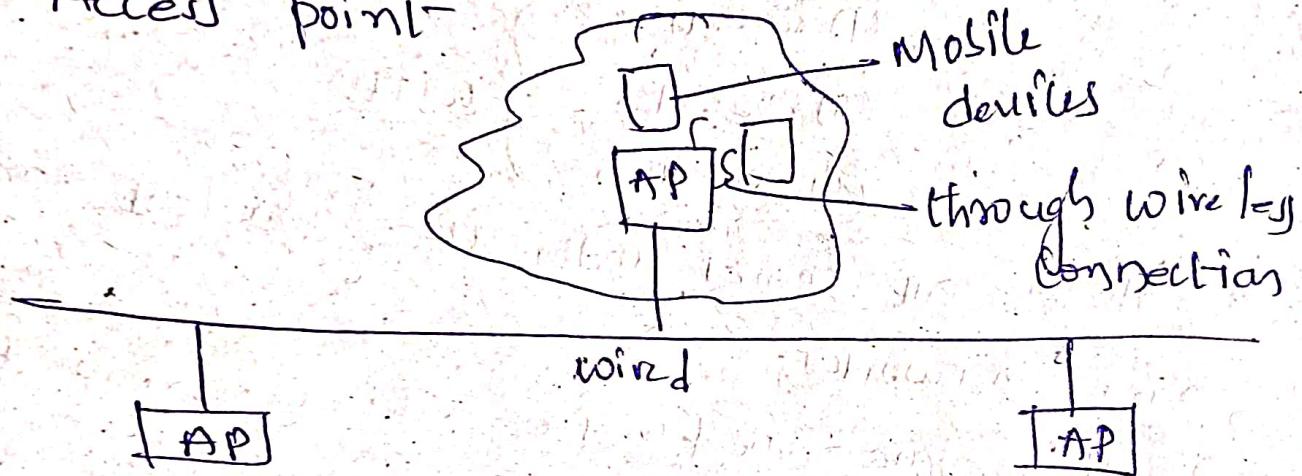
802.15.4a is used for zigbee

Generally there are 2 types of networks

1. Adhoc
2. Infrastructure

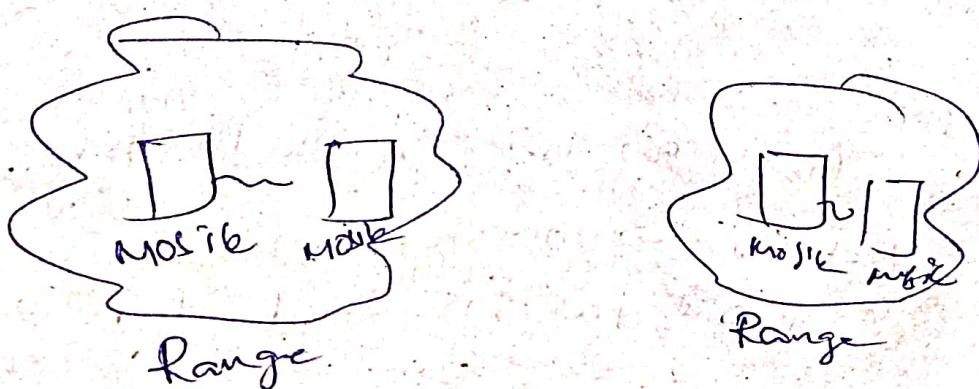
Infrastructure :-

ii- It is an pre established network we want to establish an connection with Access point.



Ad Hoc.

There is no pre-established structure. It contains of an range limit ~~they~~ within the range & only connection establish



Fundamentals of WLAN's :-

In the field of Networking portable and mobile devices can move from one place to another, but portable terminals are accessed only when they are stationary.

While the mobile terminals are more powerful and cable accessed when they are in motion.

WLAN's also supports truly mobile work stations.

Technical Issues :-

1. Diff b/w wired and wireless LAN
2. Usage of wireless LAN's
3. Design goals for wireless LAN's

Differences

1. address
2. Dynamic Topology
3. Medium Boundary
4. Error prone medium

Usage

1. Historical Background
2. Earthquakes / Tsunami

Design goals :- criteria to design the wireless

1. Operational simplicity (Tap with wifi easily connected)
2. Power efficient Operation (Minimum amount of power)

Usage of wireless LAN's

1. Historical places :- In some century years, buildings, place there is an wireless LAN is better than wired because if they will ask to broken they the re-connection is needed but in wired connection there is need to re-establish the wires
2. Earthquakes / Tsunamis :-

The places which are having the high possibilities of earthquakes and Tsunamis