UNIT -5

IEEE 802.11 (Institute of Electrical & Electronic Engineer)

→ It is a committee that developed standard for WLAN (Wireless local area network)

→ It is a standard that specify the physical or ~~MG~~ MAC layer adapted.

→ Define separate standard for infrastructure ~~wo~~base and adhoc network (infrastructureless)

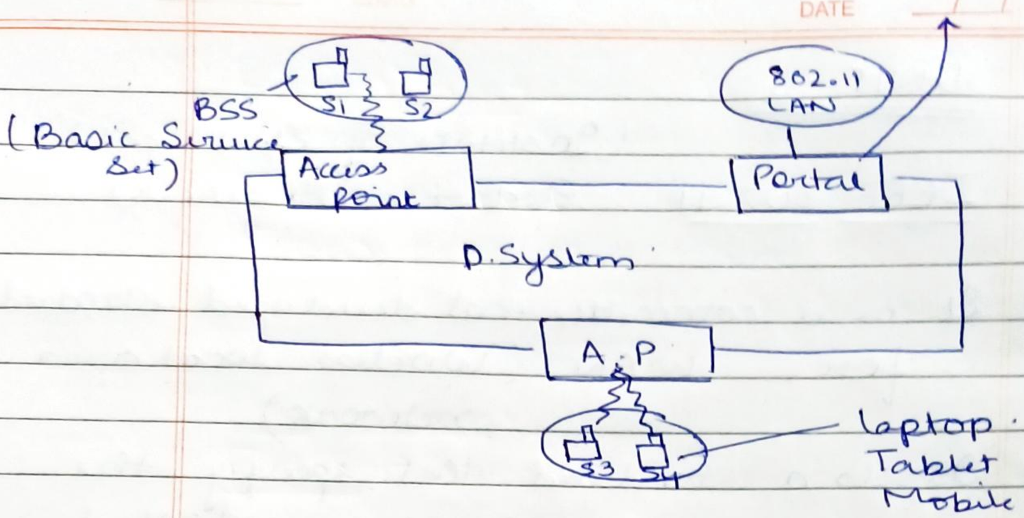
→ WLAN are slower than LAN. (when moved out of range, it suffers from noise & error)

Infrastructure base mode

→ Helps in providing wifi for internet access

→ Based of CA (collision avoidance)

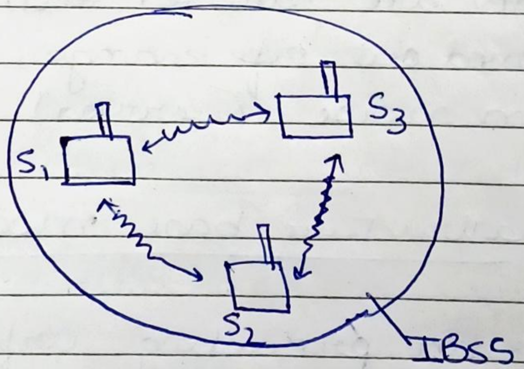
→ Multiple access point are connected to form a distribution network.



It is used when other family of 802 is to be connected

Har access point ka apna ek BSS hota hai

Adhoc Network



Independent Basic Service Set

802.11 Protocol Stack

OS	Application layer			
OS	Upper layer			
IEEE.802.11	Logical layer			Data Link layer
IEEE.802.11	MAC			Data Link layer
IEEE.802.11	FHSS	DSSS	IR	Physical layer

Physical layer

1) Encoding & Decoding of signal
Converting the signal into binary

2) Bit Transmission and receiving.

3) Wireless signal encoding

4) Frequency band definition

Medium Access Control (MAC)

1) Assemble the data into frames

2) Error detection

3) Reliable data delivery

4) Wireltess access control protocol

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Logical layer.

1) Error control
2) Flow control.

Physical layer -

FHSS → Frequency Hopping Spread Spectrum.

It is repeated switching of carrier frequency during radio transmission to reduce and avoid interception.

DSSS → Direct Sequence Spread Spectrum

It is a transmission technology used in local area wireless network transmission

IR → Infrared.

It is a wireless mobile technology used for device communication over short range.

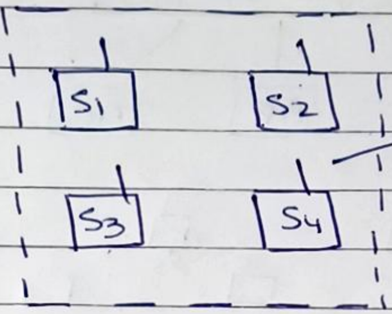
Services of 802.11

1) BSS
2) ~~BSS~~ ESS

1) → **BSS** → 1) made up of mobile wireless station and access point

2) ~~(a)~~ (a)

Adhoc Network

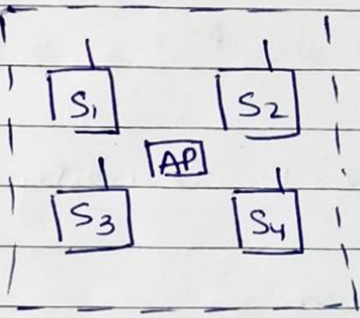


directly communicate

BSS without AP / IBSS

(b)

Infrastructure network

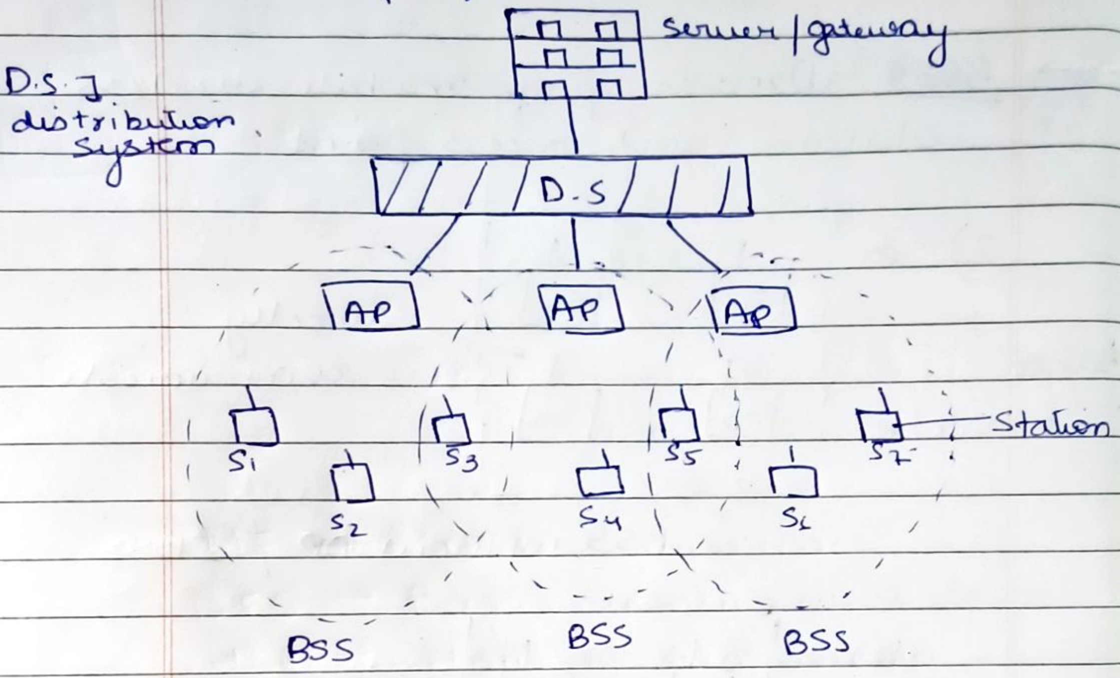


BSS with AP

2) ESS

Extended Service Set

Made up of 2 or more BSS with AP



IEEE 802.11 Security (WLAN Security)

1) Authentication
2) Access control
3) Privacy with message integrity

GSM (Global System for Mobiles) — C A I

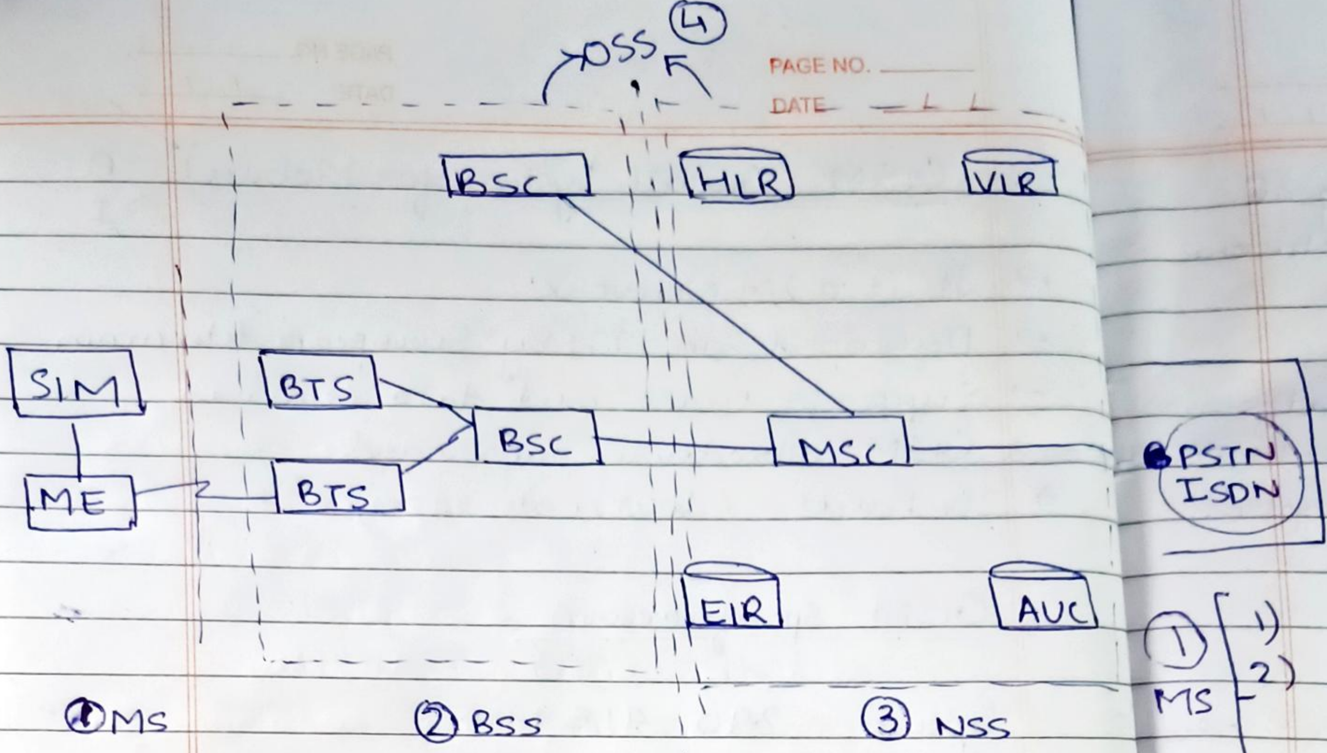
→ It is a 2G Network
→ Developed in 1991 by European telecomm
→ Supports voice and data services
→ GSM introduced sim card
→ 2G handset (low cost, size)

GSM Specification

Uplink - 890-915 MHz
Downlink - 935-960 MHz
Transfer Rate - 9.6 kbps
No. of carriers - 124
Carrier separation - 200 KHz
Modulation - GMSK
Access Method - TDMA / FDMA
Time slot - 8
GSM speed - 14.4 kbps

GSM Architecture

1) Mobile Station (MS)
2) Basic Station ~~Substation~~ Subsystem (BSS)
3) Network Switching Subsystem (NSS)
4) Operation Support Subsystem (OSS)



ME → Mobile Equipment
BTS → Base Transreceiver Station
HLR → Home location Register
VLR → Visitor Location Register
EIR → Equipment Identity Register
AUC → Authentication centre
MSC → Mobile Service Switching Centre
BSC → Base Station Controller.

① MS

1) MS → Mobile Station.

2) SIM → used to send & receive calls & messages

3) ME → IMEI Number.

② BSS

4) BTS → send and receive signal from mobile phone

5) BSC → controls group of BTS
→ Allocate Radio channels
→ Handover from one BTS to another BTS.

③

6) NSS

MSC → Heart of GSM Network
→ Management of mobile services like registration, authentication.
→ Communicate with HLR, VLR, AUC, EIR.

EIR → Database containing all valid handset on network using IMEI number

AUC → Protected database that stores copy of IMEI no. used for authentication & encryption

VLR → Subset of HLR
→ local database for user visiting location in other domain

HLR → Master database of user, current location & information.

(4)

7) OSS

→ Connected to all equipment in switching system
→ Security operation and performance management
→ Network configuration and maintainance task
→ Admin & commercial operation

PSIN - Public Switch Telephon Network

ISDN - Integrated Service Digital Network

Security of GSM

The main security goal in GSM is
C – Confidentiality
I → Integrity
A → Authentication

1) Confidentiality – One of the most important security is to protect user message

2) Entity Authentication – The MSC needs to be sure that the call is billed to the person making the calls.

3) Message Integrity – The receiver needs to ~~vet~~ verify that the message has be received without error

The main step in authentication are:-
Step1: Authentication request from cellphone

Step2: Creation and transmission of authentication vector

Step3: cellphone respons
Step4: Receipt of encryption key

UMTS

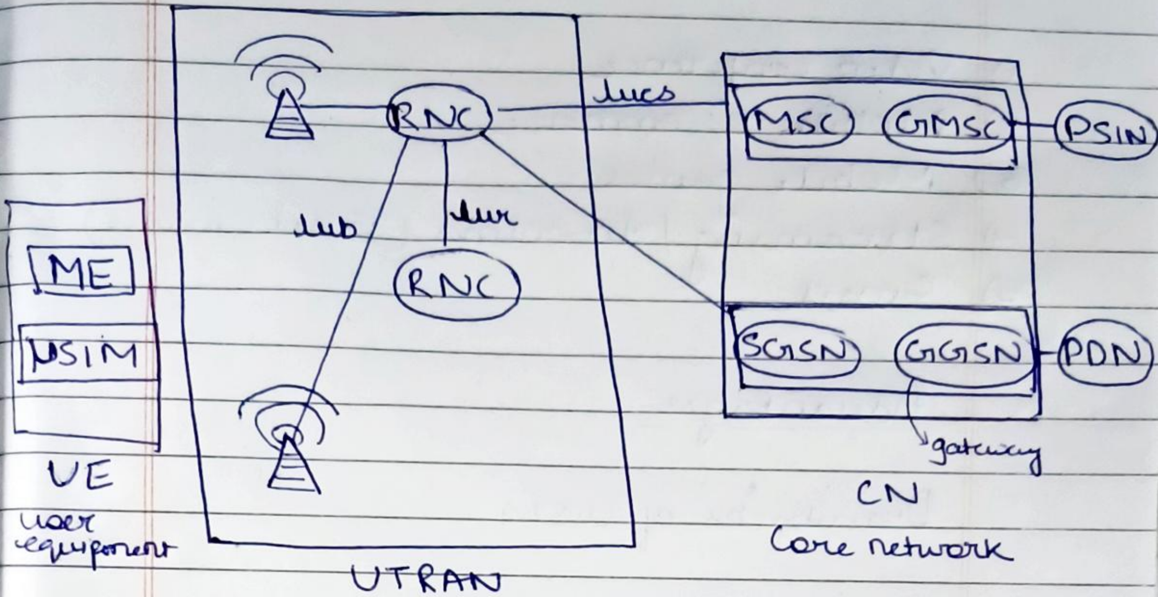
Universal Mobile Telecommunication System

→ It is the 3rd generation of mobile communication
→ It supports both packet transmission
→ Packet based transmission of text, voice and multimedia at data rate upto 2 mbps.
→ UMTS has two modes

1) UMTS FDD
(Frequency Division Duplex)
→ Two frequencies are used
→ One used for uplink, second used for downlink

2) UMTS (TDD)
(Time Division Duplex)
→ One frequency is used
→ Both uplink and downlink

Architecture of UMTS



UMTS terrestrial radio access network

RNC – Radio Network Control
ME – Mobile Equipment.
USIM – User sim
MSC – Mobile Service Switching Centre
PSIN – Public Switch Telephone Network
SGSN – Servicing GPRS support
PDM – Packet data network

Feature of UMTS

1) It uses FDD / TDD duplex method
2) It uses bandwidth of 5MHz
3) The chip rate is about 3.84 mbps

Application of UMTS

1) Video Conference
2) Mobile e-commerce.
3) Mobile games
4) Streaming / download (Video audio)
5) Email

Advantages:

Drawbacks of GSM

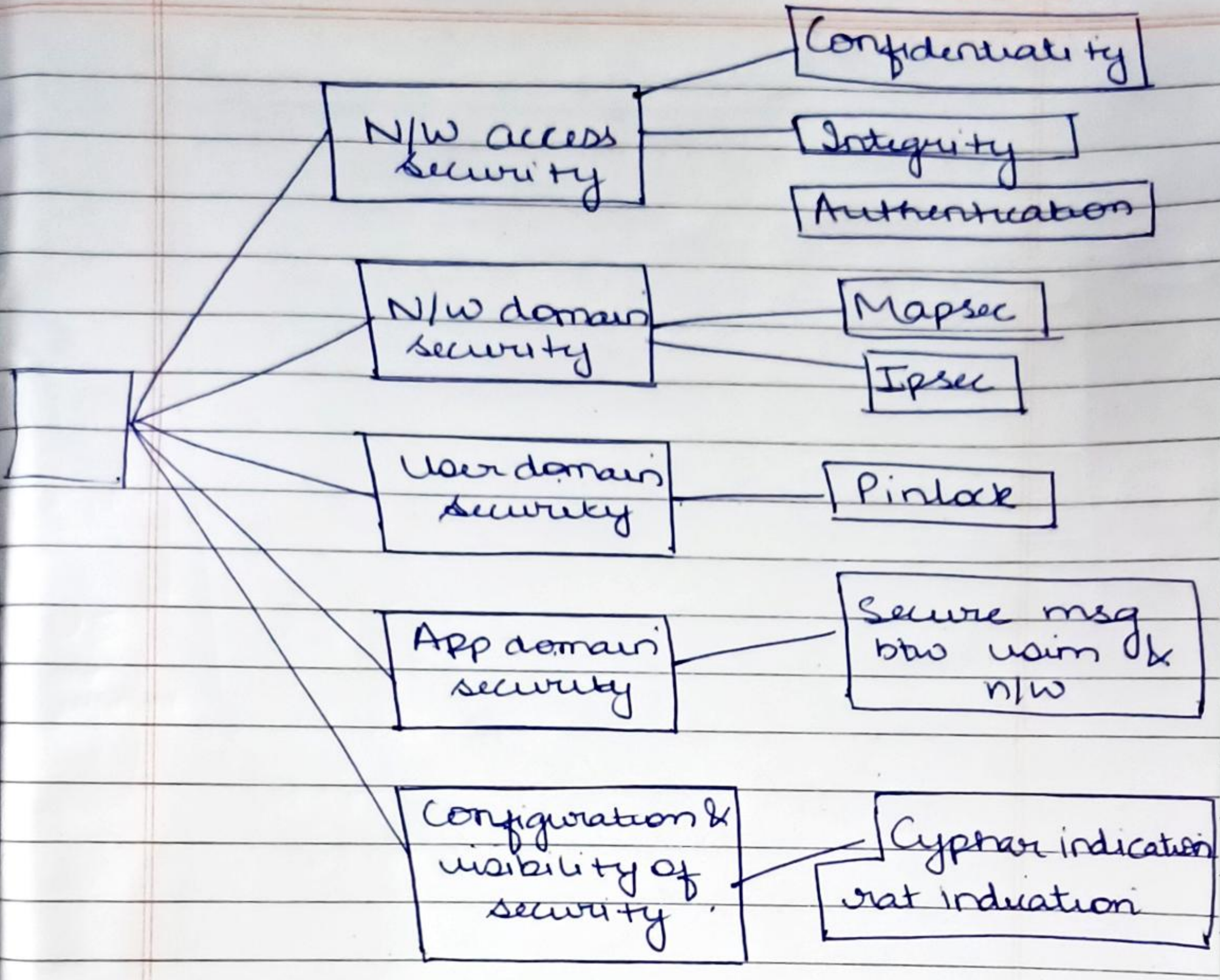
Disadvantages:

1) It is more expensive than GSM
2) UMTS has poor video experience
3) UMTS is still not a broadband

Security of UMTS (5 types)

→ UMTS security is also referred as 3G security

→ Five security group exist in 3G network.


N/W access security
Confidentiality
Integrity
Authentication
N/W domain security
Mapsec
Ipsec
User domain security
Pinlock
App domain security
Secure msg btw usim & n/w
Configuration & visibility of security
Cyphar indication
rat indication