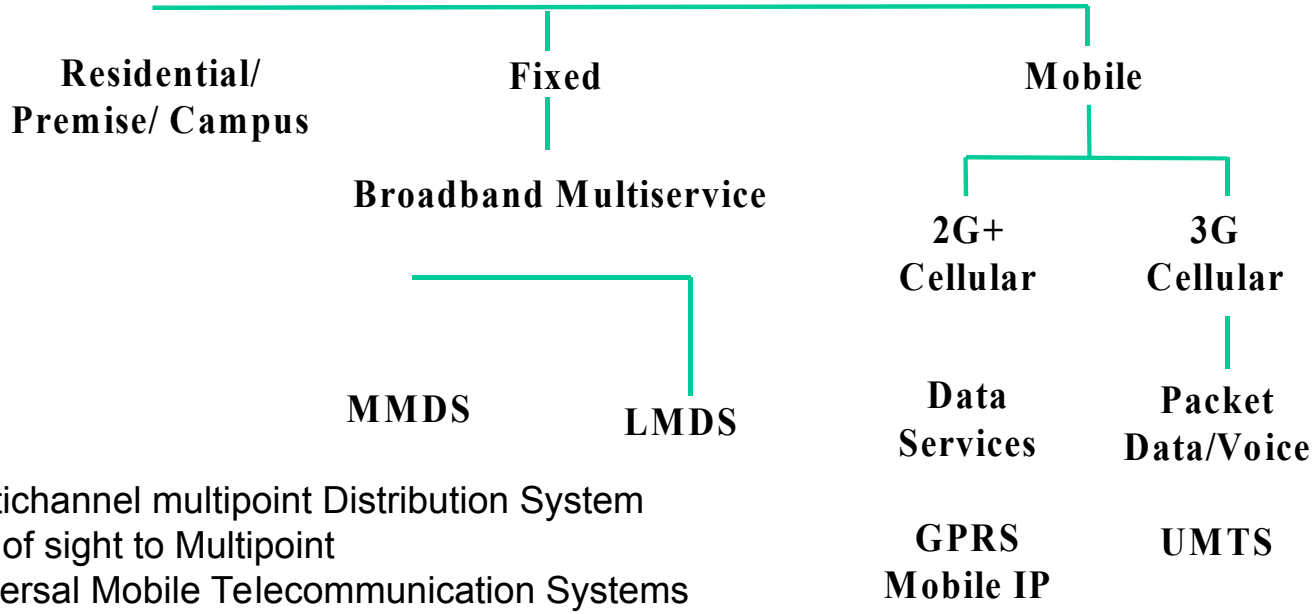
IEEE 802.11

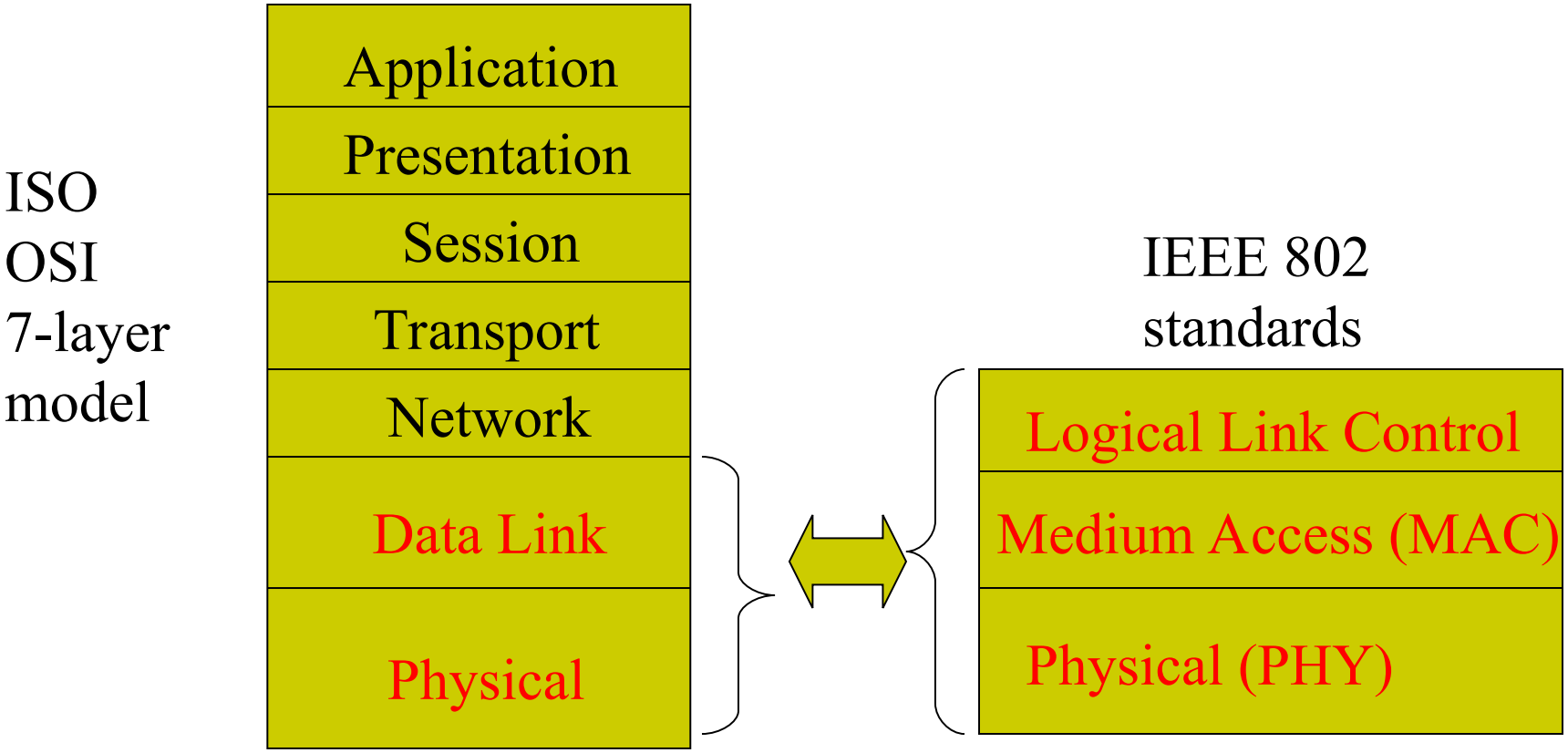
Wireless Market Segments

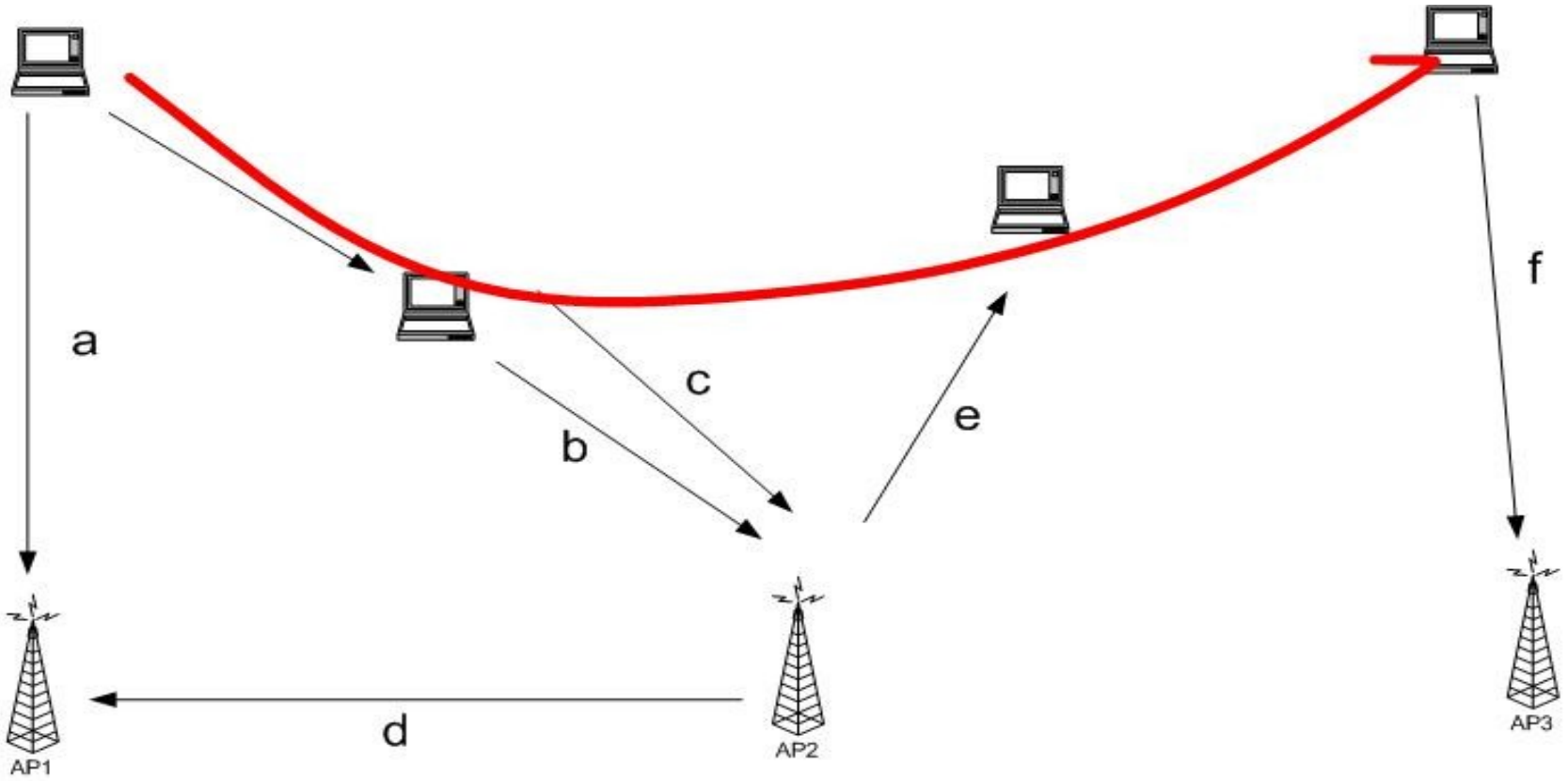


MMDS=Multichannel multipoint Distribution System
LMDS=Line of sight to Multipoint
UMTS- Universal Mobile Telecommunication Systems
GPRS-General Packet Radio Service

Standardization of Wireless Networks

- Wireless networks are standardized by IEEE.
- Under 802 LAN MAN standards committee.





(a) ---- The station finds AP1, it will authenticate and associate.

(b) ---- As the station moves, it may pre-authenticate with AP2.

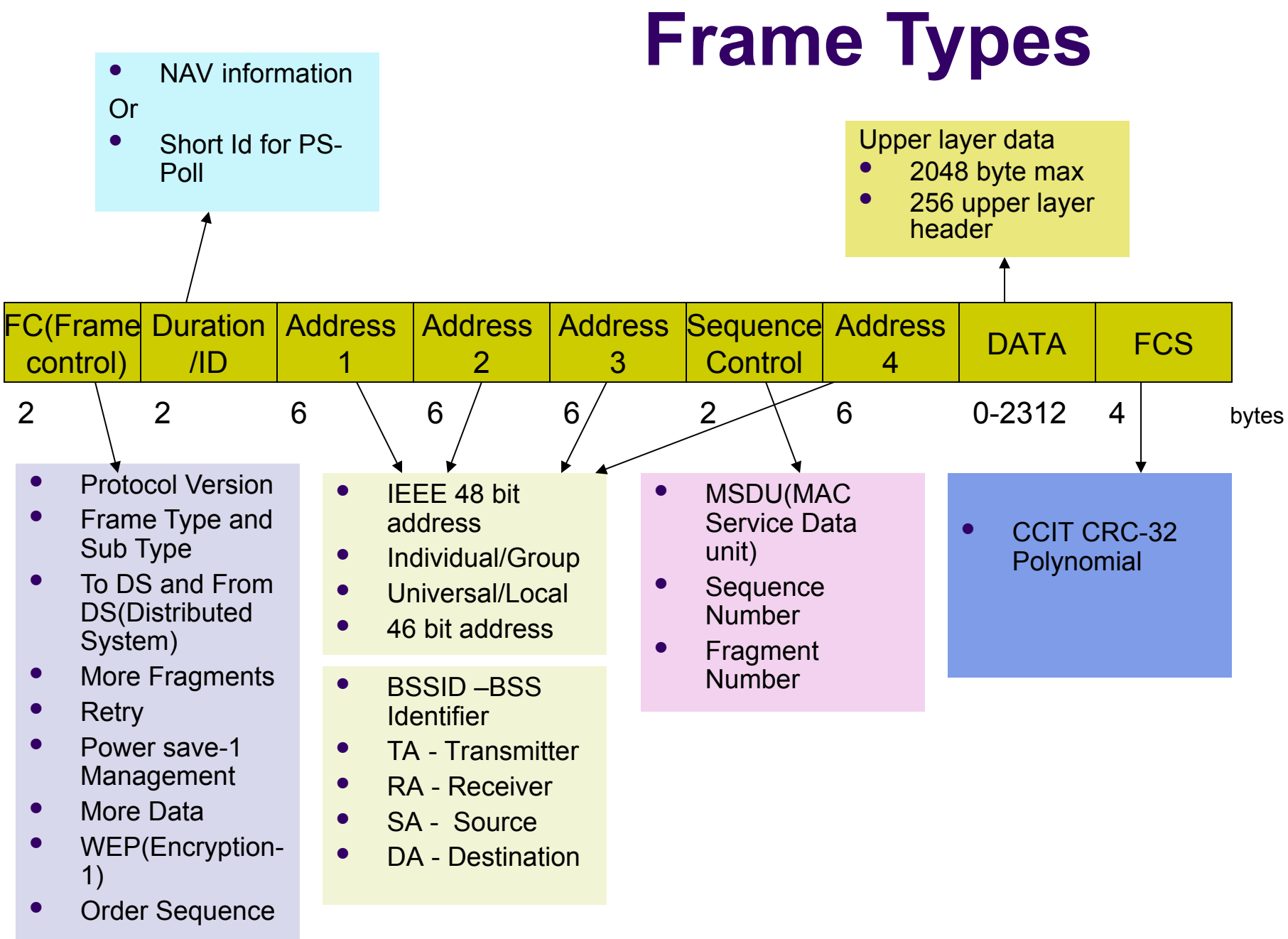
(c) ---- When the association with AP1 is no longer desirable, it may reassociate with AP2.

(d) ---- AP2 notify AP1 of the new location of the station, terminates the previous association with AP1.

(e) ---- At some point, AP2 may be taken out of service. AP2 would disassociate the associated stations.

(f) ---- The station find another access point and authenticate and associate.

Frame Types


NAV information
Or
Short Id for PS-Poll
Upper layer data
2048 byte max
256 upper layer header
FC(Frame control)
Duration /ID
Address 1
Address 2
Address 3
Sequence Control
Address 4
DATA
FCS
2
2
6
6
6
2
6
0-2312
4
bytes
Protocol Version
Frame Type and Sub Type
To DS and From DS(Distributed System)
More Fragments
Retry
Power save-1 Management
More Data
WEP(Encryption-1)
Order Sequence
IEEE 48 bit address
Individual/Group
Universal/Local
46 bit address
BSSID –BSS Identifier
TA - Transmitter
RA - Receiver
SA - Source
DA - Destination
MSDU(MAC Service Data unit)
Sequence Number
Fragment Number
CCIT CRC-32 Polynomial

To DS	From DS	Address 1	Address 2	Address 3	Address 4
0	0	Destination	Source	BSS ID	N/A
0	1	Destination	SendingAP	Source	N/A
1	0	Receiving AP	Source	Destination	N/A
1	1	Receiving AP	SendingAP	Destination	Source

AP ACCESS POINT

MAC Management

- Interference by users that have no concept of data communication. Ex: Microwave
- Interference by other WLANs
- Security of data
- Mobility
- Power Management

IEEE 802.11 Protocols

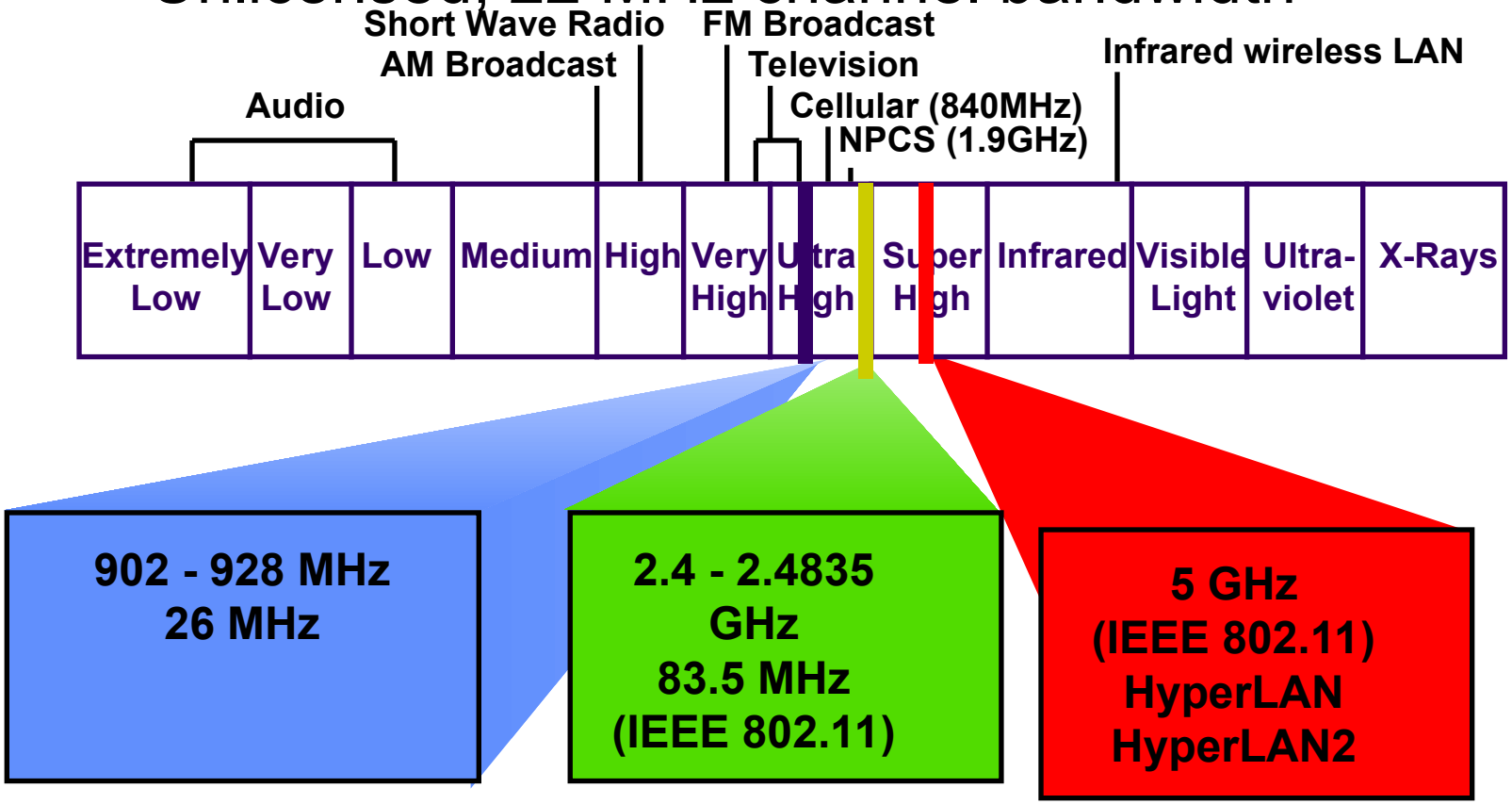
- IEEE 802.11a
  - PHY Standard : 8 channels : 54 Mbps : Products are available.
- IEEE 802.11b
  - PHY Standard : 3 channels : 11 Mbps : Products are available.
- IEEE 802.11d
  - MAC Standard : operate in variable power levels : ongoing
- IEEE 802.11e
  - MAC Standard : QoS support : Second half of 2002.
- IEEE 802.11f
  - Inter-Access Point Protocol : 2nd half 2002
- IEEE 802.11g
  - PHY Standard: 3 channels : OFDM and PBCC : 2nd half 2002
- IEEE 802.11h
  - Supplementary MAC Standard: TPC and DFS : 2nd half 2002
- IEEE 802.11i
  - Supplementary MAC Standard: Alternative WEP : 2nd half 2002

The Basics of WLANs

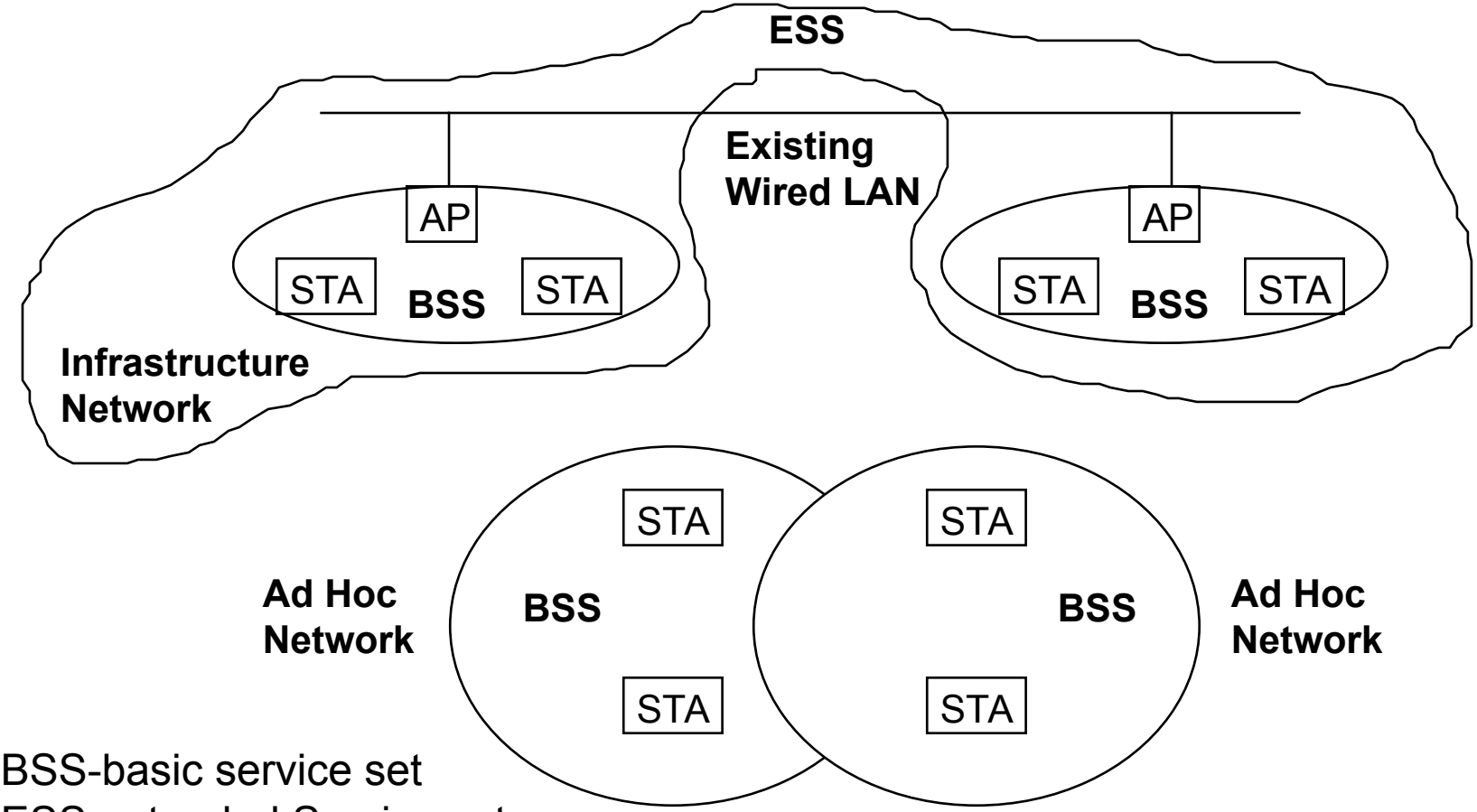
	PAN	LAN	WAN
Access speed	1-2mb	11mb	>56kb
Range	10m	100-400m	global
Standard		IEEE 802.11b	GPRS 1xRTT
Scalability	Low device specific	Medium ethernet	High regional Infrastructure
Architecture	FHSS	DSSS	cellular

Frequency Bands- ISM

- Industrial, Scientific, and Medical (ISM) bands
- Unlicensed, 22 MHz channel bandwidth



Overview, 802.11 Architecture



BSS-basic service set
ESS-extended Service set
STA-stations

Performance, Theoretical Maximum Throughput

- Throughput numbers in Mbits/sec:
  - Assumes 100ms beacon interval, RTS(Request to send , CTS(Clear to send) used, no collision(CSMA-CA- Collision Avoidance)
  - Slide courtesy of Matt Fischer, AMD

	1 Mbit/sec		2 Mbit/sec	
MSDU size (bytes)	DS	FH (400ms hop time)	DS	FH (400ms hop time)
128	0.364	0.364	0.517	0.474
512	0.694	0.679	1.163	1.088
512 (frag size = 128)	0.503	0.512	0.781	0.759
2304	0.906	0.860	1.720	1.624

MSDU-MAC service data unit