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**Week 11 Homework**

**Review Questions:**

**R1)** The link-layer frame in the example in 5.1.1 would be the information of the connection between each destination that is used by each transportation mode. For example, a plane or train ticket.

**R2)** If all links in the Internet were to provide reliable delivery service, TCP’s reliable delivery service wouldn’t be redundant as the links don’t guarantee reliable delivery between the router and host, the transport layer.

**R3)** The link-layer can offer services such as error detection, just as IP can, but can also offer error correction. It can also provide framing similar to that of IP. Link-layer also shares similarities with TCP in that it can provide reliable delivery of data.

**R4)** D-prop = L / R. There won’t be a collision if D-prop < L / R because the data will arrive faster than the next packet.

**R5)** Slotted ALOHA has the following desired characteristics: R bps throughput when only one node has data to send, and it is inexpensive and simple. On the other hand, token-passing has the following desired characteristics: R bps throughput when only one node has data to send, there is an average transmission rate of R/M, its decentralized, and is simple.

**R6)** After the 5th collision there is a 1:32 chance of K = 4. The delay is equal to 204.8 microseconds.

**R7)** In polling protocol, the master node would be the party’s host who designates when each person in the party is allowed to converse. In Token-passing protocol each guest has a set order in which they are allowed to talk and are only allowed to talk after specific guests.

**R8)** Token-ring protocol would be inefficient on a large-scale LAN as if a low-number node had to communicate to a high-number node, it would take a large amount of time for the token to pass from each node between the two nodes.

**R9)** The address space for MAC is 2^48 bits long, for IPv4 is 2^, and for IPv6 is 2^128.

**R10)** Node C will not process the frames addressed to B, but will simply drop the frames. It would process the frames if they were sent from node A using the MAC broadcast address which has all nodes receive and process the frame.

**R11)** An ARP query is sent within a broadcast frame so that each MAC address belonging to each IP address is found and to find who requested the data. Then the response is returned with a specific destination MAC address belonging to the host that requested the data.

**R12)** It is possible for the same MAC addresses to appear in both ARP tables if a MAC address from one side is sending to a MAC address from the other side that is also sending information to the other side of the router.

**R13)** 10BASE-T Ethernet can process speeds up to 10 Mbps, whereas 100BASE-T Ethernet can process speeds up to 100 Mbps. Gigabit Ethernet can handle speeds up to 1,000 Mbps or 1 Gbps and is backward compatible with 10BASE-T and 100BASE-T, uses CSMA/CD for shared broadcast channels, can use point-to-point links as well as shared broadcast channels, and finally allows for full-duplex operations at 1 Gbps in point-to-point channels. Gigabit Ethernet can also now use not only optical fiber, but also CAT 5 cables as well.

**R14)** In terms of addressing in figure 5.15, there are 5 different subnetworks. 1 for the web server, 1 for the mail server, 1 for each of the routers connecting each host.

**R15)** The max number of VLANs that can be configured on an 802.1Q protocol supported switch is 4096. This is because the VLAN ID field is 12-bits long and thus 2^12 are allowed.

**R16)** An 2N number of ports are going to be needed to connect N number of switches via a trunking protocol. This is because a single port on each switch is needed to connect each switch to one another.

**Practice Problems:**

**P1)** I – row bits: **1100**

J – column bits: **1001**