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Super Quiz 2 Study Guide

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Week 9 Chapter 13:

- Chapter 13 LAN: Packets, Frames and Topologies:
    - Circuit Switching versus packet switching
        - Circuit switching is direct connection between entities and must establish connections, packet switching uses a shared connection and is asynchronous without a lot of necessary setup.
    - LAN vs WAN vs MAN: Differences in size of network
    - Different types of LAN topologies: Bus, ring, star, mesh
        - Bus is connected by a single wire
        - Ring is a single wire connecting to all entities in a loop
        - Star is a central point or hub that connects to each entity
        - Mesh is each entity connected to all other entities individually
    - Frames are how packets are structured to have a set format for communication:
        - Consists of the header, which contains address information to find the recipient and the payload, the actual message/data
    - Unicasting versus broadcasting versus multicasting:
        - Different scopes of distributing communications on a network

Week 10 Chapters 22 & 23:

- Chapter 22 & 23 Datagram forwarding:
    - Virtual packets: hardware independent packet formats to allow for heterogeneous hardware to communicate
    - IP Datagram: TCP/IP formatted packet consists of a header and a payload, similar to a frame
        - Amount of data in a datagram is not fixed, determined by the application sending the data
        - Headers contain IP address for the sender and recipient, as well as other information about the packet itself.
    - IP Datagram forwarding: When a packet is received, it uses the destination address from the header and a forwarding table to determine the next place to send the packet. The packet hops from router to router until it reaches the destination.

    - The TCP/IP suite is considered “best-effort,” meaning it does not guarantee delivery or integrity of the data being transmitted.
    - Encapsulation is used to transport entire IP datagrams across physical networks using MAC addresses to reach the destination
    - Datagrams can be fragmented to allow data to be transmitted across networks with limited MTUs (maximum transmission unit)
- Chapter 23 Support Protocols And Technologies:
    - Address resolution resolves an IP address to a MAC address for forwarding datagrams
    - IPv4 uses ARP to connect the IP address with a MAC address for next-hop forwarding.
    - ICMP serves as a mechanism to check for errors in datagram headers when forwarding.
    - DHCP provides a host information such as their IPv4 address and other routing information.

Week 11 Chapters 24 & 25:

- Chapter 24 (UDP: Datagram Transport Service)
    - IP is not able to distinguish among multiple application programs running on a host.
        - An email application and a web browser opened at the same time would look the same if IP was the lone interpreter.
        - IP cannot distinguish if multiple versions of the same application are open as well.
            - IP cannot support multiple applications because its datagram header field only has id’s computers. Therefore, IP is only looking at the end points of connected computers.
    - Instead of IP having these additional features designers of TCP/IP put placed end-to-end protocols to layer 4 of the OSI-model (the Transport layer).
    - Both UDP and TCP differ in the services they provide
        - UDP can distinguish between many applications and programs that are running on a computer. It also has the ability to send and receive individual messages to and from applications and hosts.
        - UDP does not depend on the local operating system to identify an application and/or program on a computer.
    - UDP’s best effort feature allows applications to send and receive IP datagrams.
        - This would be useful in applications that use high data transfers or require real-time action.

- Chapter 25 (TCP Reliable Transport Service)
    - The TCP (Transmission Control Protocol provides reliability; it is reliable because it ensures that the data being transmitted is not lost or corrupted or delivered out

of order. This is especially important when it comes to TCP packet-switching where (between client and server) TCP takes the quickest route between networks and resolves in an orderly fashion.
    - TCP only has two endpoints which. However, there can be many nodes in between those endpoints.
    - Data can be streamed in a continuous sequence via TCP packets.
        - Data is not delivered in one single packet but multiple packets. Oftentimes the size of each pack varies.

Week 12 Chapters 15 & 17:

- Chapter 15 (Wired LAN Technology: Ethernet and 802.3)
    - Ethernet technology has survived for over 3 decades with much of the core technology remaining constant.
        - Ethernet development has since seen new features such as backward compatibility in that a newer LAN can sense an older LAN and accommodate the older ethernet technology.
    - The ethernet frame format
        - Packets are organized in three main segments with subsegments for the first part. The main segments are the header, 46-1500 bytes of Payload data, and 4byte CRC.
        - Within the header there are three subsegments
            - 6 byte destination address
            - 6 byte source address
            - 2 byte allocation to header details
    - Multiplexing and Demultiplexing
        - Ethernet allows a computer to have many protocols working together in tandem. Some of these protocols use IPV4 or IPV6 datagrams.
            - Datagrams all have their own hexadecimal
                - 0x0800 for IPV4 datagrams
                - 0x08DD for IPV6 datagrams
    - 802.3
        - A ethernet based standard that uses a different frame format.
            - The frame now has four segments which are the header, new header, 46-1492 of Payload, and 4 byte CRC.
                - The header has three segments which contains the segment for 48-bit destination address, 48 bit source address, and 16-bit for header details
                - The New IEEE header contains three new features that concern themselves with what is known as a Logical Link Control Network.
                    - This layer helps correct for data errors within the data layer of the OSI model.

- Chapter 17 (Repeaters, Bridges, and Switches)
    - Fiber Modem Extensions
        - Optical fiber that connects a computer to an Ethernet hub/switch
        - This is a physical medium and the strength of the connection depends on the composition of the fiber.
    - Repeaters
        - A cable box communicates via infrared to a cable box or repeater which is connected by wire to a remote sensor
    - Bridges and Bridging
        - Bridges connect two LANs or hubs and send packets between them.

Week 13 Chapter 16:

- **Personal Area Networks** - A PAN technology provides communication over a short distance, and is intended for use with devices that are owned and operated by a single user
    - Categories include: Bluetooth, Infrared, ZigBee, and other ISM wireless technologies.
- ISM- Governments have reserved three areas of the electromagnetic spectrum for use by **Industrial, Scientific, and Medical groups.**
- **3 key multiplexing techniques used in Wi-Fi wireless networks-**
    - DSSS (DIRECT SEQUENCE SPREAD SPECTRUM)
    - FHSS(FREQUENCY HOPPING SPREAD SPECTRUM)
    - OFDM(ORTHOGONAL FREQUENCY DIVISION MULTIPLEXING)
- IEEE has created many wireless networking standards that handle various types of communication. **BE FAMILIAR WITH THE 8 STANDARDS!**
- WiMAX is a wireless LAN technology that can be used for backhaul, fixed, or mobile access; deployments for access do not require a clear line-of-sight.
- Be familiar with **PAN standards**
- The telecommunications industry divides cellular technologies into four generations that are labeled 1G, 2G, 3G, and 4G, with intermediate versions labeled 2.5G and 3.5G.
    - Be familiar with the characteristics of each

Week 14 Chapter 29:

- Major security problems that exist on the internet include-
    - **Phishing, Misrepresentation, Scams, Denial of Service, Loss of Control, and Loss of Data. Be familiar with descriptions.**
- Be familiar with **techniques used by criminals to exploit and techniques that have been created to prevent them.**
- The set includes: **encryption, hashing, digital signatures and certificates, firewalls, intrusion detection systems, deep packet inspection, content scanning, and Virtual Private Networks.**
- **Be familiar with the technologies which aid in security**
    - **PGP, SSH, SSL, TLS, HTTPS, IPsec, RADIUS, and WPA**

3 to 5 Multiple Choice questions:

1. IP can distinguish among multiple application programs running on a host/
    a. True
    b. False

2. Wireless WAN technologies can be divided into two categories, Cellular and Metropolitan communication systems.
    a. True
    b. False

3. The 16-bit type field allows for an Ethernet frame to be used with multiple protocols like IPv4 or IPv6.
    a. True
    b. False

4. A repeater is an analog hardware device used to extend a LAN. It amplifies and sends all incoming signals to the other side.
    a. True
    b. False

5. Which address refers to sending information to all computers on the network?
    a. Unicast
    b. Broadcast
    c. Multicast