Module Practice and Quiz

7.5.1

What did I learn in this module?

Ethernet Frame

Ethernet operates in the data link layer and the physical layer. Ethernet standards define both the Layer 2 protocols and the Layer 1 technologies. Ethernet uses the LLC and MAC sublayers of the data link layer to operate. Data encapsulation includes the following: Ethernet frame, Ethernet addressing, and Ethernet error detection. Ethernet LANs use switches that operate in full-duplex. The Ethernet frame fields are: preamble and start frame delimiter, destination MAC address, source MAC address, EtherType, data, and FCS.

Ethernet MAC Address

Binary number system uses the digits 0 and 1. Decimal uses 0 through 9. Hexadecimal uses 0 through 9 and the letters A through F. The MAC address is used to identify the physical source and destination devices (NICs) on the local network segment. MAC addressing provides a method for device identification at the data link layer of the OSI model. An Ethernet MAC address is a 48-bit address expressed using 12 hexadecimal digits, or 6 bytes. An Ethernet MAC address consists of a 6 hexadecimal vendor OUI code followed by a 6 hexadecimal vendor assigned value. When a device is forwarding a message to an Ethernet network, the Ethernet header includes the source and destination MAC addresses. In Ethernet, different MAC addresses are used for Layer 2 unicast, broadcast, and multicast communications.

The MAC Address Table

A Layer 2 Ethernet switch makes its forwarding decisions based solely on the Layer 2 Ethernet MAC addresses. The switch dynamically builds the MAC address table by examining the source MAC address of the frames received on a port. The switch forwards frames by searching for a match between the destination MAC address in the frame and an entry in the MAC address table. As a switch receives frames from different devices, it is able to populate its MAC address table by examining the source MAC address of every frame. When the MAC address table of the switch contains the destination MAC address, it is able to filter the frame and forward out a single port.

Switch Speeds and Forwarding Methods

Switches use one of the following forwarding methods for switching data between network ports: store-and-forward switching or cut-through switching. Two variants of cut-through switching are fast-forward and fragment-free. Two methods of memory buffering are port-based memory and shared memory. There are two types of duplex settings used for communications on an Ethernet network: full-duplex and half-duplex. Autonegotiation is an optional function found on most Ethernet switches and NICs. It enables two devices to automatically negotiate the best speed and duplex capabilities. Full-duplex is chosen if both devices have the capability along with their highest common bandwidth. Most switch devices now support the automatic medium-dependent interface crossover (auto-MDIX) feature. When enabled, the switch automatically detects the type of cable attached to the port and configures the interfaces accordingly.

7.5.2

Module Quiz - Ethernet Switching

1. Which two characteristics describe Ethernet technology? (Choose two.)

- [x] It uses unique MAC addresses to ensure that data is sent to the appropriate destination.
- [x] It is supported by IEEE 802.3 standards.
- [ ] It is supported by IEEE 802.5 standards.
- [ ] It uses a ring topology.
- [ ] It typically uses an average of 16 Mbps for data transfer rates.

2. What statement describes a characteristic of MAC addresses?

- ( ) They have a 32-bit binary value.
- (•) They must be globally unique.
- ( ) They are only routable within the private network.
- ( ) They are added as part of a Layer 3 PDU.

3. What is the special value assigned to the first 24 bits of a multicast MAC address transporting an IPv4 packet?

- ( ) FF-FF-FF
- ( ) FF-00-5E
- ( ) 01-5E-00
- (•) 01-00-5E

4. What will a host on an Ethernet network do if it receives a frame with a unicast destination MAC address that does not match its own MAC address?

- ( ) It will remove the frame from the media.
- ( ) It will strip off the data-link frame to check the destination IP address.
- (•) It will discard the frame.
- ( ) It will forward the frame to the next host.

5. Which network device makes forwarding decisions based on the destination MAC address that is contained in the frame?

- (•) switch
- ( ) hub
- ( ) repeater
- ( ) router

6. Which network device has the primary function to send data to a specific destination based on the information found in the MAC address table?

- (•) switch
- ( ) hub
- ( ) router
- ( ) modem

7. Which function or operation is performed by the LLC sublayer?

- ( ) It adds a header and trailer to a packet to form an OSI Layer 2 PDU.
- ( ) It performs data encapsulation.
- (•) It communicates with upper protocol layers.
- ( ) It is responsible for media access control.

8. What happens to runt frames received by a Cisco Ethernet switch?

- ( ) The frame is broadcast to all other devices on the same network.
- ( ) The frame is returned to the originating network device.
- (•) The frame is dropped.
- ( ) The frame is sent to the default gateway.

9. What addressing information is recorded by a switch to build its MAC address table?

- ( ) the destination Layer 3 address of incoming packets
- ( ) the destination Layer 2 address of outgoing frames
- (•) the source Layer 2 address of incoming frames
- ( ) the source Layer 3 address of outgoing packets

10. What is auto-MDIX?

- ( ) a feature to automatically determine speed and duplex
- (•) a feature that detects Ethernet cable type
- ( ) a type of Cisco switch
- ( ) an Ethernet connector type

11. What type of address is 01-00-5E-0A-00-02?

- ( ) an address that reaches every host in the network
- ( ) an address that reaches every host inside a local subnet
- ( ) an address that reaches one specific host
- (•) an address that reaches a specific group of hosts

12. Which statement is true about MAC addresses?

- ( ) MAC addresses are implemented by software.
- ( ) A NIC only needs a MAC address if connected to a WAN.
- (•) The first three bytes are used by the vendor assigned OUI.
- ( ) The ISO is responsible for MAC addresses regulations.

13. What are the two sizes (minimum and expected maximum) of an Ethernet frame? (Choose two.)

- [ ] 128 bytes
- [ ] 56 bytes
- [x] 64 bytes
- [x] 1518 bytes
- [ ] 1024 bytes

14. Which two functions or operations are performed by the MAC sublayer? (Choose two.)

- [ ] It performs the function of NIC driver software.
- [ ] It handles communication between upper and lower layers.
- [x] It adds a header and trailer to form an OSI Layer 2 PDU.
- [x] It is responsible for Media Access Control.
- [ ] It adds control information to network protocol layer data.

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