

CHAPTER 1

1. From the 1930s, communication has been used as telecommunication. Marconi found wireless in 1895. 1978 SCORE flied in the sky and opened the new times of wireless communication. GSM was born in 1988. First WLAN was published in 1997.

- 2. (1) cellular system (2) mobile management (3) Wi-Fi (4) WiMax (6) Self-organizing network (8) Wireless Network Safety (8) mobile IP (8)

CHAPTER 2

1. Wired network is used to carry different forms of electronic signals from one end to another. Wireless network does not use wires for data or voice communication, it used radio frequency waves as mentioned above

2. Unlicensed devices on the smart grid span part of the bands set aside by the FCC for industrial, scientific or medical (ISM) applications. Licensed spectrum devices operate within the portion of the radio spectrum designated by the FCC to be reserved by the organization that have been granted licenses.

3. space, atmosphere, polarization
4. (1) Wave in the media interface when the phenomenon occurs back to spread (2) when the wave encounters an obstacle, it deviates from the origin (line) through the local points due to the role of potential, wave must change its linear trajectory.

5. Indoor to send information to each other and other and outdoor to communicate with each others by wave.

6. Empirically, the relation between the average received power and distance is determined by the expression where γ is called the path loss exponent. The wireless radio channel puts fundamental limitations to the performance of wireless communications systems.

7. $P_r = P_t + 10 \log(\gamma) + X$

8. The shadow effect caused by the obstruction, the received signal strength decreased, but the field strength with the geographical changes slowly change

9. $f_d = f_c \sin \theta = \frac{v}{c} f_c \sin \theta$

10. free space: $\gamma = 2$, cellular urban 2.6-3.5 the shadow of urban cellular 3.5.

11. Large-scale fading, due to path loss of signal as a function of distance and shadowing by large objects such as buildings and hills. Small scale fading, due to the constructive and destructive interference of the multiple signal paths between the transmitter and the receiver.
12. Ricean distribution 13. $f_d = \frac{v}{c} f_c \sin \theta$

14. $f_{Dop} = \frac{v}{c} \exp(\frac{v^2}{2c^2}) \approx 0$

$f_{Dop}(v) = \frac{v}{c} \exp(\frac{-v^2}{2c^2}) \approx 0$

15. For Rayleigh fading, $L_{CR} = \sqrt{1 + \rho^2} P^2$

$P = \frac{P_{avg} \text{RMS}}{R_{rms}}$, $RFD = \frac{e^{P-1}}{2P^2}$

CHAPTER 3 & CHAPTER 4

1. 2G; TDMA 3G; CDMA
2. The technique of substituting a single high power transmitter by several low power transmitters to support many users is the backbone of the cellular concept.

3. The same frequency bands are used by two or more base stations that are located in relative proximity to each other.
4. The entire network coverage areas is divided into cells based on the principle of frequency reuse.

5. The HLR in telecom is the reference database for subscriber parameters. The VLR contains a copy of most of data stored at the HLR.

6. Handoff management.

Ensuring that a mobile user remains connected while moving from one location to another. Packets or connections are routed to the new location.

Location Management
Search, Update, Location info, Reauthentication

7. faster and more efficient

8. GSM or CDMA

9. The inter-SSN routing update is the most complicated routing update. The MS changes from one SSN area to another, and it must establish a new connection to a new SSN

10. Three standard principle: CDMA 2000, WCDMA, TD-SCDMA.

11. CDMA Technology.

12. EDGE combined by the GPRS 2.5G technology is called EGPRS, and allows peak data rates in the order of 2.3Mbps just as the original UMTS WCDMA version. And thus formally fulfills the IMT2000 requirements on 3G systems

13. A channel-access scheme is based on a multiplexing method, that allows several data streams or signals to share the same communication channel or physical medium by physical layer.

14. 3G cellular networks towards a uniform architecture for all-IP wireless networks. Second this paper proposes a flexible hierarchical resource management mechanism for the proposed all-IP architecture which aims at providing connection-level

quality of service for mobile users.

CHAPTER 5

1. Mobile compute Cloud, Mobile Web, Mobile web Initiative.

CHAPTER 6

1. Monitor the signal strength changes. Once it exceed the threshold, switch begins.
2. Mobile station begin to recognize the new base station.
3. After several interaction, the new link was established.

2. if during ongoing call mobile unit moves from one cellular system to a different cellular system which is controlled by different MCO, a handoff procedure which is used to avoid dropping of call is referred as inter handoff.

3. MCHO: Mobile station monitor the signal strength and choose the best choice.

NCHO: Network monitor the signal strength and launch the switch.

MCHO: Mobile station monitor the signal strength and network made the switch choice.

Advantage: soft handoff: the connection to the source cell is broken only when a reliable connection to the target cell has been established and therefore ~~broken~~ the chances that the call will be terminated abnormally due to failed handovers are lower.

hardoff: at any moment in the time one call uses only one channel.

Disadvantage. soft switch: require more complex hardware in the phone hard switch: ping-ponging effect may occur.

5. Monitor the signal strength change between unit and mobile unit and once the change exceed the threshold execute handoff.

6. fluid flow model is mathematical model used to describe the fluid level in a reservoir subject to randomly determined periods of filling and emptying.

straight-line model: user's behavior is linear.

7. omitted

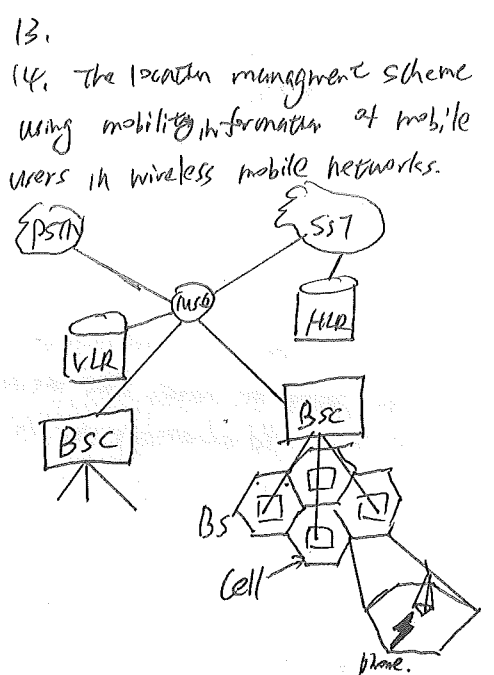
8. intra-switched: when a mobile station becomes weak in a given cell and MTC

can't find other cell within its system to switch it can transfer the call then it uses Intra system handoff.
 Inter-switch: When a mobile signal becomes weak in a given cell and MTSO can't find other cell within its system to which it can transfer the call then it uses Inter-system handoff.

9. omitted.
 10. The smaller the cell is, the higher hand off rate is.

11. LLC & MAC

12. When the mobile unit boots or shuts down, cellular network will ask it to report its location and it is also asked to report its location in a certain level interval.
 13.
 14. The location management scheme using mobility information of mobile users in wireless mobile networks.



CHAPTER 7

1. once the user's location changes a new address is required, but most of the network idea is transmitted over TCP. Changing the IP address will create a new connection accordingly, resulting in application interruption and loss of data.

2. MN: the location is often changed. nodes are often switched from one link to another.

HA: A node on the mobile nodes home link, which is used to keep the location for forwarding the packet

sent to the mobile nodes goes out. it is responsible for forwarding the packet sent to mobile node to mobile node.

FA: A router on the local link where the mobile node is located.

COA: An IP Address associated with the node and other nodes communicate. do not directly use the care-of address to do the destination or source address.

CN: A communication object for a mobile node.

3. MH sends to FA
 FA tunnels packets to HA by encapsulation. HA forwards the packet to the receiver (standard care).

4. Mobile node \leftrightarrow Foreign Agent $\xrightarrow{\text{Reverse}}$ Home agent \rightarrow IP network \leftrightarrow Correspondent node.

5. The mobile node sends a registration request to the prospective foreign agent to begin the registration process.

The foreign agent processes the registration request and then relays it to be the home agent.

The home agent sends a registration reply to the foreign agent through to grant or deny the request.

The foreign agent processes the registration reply and then relays it to the mobile node to inform it of the disposition of its request.

6. A limited lifetime allows a mobile node registers with its home agent using a registration request message so that its home agent can create or modify a mobility binding for that mobile node.

7. 0 1 2 3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 ---
 TYPE length Sequence Number.
 Lifetime. (R|B|H|F|MG|V|T|)

zero or more Care of Address. The only change to the Mobility Agent Advertisement Extension (15) is the additional 'T' bit.

T Agent offers reverse tunneling service. A foreign agent that sets the 'T' bit must support the two

delivery styles currently supported. Direct and Encapsulating Delivery Style.
 0 1 2 3
 0 1 2 3 4 5 6 7 8 9 ---
 Type (S|D|M|G|V|T)-1 Lifetime.
 Home Address
 Home Agent
 Care of Address
 Identification.

The only change to the Registration Request packet is the additional 'T' bit. if the 'T' bit is set, the mobile node ask its home agent to accept a reverse tunnel from the care of address. Mobile nodes using a foreign agent care-of address as the foreign agent to reverse-tunnel its packets.

9. If a foreign or home agent that doesn't support reverse tunnels receives a request with the 'T' bit set, the Registration Request fails.

10. IP in IP encapsulation: defined by RFC 2003. IP in IP technology, the entire IP packet is directly encapsulated as a new IP packet payload.

Minimum encapsulation: defined by RFC 2004. In the smallest encapsulation, the New IP header is inserted between the original IP header and the original IP payload.

General routing encapsulation: defined by RFC 1701. which is a mobile IP has been developed before the agreement.

11. Reverse tunnel is the tunnel between the MN and its HA, it begins from the care-of address of the MN and ends in that of HA.

- 12. really can't find it.
- 13. can't find it.

CHAPTER 8.

1. DCF is the fundamental MAC tech of IEEE 802.11 base WLAN standard. DCF employs a CSMA/CA with binary exponential back off algorithm. PCF is a Media Access Control technique used in IEEE 802.11 based WLANs. It resides in a point coordinator also known as Access point, to coordinate the communication within the network. PIFS: is a acronym for PCF Interframe Spacing. It is the time delay for which sender wait after completing it's back off, before sending RTS package.

SIFS stands for shortest Interframe spacing. It's considered as shortest among above mention networking Tech.

PCF Interframe Space (PIFS) enabled access point wait for PIFS duration rather than PIFS to occupy the wireless medium.

2. The RTS/CTS access mechanism is mainly used to minimize the amount of time spent when a collision occurs since collision occurs in these short messages.

3. IEEE 802.11e is an approved amendment to the IEEE 802.11s that defines a set of quality of (QoS) enhancements for WLAN applications through modifications to the MAC layer.

EPCA: with it, high-priority traffic has a higher chance of being sent than low-priority traffic.

HCF: With HCF, there are two methods of channel access, similar to those defined in the legacy 802.11 MAC HCF Controlled Channel Access, and EPCA.

4. Adhoc mode.

An Adhoc network allows each device to communicate directly with each other. There is no central.

AP controlling device communications may be higher to suit the high mobility. no base stations; nodes can only transmit to other nodes within 1mk coverage. nodes organize themselves into a network.

Infrastructure mode. base station connects mobiles into wired networks. mobile changes base station providing connection into wired networks.

6. Physical layer.

7. LLC: logical link control.

MAC: medium access control.

PLCP: physical layer convergence control

PMD: Physical Media dependent.

8. Compared to the infrared wireless networks, the radio wireless networks have a longer bandwidth.

9. PLCP, PMD are in 802.11 standards so far.

10. The 802.11 defines the signal character and modulation ways.

11. Code-division frequency-division and time division transfer data bits to receiver by division.

13. Unicast of any to be transmitted over WLAN are at much higher rates than multicasts.

14. NAV is a logical abstraction which limits the need for physical carrier-sensing to save power.

15. QoS is supported in 802.11 in both nodes by measuring quality of service like bit rate.

16. 802.11 needs synchronization to fulfill time-synchronization among users.

17. Timing synchronizing frames are transmitted periodically to announce the presence of a wireless LAN or PLCP.

18. Clock Synchronization is essential for power management protocol in a multi-hop MANET.

19. The power cannot be inefficient to the mobile devices, so we need power Management.

20. The transmitter and receiver will be awake and sleep switch every small time period in ad-hoc mode. the timing

22. ATM is a management frame with no frame body.

23. Handover operations between APs in IEEE 802.11 is entirely driven by STA.

24. A message's length may not suit a package, so we fragment it to use standard to transmit. The MAC header contain the message's source and destination.

26. A sector can access multiple users. each user can take multiple user terminals.

27. The IEEE 802.11a S is a follow-on standard for the IEEE 802.11b standard which adopts OFDM while b adopts DSSS.

28. Wireless LAN and the attack the limited security as limited local area networks.

29. Making the difficulty of attacking WLAN and attack the limited local area network is very difficult.

30. This depends on the specific modification.

31. standard 64-bit WEP uses a 40 bit key, which is concatenated with a 24-bit IV to form the PCK key.

32. WEP provide data confidentiality comparable to that of a traditional wired network.

33. During an active scan, the client radio listens on each channel for beacons sent periodically by an AP.

34. 802.11 for data & videos 802.11ac for videos and 802.11ad for uncompressed video.

35. This depends on specific combination.

CHAPTER 9.

1. WiMAX has QoS guaranteed, high transmission speed, variety of business adopted advanced Tech, and realized mobility of broadband service.

2. The transport convergence sublayer is responsible for transmitting the convergence sublayer data unit to the received MAC layer data unit.

3. OFDM divides the channel into a number of orthogonal subchannels, modulates the transmission to each subchannel.

CHAPTER 10

1. This is the traditional ad-hoc mode.

- Another is the ad hoc network mode.
- The following two conditions are met the node v_i can be transmitted no node d is R_1 don't perform data transmission.
 - Neighboring users send messages at the same time will produce inter-users interference. so that the entire network performance deterioration.
 - For optimal throughput, the transmission rate of each node must be strictly controlled and carefully scheduled.
 - The existence of "hidden terminal" and "exposed terminal" will cause the disorderly contention and waste of ad hoc network time slot resources.

- integrity and security of data T multi-target recognition tech.
- Campus card, RFID only electronic license plate, Toll station ETC System
- CHAPTER 13.
- ~~to~~ ~~too~~ ~~long~~ ~~to~~
- The power module offers the reliable power needed for the system.
 - WSNs are key for improving the energy efficiency performances of existing buildings.
 - finally, broadcast their status to the surroundings and receives status from other nodes to detect each other.
 - Secondly, the sensor network nodes are organized into a connected network according to a certain topology.
 - The communication distance of the nodes in the network is generally short.

- CHAPTER 16, 17, 18.
- Sensor, Electrical machinery, Video camera, GPS Navigator, microphone, sonar, WIFI
 - Self driving cars, environmental detection, medical care, Army field, housing for self driving cars, it uses auto-control as well as AZ and CV.
- CHAPTER 19.
- M2M1 refers to multiple input multiple output while S2S0 means single / output / input.
 - input \rightarrow encoding \rightarrow modulating \rightarrow special encoding \rightarrow up sampling output \leftarrow decoding \leftarrow demodulation \leftarrow special decoding \leftarrow detect down sampling synchronization
 - Space-diversity is to transfer the same information on parallel rates, the receiver is used to eliminated the influence caused by channel to increase the credibility. Space-multiplexing is to transfer different information. the receiver is to recover the signal.

- CHAPTER 11.
- request the workstation to send the authentication frame. (2) returns a validation frame (3) get the question text and encrypt it. and then send an authentication management frame. (4) use the shared key to decrypt the challenge text.
 - request the workstation to send authentication frame.
 - WEP: Authentication status is unclear and, resulting in potentially improved AP. WAP2: add a certification infrastructure WAP2 used to achieve the users identity authentication, IEEE 802.11i protocol into the WLAN security mechanism to enhance the WLAN identity authentication and access control capability; increased the key management mechanism.

- Ambient energy harvesting from external sources are used to power small autonomous sensors such as MEMS Tech.
- CHAPTER 14.
- Ultra-wideband wireless communication (soft defined radio) BL Low Energy BAN.
 - High transfer rate, good security, low cost, Accurately positioning.
 - Bluetooth Low Energy is based on bluetooth, at the same time simplify the bluetooth.
 - A DR monitors its own performance continuously, in addition to "reading the radio's outputs".
 - BAN devices embed inside the body. short distance. high speed. Time change. Personalize.

- CHAPTER 21-22.
- security of value, security of account / transaction / privacy
 - conversion information (2) pattern information (3) information content & check bit (4) identifier (5) self-salience distinct.

- CHAPTER 12
- the biggest feature is low power consumption, low cost, to enhance equipment compatibility, reduce the delay. effective coverage to expand
 - standby & connection.
 - RFID TAG, RFID Tag reader application software system.
 - then energy supply of the table tag to the reader data transmission

- CHAPTER 15.
- a programmable network with the use of centralized management through normalization.
 - Openlight, P2P, OLP
 - highly-response and huge amount of data transferring service, more safe.

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