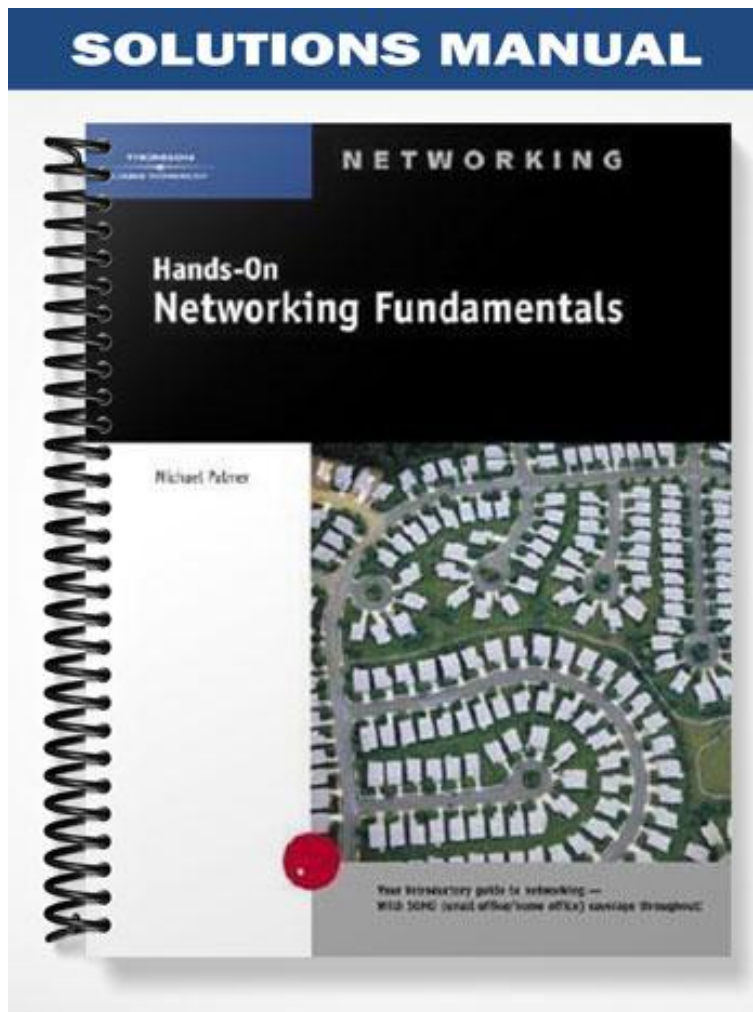


SOLUTIONS MANUAL



Hands-on Networking Fundamentals

Chapter 2 Solutions

Answers to the Chapter 2 Review Questions

1. Your network computer can transmit faster than an older network printer can receive. What capability of the OSI model helps to manage transmissions so that the printer is not overrun by communications from your computer?
Answer: a. flow control
2. When was the OSI model developed?
Answer: c. 1970s
3. An advantage of token ring over Ethernet is that _____.
Answer: a. broadcast storms are unlikely in token ring
4. Your network is beaconing. In which of the following networks would this occur?
Answer: b. in token ring when no broadcasts are detected from the active monitor
5. Which of the following is an IEEE standard for Ethernet? (Choose all that apply.)
Answer: c. 802.3
6. You have an Ethernet network on which the AppleTalk protocol is used with other protocols. Which of the following enables AppleTalk to work on your network? (Choose all that apply.)
Answer: b. Ethernet SNAP
7. When your computer communicates with a server through the Physical layer (Physical layer to Physical layer) it uses _____.
Answer: a. peer protocols
8. A router is able to route packets along the shortest path thanks to the routing capabilities provided by which OSI layer?
Answer: d. Network
9. When you use My Network Neighborhood in Windows XP to view computers on your network, this is possible through which of the following? (Choose all that apply.)
Answer: b. Microsoft Windows redirector and c. Capabilities specified in the OSI Application layer
10. Assume that your RBOC is Qwest and your long distance carrier is AT&T. What type of lines are used to connect Qwest to AT&T?
Answer: a. interexchange carrier lines
11. When you monitor computers on a network using the physical address that is coded into their network interface cards, you are taking advantage of the _____ sublayer in the Data Link layer.
Answer: b. media access control (MAC)
12. What types of devices would you expect to see in a headend? (Choose all that apply.)
Answer: a. cable connections, b. satellite dishes, c. antennas, and d. trunk lines
13. Statistical multiple access is more efficient than _____. (Choose all that apply.)
Answer: a. Frequency Division Multiple Access and b. Time Division Multiple Access

14. In Ethernet a _____ is measured by signal strength.
Answer: c. collision
15. You are working on an older token ring network with an assistant, when your assistant asks the name of the device that connects the links of the network. You answer that the device is a(n) _____.
Answer: d. multistation access unit
16. You work in a community college system that consists of 15 community colleges throughout the state and a central administration center at one of the colleges. The central administration center processes the payroll and student information and needs to have communications of over 40 Mbps between it and the colleges. Which of the following would best provide this type of communications?
Answer: c. T-3 or T-3C communications
17. Your network is currently busy and your monitoring shows that it has discovered frames with errors and there are retransmissions to correct the errors. The layer of the OSI model that is handling the error checking is the _____ which is using _____ information.
Answer: b. Data Link layer, CRC
18. Which fields are in a token on a token ring network? (Choose all that apply.)
Answer: a. start delimiter, c. end delimiter, and d. access control
19. You have received an e-mail from your sister who is on the same enterprise network and notice in the message header that the e-mail has traveled through four different points before reaching you. This is an example of _____.
Answer: b. message switching
20. When a station on an Ethernet network is sending a packet, the other stations on that network are said to be _____.
Answer: a. in defer mode

Hands-On Projects Tips and Solutions for Chapter 2

Activity 2-1

In Step 6, the general reasons for standardization as provided by the ISO include:

- To ensure products are of good quality
- So that products fit their purpose
- To reduce incompatibilities
- So that products are not “unreliable or dangerous”
- Because standards have “important economic and social repercussions”
- Because standards are “useful to industrial and business organizations of all types, to governments and other regulatory bodies, to trade officials, to conformity assessment professionals, to suppliers and customers of products and services in both public and private sectors, and, ultimately to people in general in their roles as consumers and end users.”
- Because standards are good for: trade, product development, safety, environmental concerns, and the transfer of technology

Activity 2-2

An optimal design for this project is a network that does not contain a network hub or switch and that is a legacy bus network consisting of coaxial cable connecting two or more workstations and servers. Another viable option is a network that uses unshielded twisted-pair cable and a hub or switch.

Yet another option is to use a wireless network and employ one or more wireless devices that you have already determined can cause interference, such as a specific cordless telephone or camera or a transmitter that you have obtained for this lab (talk to your school's amateur radio club for help).

One method for displaying EMI/RFI problems is to first download a file of moderate size before applying EMI/RFI to the cable (or wireless) segment and observing the time it takes to download the file. Then place the EMI/RFI source as close as possible to the cable segment (or wireless card) and observe and compare the time again.

Emphasize to the students that proper installation and placement of network media is vital to reliable and optimal network performance. Coaxial cable is more susceptible to EMI/RFI interference because of the cable design and individual interface design of the hardware logic contained in the network device. Unshielded twisted-pair cabling and the individual interface design of the associated hardware logic contained in the network device takes into account EMI/RFI or "noise" present on the cabling and can tolerate higher noise ratios by employing media filters and isolation transformers on each twisted-pair interface that acts as a filter to minimize EMI/RFI.

If your test network has an intelligent hub or switch that interconnects the workstations and servers, the easiest method for detecting problems is to look for high error counts on the interface nearest the EMI/RFI source. You can observe these error counts on the hub or switch with the management software provided by the vendor or by utilizing the console port on the hub or switch.

This project also demonstrates that a network having two or more workstations or servers should be interconnected via a hub or switch, and if possible, an intelligent hub or switch, to allow for better troubleshooting tools and for easier resolution of problems.

Activity 2-3

This project illustrates valuable tools for your students to use in identifying address information for a NIC in the Microsoft Windows, Fedora, and Red Hat Enterprise Linux operating systems. If you have other devices running other operating systems on your network, you might have students use similar tools to provide this information (for example, you can use GUI tools or use *ifconfig* in a terminal window in Mac OS X). This is an example of why it is imperative that you have detailed documentation about your network. When problems arise, the device or devices that are causing the problems can be quickly located and repaired using the documentation. You might also emphasize that it is important to keep this information up to date as the network grows.

Most intelligent network devices, such as hubs, switches, and routers provide network management applications either locally or remotely. These applications allow you to view Layer 2 MAC addresses associated with individual interfaces to quickly locate devices connected to them. This proves very useful in locating faulty devices on your network. Such management applications also provide you with a tool for troubleshooting problems when you first connect a device to a hub or switch by ensuring the hub or switch verifies the address associated with the device connected to the interface.

Activity 2-4

This project enables students to view the SSL settings in Internet Explorer for Windows XP and Windows Server 2003. Consider using this project to initiate a discussion about the value of network security and encryption. You might also add a project in which students view how to set up encryption for a VPN or Web server—and discuss the different types of encryption.

In Step 5 of the first set of steps and in Step 3 of the second set of steps, note that the SSL options are:

- Use SSL 2.0
- Use SSL 3.0

Activity 2-5

In this project, students view the SSL options in Mozilla.

In Step 5, the SSL versions include:

- SSL version 2
- SSL version 3

Activity 2-6

Students view the Microsoft redirector at work in this project. As a supplement to the project, you might have students monitor the activities of the redirector in Windows Server 2003 through the System Monitor. They can do this by selecting to view the Redirector object and one or more of its counters. To access the System Monitor, click Start, point to All Programs, point to Administrative Tools, and click Performance. Next, click the plus sign in the System Monitor, select Redirector as the performance object, and select to view one or more counters. For example, you might have students monitor Bytes Total/sec, so that students can view the total amount of activity handled by the redirector.

Activity 2-7

In this project, students use the *ping* utility in UNIX/Linux to explore the Application layer via their loopback connection. In Fedora and Red Hat Enterprise Linux, the loopback connection is typically configured automatically as localhost when the operating system is installed—or students can use the loopback address 127.0.0.0.

Activity 2-8

One of the first things that the student will notice when viewing one or more RFC documents is that there is a standard format for an RFC. This is important because it defines the way in which the document is created and submitted for universal understanding. The standard format and design of the document also presents a good example of why standards are important from the initial creation of an idea, to its development, and finally to its implementation. Standards are very important for all aspects of computing, especially networks, because of the need for standard protocols or communications between networks. Many RFCs relate either directly or indirectly to networks, and the importance of these RFCs is that they define a standard structure for making network proposals, as well as for environments in which networks operate.

In Step 5, Steve Crocker wrote the RFC, which is called Host Software, and it was submitted on April 7, 1969.

Activity 2-9

For this project, students examine an Ethernet or token ring LAN. They should observe the types of network interface cards used and the cable in use. They also should examine how the cable is distributed and the network device(s) used to connect the cable. After determining the topology and the key network elements, students should be able to deduce whether the network is Ethernet or token ring.

Activity 2-10

This project enables students to find out more about cable modems. One Web site that has received attention from the Wall Street Journal and other news media is www.cable-modem.net. Note that at this

writing changes are occurring in the industry caused by the bankruptcy of @Home and various mergers of cable TV companies.

Cable TV does provide a means for WAN access in many areas and one that is relatively easy to install and maintain. Most providers install and configure the equipment necessary to make this connection possible. The providers also supply support and instructions for problem or service change resolution.

This access method is now widely available in most areas that have one or more cable TV providers.

Solutions to the Case Project Assignments

In the following assignments, you consult for the newsroom of the Franklin Daily Herald, a newspaper in a midwestern city. All 17 of the news reporters have computers, and now their management has funded a project to network their computers and provide Internet access to the network. Having a network will enable the reporters to more easily collaborate on stories and exchange information. And it will save time for the news editor who checks all news articles before they are printed. The newsroom network will also connect to an existing network in the pressroom.

Case Project 2-1: Implementing a Network Transport Method

One member of the newspaper's management wants to implement token ring for this network. What is your recommendation and how would you explain it to the management?

Answer:

Students might recommend Ethernet or token ring and should defend their answers. However, in this context, Ethernet makes good sense for the following reasons:

- **Ethernet enables the use of very fast transmission options, such as 100 Mbps for this network.**
- **There are many connection options for Ethernet to use high-speed networking and to quickly upgrade a network.**
- **There are many network testing and management tools available for Ethernet**
- **Most vendors support Ethernet.**
- **New standards are constantly evolving to broaden the capabilities of Ethernet.**

Case Project 2-2: Creating a Network that Can Communicate with Other Networks

The management wants to know if there are any guarantees that the network you are proposing will communicate with other networks. What is your response?

Answer:

The existence of standards and standards organizations help ensure that one network can communicate with another. Both Ethernet and token ring are network standards. Ethernet is the IEEE 802.3 standard and token ring is the IEEE 802.5 standard. The IEEE is one of the major standards organizations. The IEEE is a professional society with scientific, technical, and educational members active in over 150 countries. The 802 standards committee and Project 802 have developed the 802 networking standards in use today. Both Ethernet and token ring are part of the 802 standards. Ethernet is a particularly good choice for a network because there are many standards pertaining to Ethernet communications and many vendors who follow those standards throughout the world.

Case Project 2-3: Questions about the OSI Model

Brett Mason, a new colleague with whom you are working at Network Design Consultants, is unsure about some aspects of the OSI model. He has a list of questions for you and asks that you develop a table that he can use as a reference for the answers. Create a table containing two columns and seven rows. Label the left column “Network Function,” and label the right column “OSI Layer.” Enter each of the following functions in its own row under the left column and then specify the OSI layer that performs that function under the right column. Brett’s questions about functions are as follows:

- Which layer resizes frames to match the receiving network?
- Which layer performs data compression?
- Which layer ensures data is received in the order it was sent?
- Which layer handles the data-carrying signal?
- Which layer provides file transfer services?
- Which layer enables routing?
- Which layer enables the receiving node to send an acknowledgment?

Answer:

Brett should thoroughly understand the technology and how it relates to the successful completion of the project. The creation and presentation of the table showing the relationship of the OSI model and the layer functionality’s will be important for Brett in designing present and future projects. Directing Brett to other sources of information such as the regulatory organization’s Web sites or documentation will also help Brett understand. Brett can visit the IEEE, IETF, and other network-related regulatory Web sites for further information. There are also many different trade periodicals that Brett can consult along with numerous training courses from several different training groups.

FUNCTION	OSI LAYER
Resizes frames to match the receiving network	Transport
Performs data compression	Presentation
Ensures that data is received in the order it was sent	Transport
Handles the data-carrying signal	Physical
Provides file transfer services	Application
Enables routing	Network
Enables the receiving node to send acknowledgement	LLC at the Data Link layer for connection-oriented service and the Transport layer

Case Project 2-4: More Questions About the OSI Reference Model

Brett likes your table and has another question. He would like you to explain MAC addressing..

Answer:

Brett’s MAC addressing question can be explained by the organizationally unique address assignment by the IEEE for each vendor company. Each network interface or NIC on a network device has a unique address that enables a frame to reach its destination. In this address, called the device or physical address, the first series of bytes identify the NIC vendor and are a valuable tool for

network administration. The student might recommend that Brett visit the IEEE Web site at www.ieee.org and follow the standards links to the organizational unique identifiers for a downloadable document with each vendor's address.

Case Project 2-5: Implementing T-carrier Communications

The newspaper is being purchased by a newspaper chain and the coordinators of the purchase transition want to have T-carrier communications with the newsroom network. The Franklin Daily Herald management would like you to give them an executive overview explaining T-carrier communications and the possible options.

Answer:

As discussed in the text, a T-carrier line is a dedicated telephone line that can be used for data communications to connect two different locations for continuous point-to-point communications. For example, it is useful for joining business branches in different locations or business subsidiaries. T-carrier lines offer dependable service over very long distances. They are generally offered by telecommunications companies, such as RBOCs.

The available T-carrier speeds are outlined in Table 2-4 in the text, as replicated here:

T-Carrier	Data Transmission Rate	T-1 Switched Channels	Data Signal Level
Fractional T1	64 Kbps	1 of 24 T-1 subchannels	DS-0
T-1	1.544 Mbps	1	DS-1
T-1C	3.152 Mbps	2	DS-1C
T-2	6.312 Mbps	4	DS-2
T-3	44.736 Mbps	28	DS-3
T-3C	89.472 Mbps	56	DS-3C
T-4	274.176 Mbps	168	DS-4
T-5	400.352 Mbps	336	DS-5