Network II
Revision 2

1. What OSI layer typically encapsulates using both a header and a trailer?

Answer: The data link layer typically encapsulates using both a header and a trailer. The trailer typically includes a frame check sequence (FCS), which is used to perform error detection.

2. Define the terms DCE and DTE in the context of the physical layer and a point-to-point serial link.

Answer: At the physical layer, DTE refers to the device that looks for clocking from the device on the other end of the cable on a link. The DCE supplies that clocking. For example, the computer is typically the DTE, and the modem or CSU/DSU is the DCE. At the data link layer, both X.25 and Frame Relay define a logical DTE and DCE. In this case, the customer premises equipment (CPE), such as a router and a CSU/DSU, is the logical DTE, and the service provider equipment (the Frame Relay switch and the CSU/DSU) is the DCE.

3. True or False: "A leased line between two routers provides a constant amount of bandwidth—never more and never less." Defend your answer.

Answer: True. A leased line creates the cabling equivalent of having a cable between the two routers, with the speed (clock rate) defined by the telco. Even when the routers have no data to send, the full bandwidth is available to be used.

4. Explain how many DS0 channels fit into a T1, and why the total does not add up to the purported speed of a T1, which is 1.544 Mbps.

Answer: Each DS0 channel runs at 64 kbps. With 24 in a T1, the T1 speed seemingly would be 24 * 64 kbps, or 1.536 Mbps. T1 also includes 8 kbps for management, which, when added to the 1.536 Mbps total, gives you the full T1 rate—1.544 Mbps.

5. Define the term synchronous.

Answer: The imposition of time ordering on a bit stream. Practically, a device will try to use the same speed as another device on the other end of a serial link. By examining transitions between voltage states on the link, the device can notice slight variations in the speed on each end and can adjust its speed accordingly.

6. Imagine a drawing with two routers, each connected to an external CSU/DSU, which each is connected with a four-wire circuit. Describe the role of the devices in relation to clocking and synchronization.

Answer: The routers receive clocking from their respective CSU/DSUs. One of the two CSU/DSUs is configured as the master. The other CSU/DSU, as the slave, adjusts its clock to match the speed of the master CSU/DSU.

7. Imagine a drawing with two routers, each connected to an external CSU/DSU, which

each is connected with a four-wire circuit. List the words behind the acronyms DTE and DCE, and describe which devices in this imagined network are DTE and which are DCE.
Answer: DTE stands for data terminal equipment, and DCE stands for data communications equipment. The routers are DTEs, and the CSU/DSUs are DCEs.

8. Imagine a drawing with two routers, each connected to a Frame Relay switch over a local access link. Describe which devices in this imagined network are Frame Relay DTEs and which are Frame Relay DCEs.
Answer: The routers are DTEs, and the Frame Relay switches are DCEs.

9. What are some of the main similarities between Frame Relay and ATM?
Answer: Both use an access link to access the service provider. Both use the concept of a virtual circuit between DTE devices. And both allow multiple VCs to cross a single access link.

10. List the speeds of a T1 line, E1, OC-3, and OC-12.
Answer: 1.544 Mbps, 2.048 Mbps, 155 Mbps, and 622 Mbps.