Problem 8

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1. The **IEEE 802.3** standard, known as Ethernet, now encompasses data rates of 10 Mbps, 100 Mbps, 1 Gbps, and 10 Gbps. For the lower data rates, the **CSMA/CD** MAC protocol is used. For the 1-Gbps and 10-Gbps options, a switched technique is used.

2. The most important of high speed Lans are:

• **Fast Ethernet and Gigabit Ethernet**、**Fibre Channel**、**High-speed wireless LANs** .

3. List examples of requirements that call for higher-speed LANs:

• **Centralized server farms**、**Power workgroups**、**High-speed local backbone**

4. The earliest of IEEE 802.3 Medium Access Control techniques is ALOHA. The maximum utilization of pure ALOHA is only about 18%. , and the maximum utilization of slotted ALOHA is only about 37%.

5. CSMA means **Carrier sense multiple access** . The maximum utilization achievable using CSMA can far exceed that of ALOHA or slotted ALOHA.

The maximum utilization depends on the length of the frame and on the propagation time; the longer the frames or the shorter the propagation time, the higher the utilization.

6.For 802.3 MAC frame,

• **Preamble** is a 7-octet pattern of alternating 0s and 1s used by the receiver to establish bit synchronization.

• **Start Frame Delimiter (SFD)** is the sequence 10101011, which indicates the actual start of the frame and enables the receiver to locate the first bit of the rest of the frame.

• **Frame Check Sequence (FCS)** is a 32-bit cyclic redundancy check, based on all fields except preamble, SFD, and FCS.

7. A traditional Ethernet is half duplex : a station can either transmit or receive a frame, but it cannot do both simultaneously. With full-duplex operation, a station can transmit and receive simultaneously. If a100-Mbps Ethernet ran in full-duplex mode, the central point in the star wire cannot be a simple multiport repeater but rather must be a switching hub . In this case each station constitutes a separate collision domain.

In fact, there are no collisions and the CSMA/CD algorithm is no longer needed.

8. In computer networking, **Gigabit Ethernet** (GbE or 1 GigE) is a term describing various technologies for transmitting Ethernet frames at a rate of a gigabit per second (1,000,000,000 bits per second), as defined by the IEEE 802.3-2008 standard.

9. The key elements of a Fibre Channel network are the end systems, called **nodes**, and the network itself, which consists of one or more switching elements.The collection of switching elements is referred to as a **fabric**.

10. The IEEE standard used for wireless LANs are infrared, spread spectrum, and narrowband microwave is The IEEE 802.11 .

11.List some Wireless LAN Applications:

• LAN extension、Crossbuilding interconnect 、Nomadic access、Ad hoc networks.

12. An ad hoc network is a peer-to-peer network (no centralized server) set up temporarily to meet some immediate need.

13. All current wireless LAN products fall into one of the following transmission categories:

• **Infrared (IR) LANs**、**Spread spectrum LANs**.

14. Three alternative transmission techniques are in common use for IR data transmission

• **Directed-beam IR**  can be used to create point-to-point links.

• An **omnidirectional configuration**  involves a single base station that is within line of sight of all other stations on the LAN.

• A **diffused** configuration make all of the IR transmitters be focused and aimed at a point on a diffusely reflecting ceiling.

15. The smallest building block of a wireless LAN is a **basic service set (BSS)**. For access to the same shared wireless medium. A BSS may be isolated or it may connect to a backbone named through an access point (AP).The AP functions as a bridge and a relay point. When all the stations in the BSS are mobile stations, with no connection to other BSSs, the BSS is called an **independent BSS (IBSS)**. An **extended service set (ESS)**  consists of two or more basic service sets interconnected by a distribution system.

16. The IEEE 802.11 MAC layer covers three functional areas:

• **reliable data delivery,access control, and security**.

17. **Carrier sense multiple access with collision avoidance (CSMA/CA)** in computer networking, is a network multiple access method in which carrier sensing is used, but nodes attempt to avoid collisions by transmitting only when the channel is sensed to be "idle". This protocol operates in the Data Link Layer (Layer 2) of the OSI model.