pre-industrial era, beason; 1837 Morse, telegraph; 1873 Maxwell, electromagnetic field theory; 1876. Bell, phone; 1906, Am; 1946, public mobile phone system; 1988 GSM; 1997, WLAN

2. WiFi; Mobile Magaement; Cellular System; Mobile IP; WiMAX; IOT; Wireless Network Security; Wireless Personal Area Network

(chapter 2.)

1. Wired Media: more reliable, limited data transmission, high cost
   Wireless media: unstable, more ~ , low cost.
2. authorized individuals can use, be interferenced by adjacent owner.
3. dispersion, electronic noise, multipath transfer effect, diffuse obstructions.
4. R: go to interface, go back; diffraction: meet an angle and size become large
5. scatter: deviate from a straight trajectory.
6. All..indoor, outdoor weak, quite the same.
6. Free Space: $20\log_{10}(d) + 20\log_{10}(f) - 147.55$ Two-ray: $40\log_{10}(d) - 10\log_{10}(G h_t^2 h_r^2)$; chan
7. multiple path senario cause many signals, overlapping Doppler shift: motion cause frequence
8. see 6 9. see 6. 10. Multipath fading: different paths, $\Rightarrow$ time, phase
11. Rayleigh: all average multipath fading Ricean distribution: one powerful signal
12. $f' = \left(\frac{v + v_0}{v - v_s}\right) f$ indicate v_0, v_s move towards each other.
13. $R = 10^{-4}$ THRESH + FMS - A/B $f_{ray}(r) = \frac{r}{\sigma^2}\exp\left(-\frac{r^2}{2\sigma^2}\right)$ $f_{rc}(r) = \frac{r}{\sigma^2}\exp\left(\frac{-(r^2+\alpha^2)}{2\sigma^2}\right) I_0\left(\frac{\alpha r}{\sigma}\right)$ $r \geq 0, \alpha \geq 0$
14. $AFD = e^{\rho^2} - V_{pfd}\sqrt{2\pi}$ $AFD \times LCR = 1 - e^{-\rho^2}$ $LCR = \frac{(1 - e^{-\rho^2})\rho f_{fd}\sqrt{2\pi}}{e^{\rho^2} - 1}$

Chapter 3, 4

1. Gsm(2G)/CDMA → +GPRS, EDGE → WCDMA/CDMA2000(3G)
2. system capacity is determined by reuse factor and cell size. power ↓, cell ↓ capaci
3. $q = \frac{D}{R} = \sqrt{3N}$ downlink: b s → m p, cell: small area devided to ↑capacity. location area
4. base station: send out signal, uplink: mobile phone → b s areas composed of cells
   MSC: mobile phone ↔ Base Station ↔ MSC, to another network,
5. HLR: customer ID + customer number + detail information
   VLR: HLR data when active. Architecture: MP ↔ BS ↔ BSC ↔ MSC — VLR, HLR, Auc, EIR
   copy of
6. Handoff: when MP enters a new cell, you have to connect it to a new channel,
   Location Management: foreign area → home
7. speed, quality, confidentiality ↑ network. usually queue, buffer, packet drop decision
8. CAC is to handle the influx of data traffic oversubscribe a particular link in the
9. SGSN/GGSN it is a network node supporting Gsm to use GPRS
   MSC/GMSC/HLR, get information and then judge.

10 WCDMA, CDMA2000, TD-SCDMA 11. ~~High~~ low investment and low cost, ↑ efficiency good ~~&~~ talking ~~&~~ quality., wide coverage

12. rate: 3.84 Mcps bandwidth: 5MHz operation frequency: 1940~1955 MHz(up) 2130~2145MHz (down)

13. foreign country ~~make~~ make/receive phone calls: ≠ call or data;

Chapter 5

1. Mobile access, mobile web, mobile cloud computing pervasive computing.

Chapter 6

1. update location, start a call, receive a call, continue, handoff.

2. inter-switch: one route area to another. inter-switch: inter call

3. MCHO: monitor port signal, choose condition to make a handoff request.

NCHO: ~~mobile~~ know the signal strength and arrange handoff

MAHO: same as NCHO, but evolution ed version.

4 hard handoff: ~~don~~ few resources, failure is dangerous. soft.: high quality, less likel to block, but more resources.

5. $\Longrightarrow \Longleftarrow \Delta t = \frac{2d}{c}$, use feedback signal to control

6. straight line: linear model fluid flow: random fluid level

7. $P(H_K) = 1 - E_0[E_{FK}[P(H_K|r,\theta)]]$

8. compare signal strength between the nearby station and the neighbouring station, have a threshold to choose.

9. avid pilot contamination, low frequence resource.

10. apparently, the handoff rate ↓, because more calls lead to a more frequent motion between cells

11. data in interface while data structure in serve.

12. when passing through, moble phone detects the routing area code, find difference and then update.

13. ① calculate the threshold and location ② ~~exam~~ test it in reality ③ determined it and then handoff

~~14~~ Chapter 7.

1. mobile phone's mobility FA: ··· foreign link. COA: switch to foreign link, associa program.

2. MN: location after change, HA: a router on the mobile node home link, CN: communicati object for a mob node

3. A→B, B reverse tunnel, assigned to internal route table

4. HA ⟵ Internet backbone(CN, HA) package. ⟵ device ⟵ CN, IP FA ⟶ router

5. ① mobile detects coming back to home land, then register with home agent,
② foreign land, get another address and register in home link through foreign agent.

6. we have to make more than one registation, so if not limited, message transmit becom be mess.

7. to detect whether the mobile have roam out of the field.

8. foreign agent is to handle the condition when a mobile go to foreign area; agent

9. get routing service from foreign agent. notify the transfer of the adress to the home

10. ~~in~~ bad communicate condition: a conflict

11. IP in IP: entire IP ~~to~~ packet is directly encapsulated to be a new IP packet.

General routing: connect different layer protocols.

12. foreign area you have to reverse tunnel, or you have home adress and data discarded

13. HA → FA → CN (⇔MN)

Chapter 8

1. Distribution Coordination Function. Point Coordination Function. DIFS: time threshold. SIFS: after initializing, play as a trigger signal for PC PIFS: CFPnormal time, trigger.

2. before transfer, RTS/CTS provide license.

3. EDCA: enhanced distributed coordinated access. HCF: hybrid coordination access.

4. ad-hoc don't have a trasmission center

5. host, racter and radio

6. physical layer and digital link layer

7. LLC: identify network, MAC: address, channel control, PLCP: wireless medium → MAC PMD: trasmit, receive physical layer

8. Radio: ~~furth~~ far distance, interference, Infrared: direct path, need special receiver.

9. Not found 10. depends on AIFS, AIFS lower, then handle quicker. point controls.

11. DCF: the distance where you need medium, PCF: point coordinator in access

12. not found 13. unicast: ~~one to one~~ P2P, multicast 1→many.

14. NAV: tell the time the nodes use the channel

15. No. Ad-Hoc: SWAN, IMORA Infrastructure: PCF, HCF could be used in other situation

16. better send and receive 17. station have copied TSF 18. for more ~~securi~~ secure, beacon

19. Yes. that's a hard job. difficult. 20. control the cost; also, power too strong may cause damage to receiver because of multi-hop.

21. use PS mode, 22. DTIM decide how long station sleep. ATIM: monitor active station

23. hard handoff 24. due to capacity, you can't send too much data at one time.

25. indicate the work mode and station. 26. ~~it's hard to~~ ascertain the location you need more adress.

27. improved model, OFDM 28. to secure the data transmission.

29. RC4 confidence, using CRC for integrity 30. 31. decrypted text matches the original challenge text. 32. WEP: keys algorithm, MAC: sacrifice convenience captive portals: bond, risk ~~of~~ have 33. active: client request passive: client listens.

34. EDCA 35: S = nSindv,

Chapter 9

1. long distance, high speed. 2. physical TCL and PMD, ~~MAC~~ protocol is used to interact between MAC and PHY 3. use many sub channel, IDFT, DFT.

Chapter 10

1. Infrastructure: depend on ~~the~~ previous one, Ad-hoc: temporary system both edge side.

2. adjacent frequence radiation #3. ~~can~~ can be replaced, can't contain points from

4. hidden ~~e~~terminal: send to same receiver and cause conflict.
exposed : delay sending and no conflict.

Chapter 11

1. ① request a frame ② AP return a frame ③ management frame exchange -

2. WEP uses shared key. WAPI = security mechanism IEEE 802.11, ~~EAP~~ TKIP, CCMP.
special

Chapter 12

1. distance, consumption 2. active, sniff, hold, park.

3. reader: 2-way, tags, electronic tag: communica with reader, carry data.

4. chip, antenna, packet 5. monitor data, quality, sales and so on.

Chapter 13

1. sensor: collect, indentify basestation: transmit. monitor: observe, analyse
aggregation: process ability strong 2. easy. 3. smart dust, a line in the sand,
remote helith monitor 4. for disease, 5. large size, dynamic, reliable
6. use RF coverage 7. solar, nuclear.

Chapter 14

1. frequence, identify: sense 2. good security, process gain, against multi-path
3. low energy 4. ~~inter~~ internal state adapt to situation change.
5. human body: medical insurance, wireless access.

Chapter 15

1. SDN emerging one, decoupled from forward, directly programmable.

2. ① control channel establish, ② collect information ③ path calculation, ④ repeat

3. traffic visualization, 4 no limit of hardware, low cost.

Chapter 16, 17, 18

1. camera, utrasonic modual, wireless network. 2. driveless car, indoor position
material handling.

Chapter 19

1. more channels, ~~as~~ ~~more~~ multidiameter effect
mimo network.

2.  3. see 2, reuse the ~~atten~~ antennas 4. distributed, multi-user network

Chapter 21, 22

1. value varies. private may be ~~th~~ stolen, so, ~~th~~ there's risk

2. ~~find~~ Finder graphics, delimiter, positioning ~~s~~, correcting.