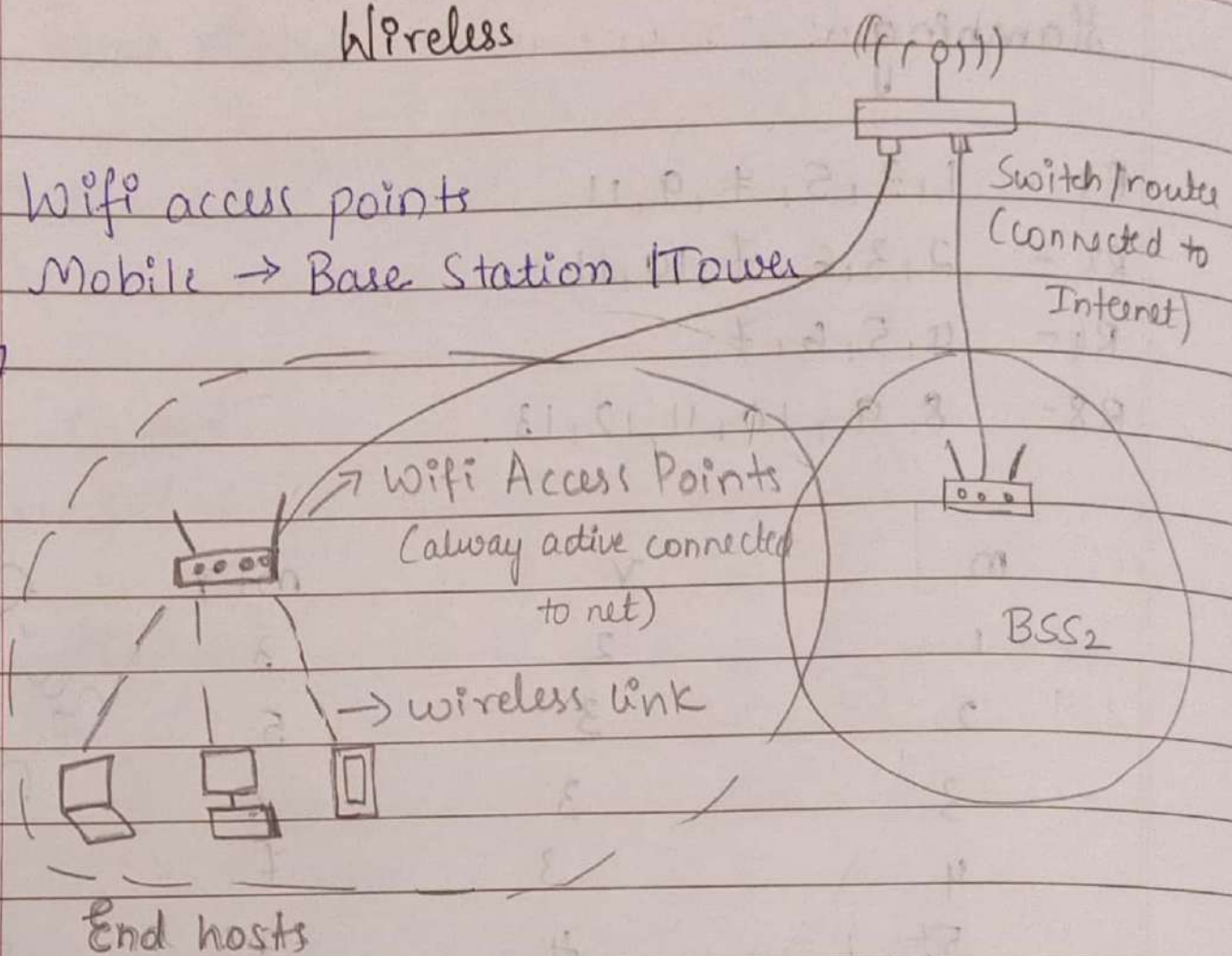


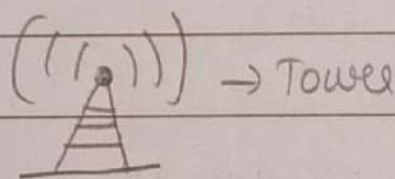
Wireless

- i) Wifi access points
- ii) Mobile → Base Station (Tower)

1/1



BSS (Basic Service Set)



--- (wireless)
—— (wired)

Access points use - link layer devices using MAC address
Router - IP/network layer

Infrastructure in WLANs

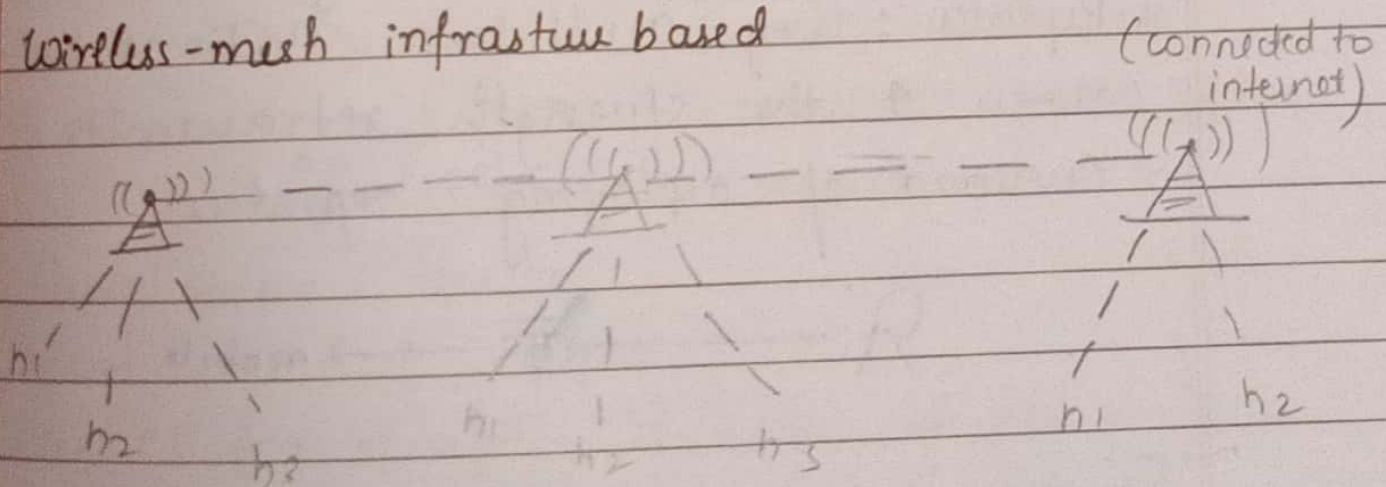
- One central entity coordinates the comm' b/w all the device connecting to internet → Single hop Infrastructure-based. All devices are connected to central control using one hop or is having direct link. It is infrastructure based means there is one central entity controlling entire network.
- If there is no place for central entity to deploy
- Deployment of central entity is costlier especially in mobile network system

Infrastructure less

Eg: Bluetooth

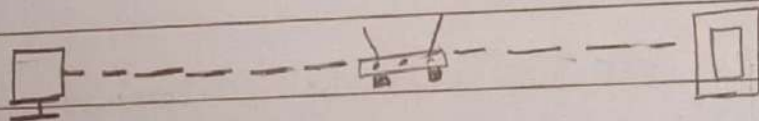
- Master & slave
- Single hop (direct link)
- One device becomes master and no central control

Wireless-mesh infrastructure based

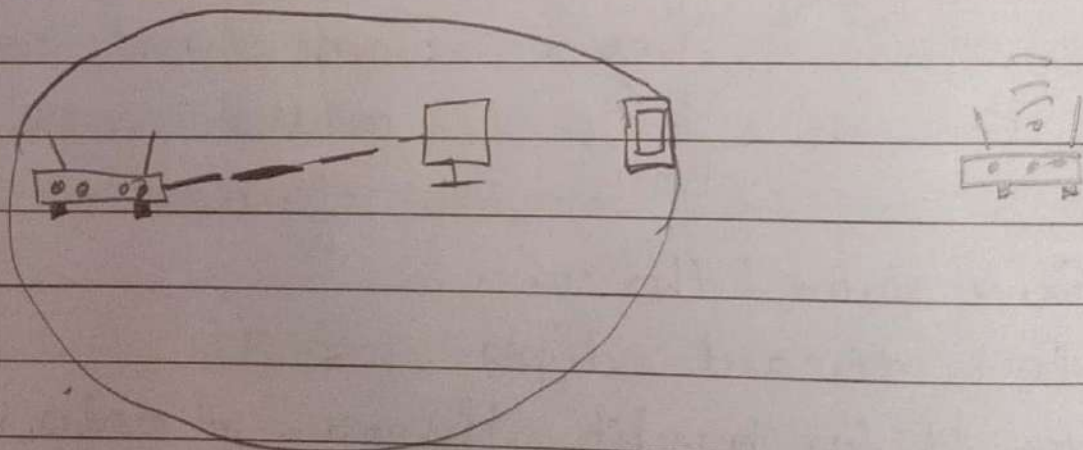


Base station not connected to Internet

- Sense channel if ↑ energy level then busy channel so don't transfer.
- If hosts have barrier and hidden they can't hear each other so think channel is idle and transmit - Hidden Terminal
- Else if hosts are too far away they can't sense the channel is busy as signal fades over distance think that channel is idle & transmit. - Fading



- Exposed terminal → even if its channel is free as wifi is broadcast if stations in its area are transmitting host feels its not idle so doesn't send



Basic unit of wireless networks is resource element

BPSK - bits/per element

BPSK - 2

16 QAM - 4

64 QAM - 6

256 QAM - 8

More data is in one resource element

Massive mimo - multiple i/p multiple o/p

n supports abgn. backward compatible

SNR (signal to noise ratio)

$$\text{SNR} = \frac{\text{Power of received signal}}{\text{Power of noise}}$$

↳ (wifi)

SINR = (signal to interference + noise ratio)

↳ mobile networks

$$\text{SINR} = \frac{\text{power from other base home}}{\text{interference of other base station} + \text{Noise}}$$

In wifi no much interference as AP are kept way apart & act in different channels

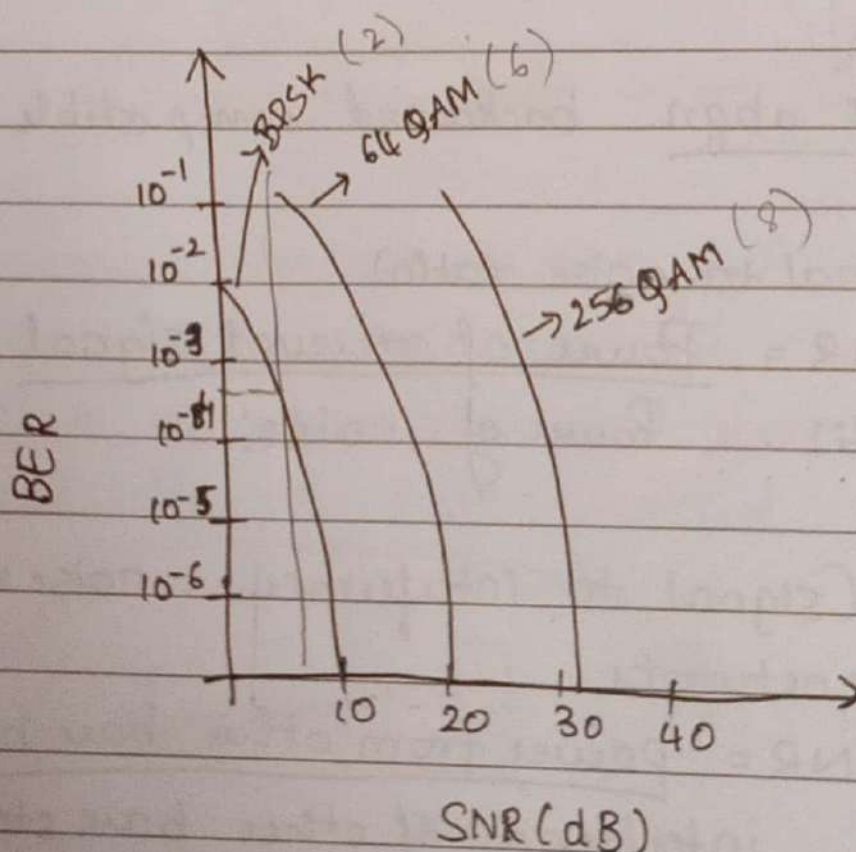
Both are expressed in dB after

$$\text{SNR(dB)} = 20 \log(\text{ratio})$$

$\uparrow \text{SNR}, \uparrow \text{SINR} \Rightarrow$ less interference & noise

BER \rightarrow probability that bit will be wrongly received at receiver (Bit error rate).

SNR and SINR helps decide no. of bits to be in resource elements.



$\uparrow \text{SINR} / \text{SNR} \rightarrow \downarrow \text{BER}$

for one particular SNR BER, higher is modulation rate

- lower SNR lower modulation rate
- Adaptive data rate - changing modulation technique depending on SNR / SINR of the host

MAC Protocols

- Smallest unit of time: slot
- SIFS: diff ~~time~~ of time b/w receiving a frame and sending a response, if any
- DIFS: (Distributed) The duration of time for which a node defers transmitting after sensing the channel to be idle

$$DIFS = SIFS + 2 \times \text{slot}$$

$$10 + 2 \times 9 \mu s$$

