CHAPTER 9

High-Speed Digital Access: DSL, Cable Modems, and SONET

Review Questions

1. DSL technology and cable modems.

2. ADSL is unsuitable for businesses because the bandwidth in the upstream direction is much less than the bandwidth in the downstream direction. SDSL is more suitable for business

3. The main users of ADSL technology are residential users.

4. Filters limit the bandwidth by allowing only sufficient bandwidth for voice communication.

5. ADSL uses DMT.

6. An ADSL subscriber needs an ADSL modem.

7. A DSLAM functions like an ADSL modem, but at the telephone company site. A DSLAM also packetizes the data.

8. HDSL uses 2B1Q encoding which is less susceptible to attenuation than the AMI encoding used by a T-1 line.

9. The head end receives video signals from broadcasting stations and feeds the signals into coaxial cables.

10. An HFC network uses a combination of fiber-optic cable and coaxial cable.

11. The upstream data band uses lower frequencies that are more susceptible to noise and interference. QAM is not a suitable technique for this reason.

12. The CM is installed on the subscriber premises; the CMTS is installed inside the distribution hub.

13. DOCSIS is a standard for data transmission over an HFC network.

14. An STS multiplexer combines several optical signals to make an STS signal, while an add/drop multiplexer adds STS signals from different paths and removes STS signals from a path.

15. STSs are the hierarchy of signals defined by the SONET standards. OCs are the services available to the user.

16. The ANSI standard is called SONET and the ITU-T standard is called SDH. Both standards are nearly identical.

17. A single clock handles the timing of transmission and equipment across the entire network. This network wide synchronization adds a level of predictability to the system.

18. A SONET regenerator takes a received optical signal and regenerates it. The SONET regenerator also replaces some of the existing overhead information with new information.

19. An STS-1 frame contains 6480 bits (810 octets) and is organized in a matrix of nine rows with 90 octets in each row.

20. A virtual tributary is a partial payload that can be inserted into a STS-1 frame and combined with other partial payloads to fill out the frame.

21. Lower rate STSs can be multiplexed to make them compatible with higher rate systems.

Multiple-Choice Questions

22. d
23. c
24. b
25. c
26. c
27. d
28. a
29. d
30. b
31. c
32. d
33. b
34. a
35. d
36. a
37. a
38. a
39. b
40. b
41. d
42. a
43. c
44. d

Exercises

45. To create an STS-36, four STS-9 can multiplexed. There is no more overhead involved.

46. Duration of frame in STS-1: 125 ms

47. Duration of frame in STS-3: 41.7 ms

    Duration of frame in STS-9: 13.8 ms

    Duration of frame in STS-12: 10.4 ms

    Duration of frame in STS-18: 6.9 ms

    Duration of frame in STS-24: 5.2 ms

    Duration of frame in STS-36: 3.5 ms

    Duration of frame in STS-48: 2.6 ms

    Duration of frame in STS-96: 1.3 ms

    Duration of frame in STS-192: 0.65 ms

48. 30 VT1.5s in STS-1 frames

49. 22 VT2s in STS-1 frame

50. 15 VT3s in STS-1 frame

51. 7 VT6 in STS-1 frame

52. VT3 = 3.456 Mbps

53. Combination of one VT6 and one VT1.5 for 8.64 Mbps

54. 2 VT6 = 13.824 Mbps

55. VT1.5

56. STS-1

57. 6.4 Mbps is needed, VT6 would be suitable

58. Figure 9.1 shows one solution.

Figure 9.1   *Exercise 58*