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Overview of Wireless Network 1.Marconi found wireless in 1895, SCORE flied in the sky and opened the new times of wireless communication in 1958. GSM was born in 1988. First WLAN was published in 1997.2. cellular system\mobile management\mobile IP\Wi-Fi\WiMAX\...

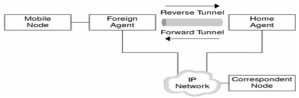
Radio Propagation 1. Wired media:carry different forms of electrical signals from one end to the other. Wireless media does not use wires2. Licensed :operate within the portion of the radio spectrum designated by the FCC. Unlicensed :set aside by the FCC for industrial, scientific or medical (ISM) applications. 3.space/atmosphere/ ionization4.(1)wave in the media interface when the phenomenon occurs back to spread(2) it deviates from the original line when the wave encounters an obstacle (3) Through the local potential, due to the role of potential, wave must change its linear trajectory.5.Indoor to send information to each other and outdoor to communicate with each other by wave.6.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.$L_p = L_0 + 10a \lg D + X$ 8.Effect caused by the obstruction of the obstruction, the received signal strength decreased, but the field strength with the geographical changes slowly change.9. $f_{d,n} = f_d = f_m \cdot \cos\theta = \frac{v}{c} f_c \cos\theta$ 10.diffirent conditions have different rate loss index.11. Large-scale fading, due to path loss of signal .Small-scale fading, due to the constructive and destructive interference. 12.Ricean distributions.13. $f_d = \frac{1}{2\pi}\frac{\Delta\varphi}{\Delta t} = \frac{v}{\lambda}\cos\theta$14. $I_0(x) = \frac{1}{\gamma\pi}\int_0^{2\pi}\exp(x\cos\theta)\mathrm{d}$15.$p_Z(z) = \frac{2m^m z^{2m-1}}{\Gamma(m)P_r^m}\exp\left[\frac{-mz^2}{P_r}\right]$

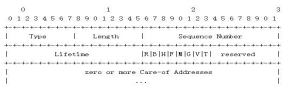
Cellular System 1. TDMA in 2G. CDMA in 3G.2. The technique of substituting a single high power transmitter by several low power transmitters to support many users is the backbone of the cellular concept.3. The same frequency band is used by two or more base stations that are located in relative proximity to each other.4. the entire network coverage area 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 the data stored at the HLR. 6.uses,servers,hosts7.faster and more efficient8.GSM to CDMA9. The inter-SGSN routing update is the most complicated routing update. The MS changes from one SGSN area to another, and it must establish a new connection to a new SGSN. 10. Three standard principle: CDMA2000, WCDMA, TD-SCDMA11.CDMA technology12. EDGE combined with the GPRS 2.5G technology is called EGPRS, and allows peak data rates in the order of 200 kbit/s, just as the original UMTS WCDMA versions, 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. In this context. multiplexing is provided by the physical layer14. 3G cellular networks towards a uniform architecture for all-IP wireless networks.

Future Technologies 1.Mobile Compute Cloud\Mobile Website\Mobile Web Initiative

Mobility Management 1.(1)Monitor the signal strength changes.(2)Mobile station begin to recognize the new base station.(3)After several interaction, the new link was established.2.When ongoing call mobile unit moves from one cellular system to a different cellular system which is controlled by different MTSO, a hand-off procedure which is used to avoid dropping of call is referred as inter hand-off.The hand-off procedure in which the mobile unit adjacent cellular system which is controlled by same MTSO is referred as hand-off.3.MCHO: Mobile station monitor the signal strength and choose the best choice.MCHO: Network monitor the signal strength and launch the switch.MAHO: Mobile station monitor the signal strength and network make the switch choice.4.advantage: soft: the connection to the source cell is broken only when a reliable connection to the target cell has been establishe.hard:at any moment in time one call uses only one channel.disadvantage: soft: require more complex hardware in the

phone ;hard : ping-ponging effect may occur. 5.Monitor the signal strength change between base unit and mobile unit and once the change exceed the threshold, execute hand-off.6.Straight-line model: user's behavior is linear.fluid flow model:a mathematical model used to describe the fluid level in a reservoir subject to randomly determined periods of filling and emptying.6.the rate is related to the mobile nodes.7.intra: when a mobile signal becomes weak in a given cell and MTSO finds other cell within its system to which it can transfer the call then it uses Intra system handoff.Inter :when a mobile signal becomes weak in a given cell and MTSO can not find other cell within its system to which it can transfer the call then it uses Inter system handoff.8.they are related to the moving nodes and mobile nodes.9.the handoff will get higher if and onif the cell get small.10.mobile network and wireless network.11.When 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 interval.Service delivery: Cellular network search for the available access interface for called user. If succeed, caller will send a feedback to end this service delivery.13.ad:they are efficient.dis:can't change.

14.  4. 

7. 

8.  .

Mobile IP 1.When the location of the user change, there must be a new address.But more network datas are trasmitted according to TCP.Changing IP will get a new connection builted,and also causing the lose of data.2.MN:the location always change.HA:the servers of moving nodes are always for keep the location of moving nodes.FA:the servers are used to transmit the information of moving.COA:not using transmit location as the destination.CN:a object of moving nodes.3.MH:sends to FA .FA: tunnels packets to HA by encapsulation .HA: forwards the packet to the receiver.4.awsare is in the end of last chap.5.mobile node sends a registration request to the prospective foreign agent to begin the registration process.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&8.aswars are in the end of last chap.9.If a foreign or home agent that does not support reverse tunnels receives a request with the 'T' bit set, the Registration Request fails.10.IP in IP:the data bag of IP will be baged as the payload of a new IP,the outside part of IPhead is the whole information of IP.Mixmum:the new IPhead is insert in the original IP head and the payload of original IPhead,it can decrease the quatity of extra bytes.unite server:be transport before the IP moving.11.when the reverse change,they will work according to the changing.12.In other ways,the moving information can not be get easily.12.the node between one serves and the switch.

IEEE 802.11 WLAN 1.DCF:the fundamental MAC technique of the IEEE 802.11 based WLAN standard.PCF:a Media Access Control (MAC) technique used in IEEE 802.11 based WLANs.DIFS:acronym for DCF Interframe spacing. It is the time delay for which sender wait after completing it's backoff, before sending RTS package. SIFS:stands for shortest Interframe spacing.PIFS:one of the interframe space used in IEEE 802.11 based Wireless LANs.2.The RTS/CTS access mechanism is mainly used to minimize the amount of time spent when a collision occures.Before the transmission of a data packet,the sore sends a short control frame(RTS).3.IEEE 802.11e:an approved amendment to the IEEE 802.11 standard.EDCA:With EDCA, high-priority traffic has a higher chance of being sent than low-priority traffic.HCF:Within the HCF, there are two methods of channel access, similar to those defined in the legacy 802.11 MAC: HCF Controlled Channel Access (HCCA) and Enhanced Distributed Channel Access (EDCA).4.Ad-hos:allows each device to communicate directly with each other. Infrastructure mode network:requires the

use of an Access Point. 5.Base station:connets mobiles into wired network. Handoff:mobile changes base station providing connetion into wired network.nodes:route among themselves.6.CSMA/CA,addressing,frame validation,error detection,security mechanisms,PHY layer.7.LLC:the upper sublayer of the data link layer (layer 2) of the seven-layer OSI model.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. The802.11 defines the signal character and modulation ways. 11.Code-division, frequency-division and time-division transfer data bits to receiver by division.12.the time drag is difficult to draw.13.Unicast of any to be transmitted over WIFI 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 modes by measuring quality of service like bit rate. 16.802.11 needs synchronization to fulfill timing-synchronization among users. 17. Timing synchronizing. 18.Frames are transmitted periodically to announce the presence of a wireless LAN not PLCP. 19. Clock synchronization is essential for power management protocol in a multi-hop MANET. 20.The power cannot be inefficient to the mobile devices, so we need power Management. 21.The transmitter and receiver will be awake and asleep switch every small time period: in ad-hoc mode, the frequency may be higher to suit the high mobility. 22.ATIM is a management frame with no frame body. When a SEA receives ATIM, the formally dozing station must begin the process of retrieving buffered frame from the stations that transmit the ATIM. DTIM beacon is identical to the ordinary beacon. 23.Handover operations between Aps in IEEE820.11 is entirely driven by STA. 24.A message's length may not suit a package, so we fragment it to use standard to transmit. 25.The MAC header contain the message's source and destination.

Wimax: 1.long distance/high rate/variable funcations.2.divide the sublevel into multiple units,do the in-out prolots and the control methods.Support the coordination interaction between the MAC layer and the physical layer channel management information.3.OFDM will channel into several orthogonal sub channels, high-speed data signal into parallel low-speed data streams, modulation to transmit in each sub channel. Orthogonal signal can be separated by the relevant technology at the receiver.

Ad Hoc Networks: 1.traditional AP mode, open after only one center, the other node change data through the center point for. ad hoc mode, each point are equal, any point can communicate with other nodes, without central point.2.The definition of the number of nodes for N。Rt indicates that the node can transmit distance, Rl represents interference distance,following two conditions:1)IJ = Rt2) meet any node node K DKJ = Rl are not for data transmission3.requires all users to share a channel. 4. Uppper:The center nodes is related to the next node.lower:need to find the jump number beween two nodes.5.It will cause the contention and waste of the resources in the ad hoc network, increase the probability of data collision, and seriously affect the network throughput, .

Security: 1.(1)call station to send authentication frame.(2) give back the checking frame.(3)if right,sent information frames.(4)decode the sended frames.2.Authentication of devices connected to a local area network using physical layer characteristics. If the authentication is successful, the device is allowed to access the local area network resource.3.WEP:authentication identity is unidirectional.WAPI:add an authentication infrastructure WAI for user authentication.IEEE802.11i:put the protocol into WLAN security mechanism.

Bluetooth and RFID: 1.low power loss.low cost and two protocols.high compatibility among devices.decrease the delay.large operation location square.2.Page,Page Scan,Inquiry,Inquiry Scan3.RFID tag,RFID tag reader,application software system.4.providing of power,data transmition beween tag and read,security of data transmition.multiple destinations' identity.5.student card.ETC.intelligent identification for car ID.

Wireless Sensor Networks: 1.The WSN is built of "nodes" – from a few to several hundreds or even thousands, where each node is connected to one (or sometimes several) sensors. The nodes organized in different topologies build the sensor network. The sensor network get the data from detection area and do the Preliminary processing of data.2.The power module offers the reliable power. The sensor is the bond of a WSN node. The microcontroller receives the data from the sensor and processes the data accordingly. The Wireless Transceiver Wthen transfers the data3. (1)WSN application in the smart grid which is a online monitoring system for transmission lines(2)WSN application in smart homes,WSNs are key for improving the energy efficient performances of existing buildings4.the sensor network nodes broadcast their status to the surroundings. the sensor network nodes are organized into a connected network according to a certain topology.suitable paths are computed on the constructed network for transmitting the sensing data.5.The communication distance of the nodes in the network is generally short. The node can communicate with nodes outside the coverage area, you need to route through the intermediate node.6.The transmission rate, delivery reliability and network lifetime are three fundamental but onflicting design objectives in energy-constrained wireless sensor networks.7. Ambient energy harvesting from external sources are used to power small autonomous sensors such as those based on MEMS technology. It's very suitable for WSN.

Internet of things: 1. Ultra-wideband wireless communication,Software Defined Radio,Radio Frequency Identification2. Good security,High processing gain, Multi-path resolution ability,High transfer rate,System capacity is large,Anti-jamming performance,Accurate positioning,low cost3. Bluetooth Low Energy is based on Bluetooth, at the same time simplify the Bluetooth. The single-mode Bluetooth chip using a separate Bluetooth Low Energy Protocol, which is the simplification of the classic Bluetooth protocol.4. A CR "monitors its own performance continuously", then uses this information to "determine the RF environment.5. Short distance,high speed,Time change, Personalize.

Software-defined Network: 1.an architecture purporting to be dynamic, manageable, cost-effective, and adaptable, seeking to be suitable for the high-bandwidth, dynamic nature of today's applications. 2.the data forwarding mechanism based on the flow; the routing mechanism based on the central control;the application oriented programming mechanism.3.OpenDaylight,Protocol Oblivious Forwarding POF,Open Computing Project OCP4.Due to the dependence on the hardware of the traditional network device, the network control is separated from the physical network topology in the software defined network.

Intelligent Robots,cars and quadrotors: 1.ethernet support,motor,camera,microphone,inertial navigator,infared receiver and so on.2.Real-Time Indoor Mapping,Fully Distributed Scalable Smoothing and Mapping,Cooperative Multi-Robot Estimation and Control

MIMO: 1.MIMO: simultaneous transmission of multiple antennas.SISO: only one transmission route.2.The MIMO system uses multiple antennas to transmit information at the transmitter and receiver, and the N2 transmission path is formed in the space. Each antenna will receive the N signal. The signal received by each antenna is the vector of the transmitted signals.3.*diversity*： Aiming at improving the reliability of the system, we may choose to send same data across the different propagation (spatial) paths. Multiplexing:Aiming at improving the data rate of the system, we may choose to place different portions of the data on different propagation paths .4.3GPP: be used in Mobile radio telephone.MIMO-OFDM.be used in non-wireless system.

Bitcoin and Graphic Code: 1.the value of money.account security.transaction process.both sides of the transaction.2.Composed of square modules.Store large amounts of information,print in small space.