CCNA Quick Notes - LAN

1. What is carrier sense multiple access collision detect (CSMA/CD)? CSMA/CD describes the Ethernet access method. In CSMA/CD, many stations can transmit on the same cable, and no station has priority over any other. Before a station transmits, it listens on the wire to make sure no other station is transmitting. If no other station is transmitting, the station transmits across the wire. CSMA/CD is all about devices taking turns using the wire. 2. What are MAC addresses? For computers to identify each other on the data link layer, they need a MAC address (hardware address). All devices on a LAN must have a unique MAC address. A MAC address is a 48-bit (six octet) address burned into a network interface card. The first three octets (24 bits) of the MAC address indicate the vendor that manufactured the card. This is called the Organization Unique Identifier (OUI). The last three octets of the MAC address are the unique host address. An example of a MAC address is 00-80-C6-E7-9C-EF. 3.What are the three types of LAN traffic? The three types of LAN traffic are: Unicasts Broadcasts Multicasts 4.What are unicast frames? Unicast frames are the most common type of LAN traffic. A unicast frame is a frame intended for only one host. In unicast frames, the only station that processes the frame is the station that has its own MAC address in the destination portion of the packet. 5.What are broadcast frames? Broadcast frames are frames intended for everyone. Stations view broadcast frames as public service announcements. All stations receive and process broadcast frames. In large networks, broadcasts can bring the network to a crawl, because every computer must process them. 6.What is the destination address of broadcast frames? The destination address of broadcast frames (Layer 2 broadcast addresses) is FF-FF-FF-FF-FF-FF, or all 1s in binary. 7.What are multicast frames? Multicast frames address a group of devices that have a common interest. These frames allow the source to send only one copy of the frame on the network even though it is intended for several stations. Only stations that have a card that is configured to receive multicast frames process them. All other stations discard multicast frames. 8.What devices can you use to segment a LAN at Layer 1, Layer 2, and Layer 3? Three devices you can use to segment a LAN are: Hubs/repeaters (Layer 1) Bridges/switches (Layer 2) - physical addresses Routers (Layer 3) - logical addresses 9.What happens when you segment the network with hubs/repeaters? Because hubs and repeaters operate at the physical layer of the OSI model, segmenting a network with these devices appears as an extension to the physical cable. Hubs and repeaters are transparent to devices. They are unintelligent devices. All devices that connect to a hub/repeater share the same bandwidth. Hubs/repeaters create a single broadcast and collision domain. 10.What is the advantage of segmenting a network with bridges/switches? Bridges/switches operate at Layer 2 of the OSI model and filter by MAC address. Each port on a bridge/switch provides full-dedicated bandwidth and creates a single collision domain. Because bridges/switches operate at Layer 2 of the OSI model, they cannot filter broadcasts, and they create a single broadcast domain. For the CCNA test, remember that switches create more collision domains and fewer collisions. 11.What is the difference between bridges and switches? Bridges and switches function the same way; the only difference is in how they are implemented. Bridges are implemented by software and usually have a couple of network ports. Switches are implemented in hardware by ASIC chips and have many ports. 12.What are the advantages and disadvantages of segmenting the LAN with routers? An advantage of segmenting the LAN with routers is that each interface on a router creates a single broadcast and collision domain. Routers operate at Layer 3 of the OSI model and do not propagate broadcasts. Some disadvantages are that routers are not transparent and are implemented in software, thus introducing latency in the network. 13.What is the Maximum Transmission Unit (MTU) for an Ethernet frame? 1500 bytes is the MTU for an Ethernet frame. You will notice that some publications state that the MTU for Ethernet is 1518 bytes. This is correct also. But what is the true answer? The MTU for Ethernet, including the header, source and destination address, data, and CRC is 1518 bytes. The MTU for the data portion of the frame is 1500 bytes. 14.What three major functions do Layer 2 switches provide? The three major functions that Layer 2 switches provide are Address learning Packet forwarding/filtering Loop avoidance by spanning tree 15.What are some advantages of switches? Some advantages of switches are as follows: They increase available network bandwidth. They reduce the number of users per segment. They provide dedicated bandwidth to each segment. Transparent bridging (switching) provides five bridging functions to determine what to do when it receives a frame. 16.What are these five processes? The five processes are: Learning Flooding Filtering Forwarding Aging 17.In transparent bridging, what is the learning process? The first process a bridge goes through when it is powered on is the learning process. The MAC address table on the bridge contains no entries, and the bridge goes through the learning process to record all workstations on every interface. In the learning process, the bridge records the source MAC address and source port number in the MAC address table every time it sees a frame. 18.In transparent bridging, what is the flooding process? When a bridge is first turned on, it has no MAC address in its table. When a switch receives a unicast frame, it knows the source address and port from which the unicast frame came, but no entry exists in its table for the destination address. This is called an unknown unicast frame. When a switch receives an unknown unicast

frame, it sends the frame out all forwarding interfaces on the bridge except the interface that received the frame. This process is the flooding process. 19.In transparent bridging, what is the filtering process? The filtering process occurs when the source and destination addresses reside on the same interface on the bridge. Because the bridge does not need to forward a frame in which the destination and source addresses reside on the same interface, it filters the frame and discards it. 20.In transparent bridging, what is the forwarding process? The forwarding process occurs when a switch receives a unicast frame and has an entry of the destination address in its MAC table. The switch then forwards the frame to the interface where that destination address resides. 21.In transparent bridging, what occurs during the aging process? Every time a bridge learns a source address, it time-stamps the entry. When the bridge sees a frame from this source, it updates the time stamp. If the bridge does not hear from the source for a specific amount of time (called the aging timer), the bridge deletes the entry from its MAC address table. This process is the aging process. 22.What is the default aging time in transparent bridges? The default aging timer is 5 minutes. 23.What is the Spanning-Tree Protocol (STP)? STP is a loop-prevention bridge-to-bridge protocol. Its main purpose is to dynamically maintain a loop-free network. It does this by sending out Bridge Protocol Data Units (BPDUs), discovering any loops in the topology, and blocking one or more redundant links. 24.How does STP maintain a loop-free network? STP maintains a loop-free network by Electing a root bridge Electing a root port on each nonroot bridge Electing designated ports Putting in the blocking state any port that is not a root port or designated port 25.What two key concepts does STP calculation use to create a loop-free topology? The two key concepts that STP uses to calculate a loop-free topology are Bridge ID (BID) Path cost 26.In spanning tree, what is a Bridge ID (BID)? A BID is an 8-byte field that is composed of the bridge's 6-byte MAC address and a 2-byte bridge priority. 27.What is the default bridge priority in a Bridge ID for all Cisco switches? 32,768 28.In spanning tree, what is path cost? Path cost is a calculation to determine the link's bandwidth. It is a value assigned to each port that is based on the port's speed. 29.What is the spanning tree path cost for each of the following? 10 Mbps 100 Mbps 1 Gbps The path costs are as follows: 10 Mbps - 100 100 Mbps - 19 1 Gbps - 4 30.When calculating a loop-free environment, what four-step decision sequence does spanning tree use to determine what will be the root bridge and which ports will forward or block? The four-step decision sequence that spanning tree uses to determine the root bridge and which port will forward is as follows: Step 1. The lowest root BID Step 2. The lowest path cost to the root bridge Step 3. The lowest sender BID Step 4. The lowest port ID 31.How do bridges pass spanning tree information between themselves? Bridges pass STP information using special frame called Bridge Protocol Data Units (BPDUs). How often do bridges send BPDUs out active ports? The default time that bridges send BPDUs out active ports is 2 seconds. Note: All ports on a switch listen for BPDUs in case there is a topology change. 32.In STP, how is a root bridge elected? In STP, the bridge with the lowest BID is elected the root bridge. All ports on the root bridge are placed in the forwarding state and are called designated ports. Note: The BID is a 6-byte field that is composed of a default priority (32,768) and a MAC address. Because all Cisco switches use the default priority, the switch with the lowest MAC address is elected the root bridge. As a rule of thumb, lower will always win in spanning tree. 33.After bridges elect the root bridge, what do they do next? After electing the root bridge, switches elect root ports. A root port is the port on nonroot bridges that is closest to the root bridge. Every nonroot bridge must select one root port. 34.How do nonroot bridges decide which port they will elect as a root port? Nonroot bridges use root path cost to determine which port will be the root port. Root path cost is the cumulative cost of all links to the root bridge. The port with the lowest root path cost is elected the bridge's root port and is placed in the forwarding state. 35.What is the difference between path cost and root path cost? Path cost is the value assigned to each port. It is added to BPDUs received on that port to calculate the root path cost. Root path cost is defined as the cumulative cost to the root bridge. In a BPDU, this is the value transmitted in the cost field. In a bridge, this value is calculated by adding the receiving port's path cost to the value contained in the BPDU. 36.If a nonroot bridge has two redundant ports with the same root path cost, how does the bridge choose which port will be the root port? If a nonroot bridge has redundant ports with the same root path cost, the deciding factor is the port with the lowest port ID (port number). 37.After the root bridge and root ports are selected, the last step in spanning tree is to elect designated ports. How do bridges elect designated ports? In spanning tree, each segment in a bridged network has one designated port. This port is a single port that both sends and receives traffic to and from that segment and the root bridge. All other ports are placed in a blocking state. This ensures that only one port on any segment can send and receive traffic to and from the root bridge, ensuring a loop-free topology. The bridge containing the designated port for a segment is called the designated bridge for that segment. Designated ports are chosen based on cumulative root path cost to the root bridge. Note: Every active port on the root bridge becomes a designated port. 38.If a bridge is faced with a tie in electing designated ports, how does it decide which port will be the designated port? In the event of a tie, STP uses the four-step decision process discussed in Question 30. It first looks for the BPDU with the lowest BID; this is always the root bridge. If the switch is not the root bridge, it moves to the next step: the BPDU with the lowest path cost to the root bridge. If both paths are equal, STP looks

for the BPDU with the lowest sender BID. If these are equal, STP uses the link with the lowest port ID as the final tiebreaker. 39.What are the four spanning tree port states? The four spanning tree port states are Blocking Listening Learning Forwarding Remember that root and designated ports forward traffic and that nondesignated ports block traffic but still listen for BPDUs. Important note: There is another port state - Disabled - (No frames forwarded, no BPDUs heard). If it shows up in the answer options - select it along with the others. 40.What is the STP blocking state? When a switch starts, all ports are in the blocking state. This is to prevent any loops in the network. If there is a better path to the root bridge, the port remains in the blocked state. Ports in the blocked state cannot send or receive traffic, but they can receive BPDUs. 41.What is the STP listening state? Ports transition from a blocked state to a listening state. In this state, no user data is passed. The port only listens for BPDUs. After listening for 15 seconds (if the bridge does not find a better path), the port moves to the next state, the learning state. 42.What is the STP learning state? In the STP learning state, no user data is being passed. The port quietly builds its bridging table. The default time in the learning state is 15 seconds. 43.What is the STP forwarding state? After the default time in the learning state is up, the port moves to the forwarding state. In the forwarding state, the port sends and receives data. 44.What is STP forward delay? The forward delay is the time it takes for a port to move from the listening state to the learning state or from the learning state to the forwarding state. The default time is 30 seconds. 45.What is the hello time in STP timers? The hello time is the time interval between the sending of BPDUs. The default time is 2 seconds. 46.What is the Max Age timer? The Max Age timer is how long a bridge stores a BPDU before discarding it. The default time is 20 seconds (ten missed hello intervals). 47.What is the default time a port takes to transition from the blocking state to the forwarding state? The default time a port takes to transition from the blocking state to the forwarding state is 50 seconds: 20 seconds for Max Age, 15 seconds for listening, and 15 seconds for learning. 48.What does STP do when it detects a topology change in the network due to a bridge or link failure? If spanning tree detects a change in the network due to a bridge or link failure, at least one bridge interface changes from the blocking state to the forwarding state, or vice versa. PDF Version | **Download**