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CCENT Study Guide

Chapter 3

Introduction to TCP/IP

Chapter 3 Objectives

- The CCENT Topics Covered in this chapter include:
- ✓ **Network Fundamentals**
- 1.1 Compare and contrast OSI and TCP/IP models.
- 1.2 Compare and contrast TCP and UDP protocols.
- 1.7 Apply troubleshooting methodologies to resolve
- Problems.
- 1.7.a Perform fault isolation and document.
- 1.7.b Resolve or escalate.
- 1.7.c Verify and monitor resolution.
- 1.9 Compare and contrast IPv4 address types.
- 1.9.a Unicast
- 1.9.b Broadcast
- 1.9.c Multicast
- 1.10 Describe the need for private IPv4 addressing.

Figure 3.1: The DoD and OSI models

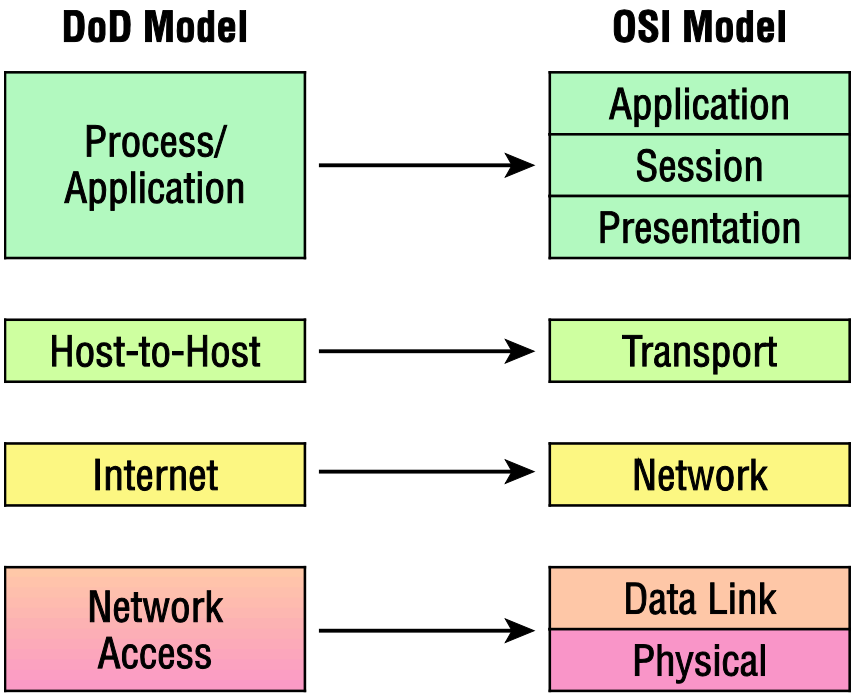
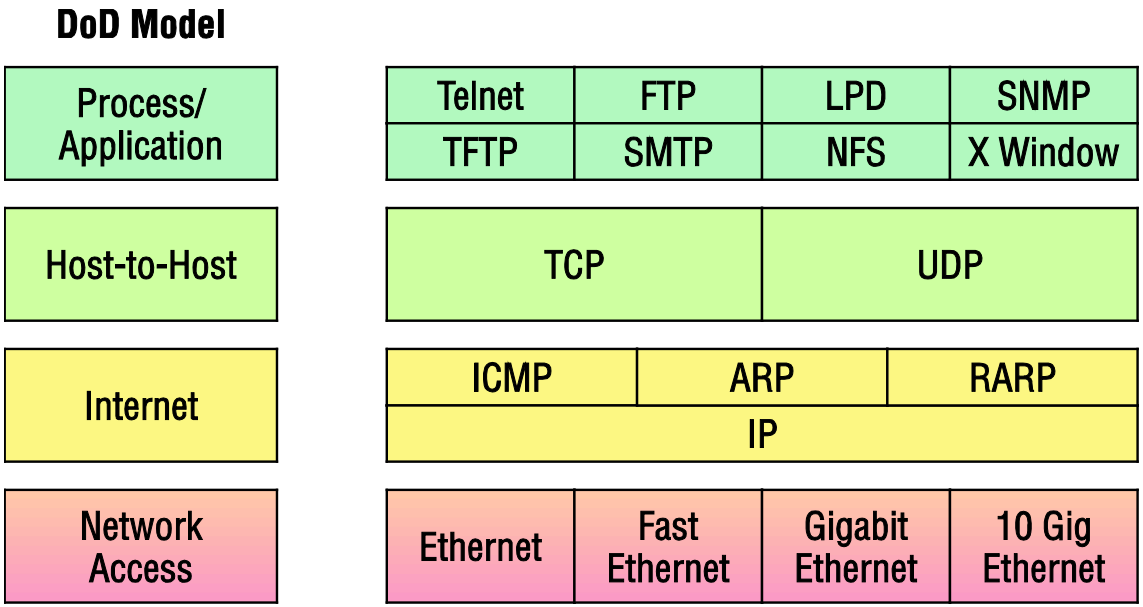


Figure 3.1 offers a comparison of the DoD model and the OSI reference model. As you can see, the two are similar in concept, but each has a different number of layers with different names.

Figure 3.2: The TCP/IP protocol suite



The DoD and OSI models are alike in design and concept and have similar functions in similar layers. Figure 3.2 shows the TCP/IP protocol suite and how its protocols relate to the DoD model layers.

Figure 3.3: Telnet

Telnet was one of the first Internet standards, developed in 1969, and is the chameleon of protocols—its specialty is terminal emulation.

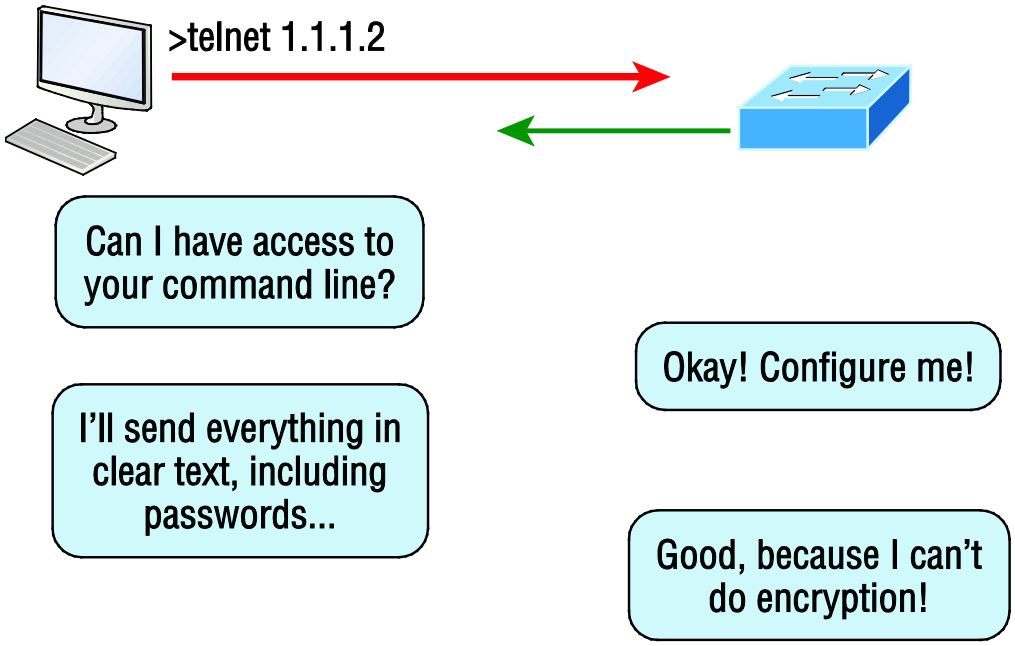


Figure 3.3 shows an example of a Telnet client trying to connect to a Telnet server.

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Figure 3.4: Secure Shell

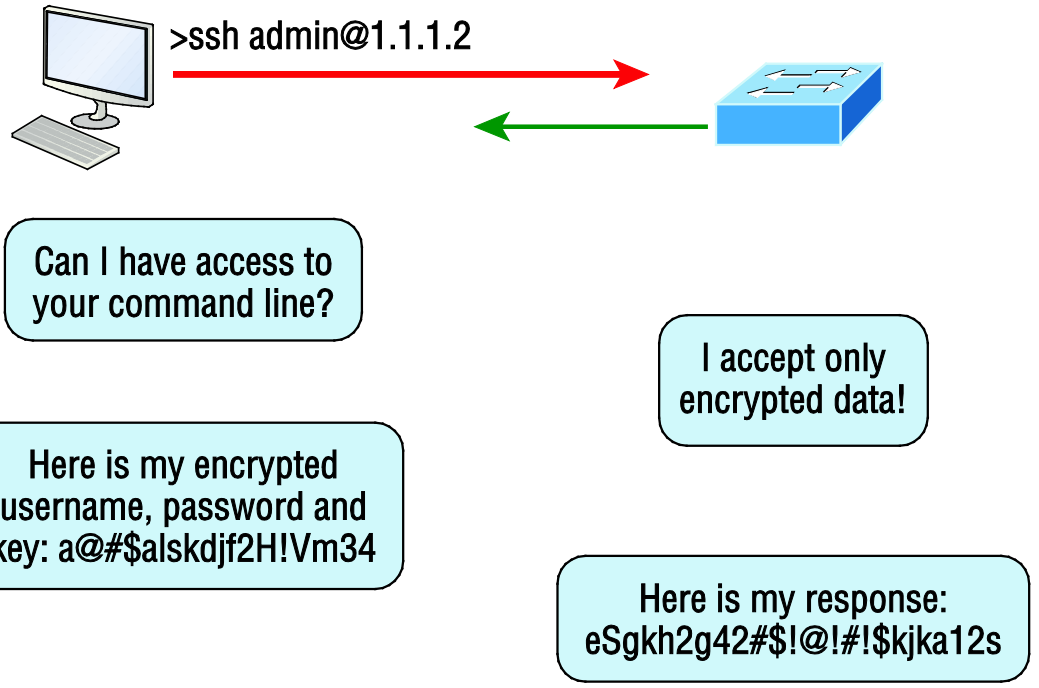

Figure 3.4 shows a SSH client trying to connect to a SSH server. The client must send the data encrypted!

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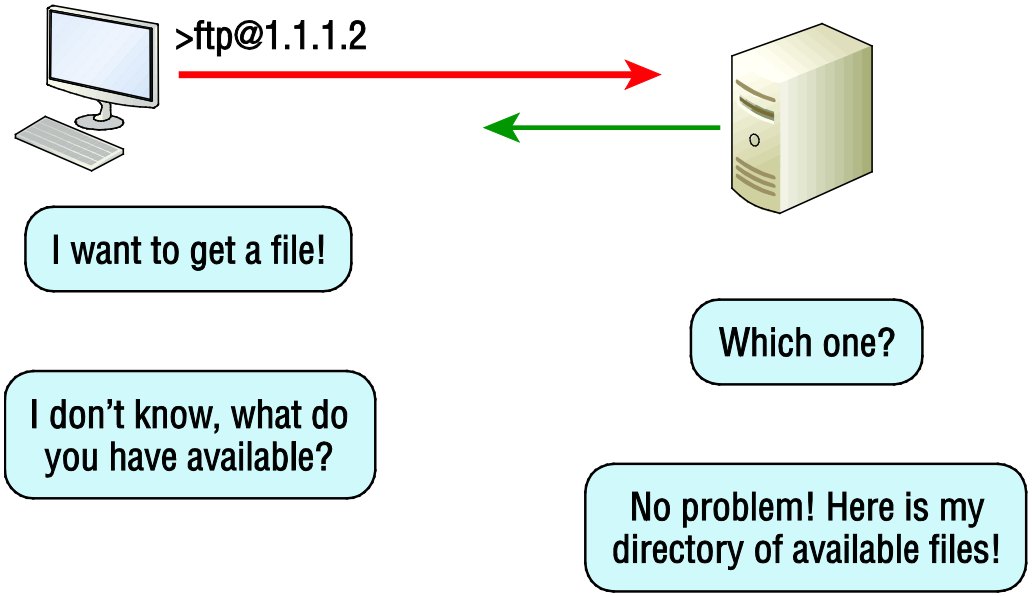
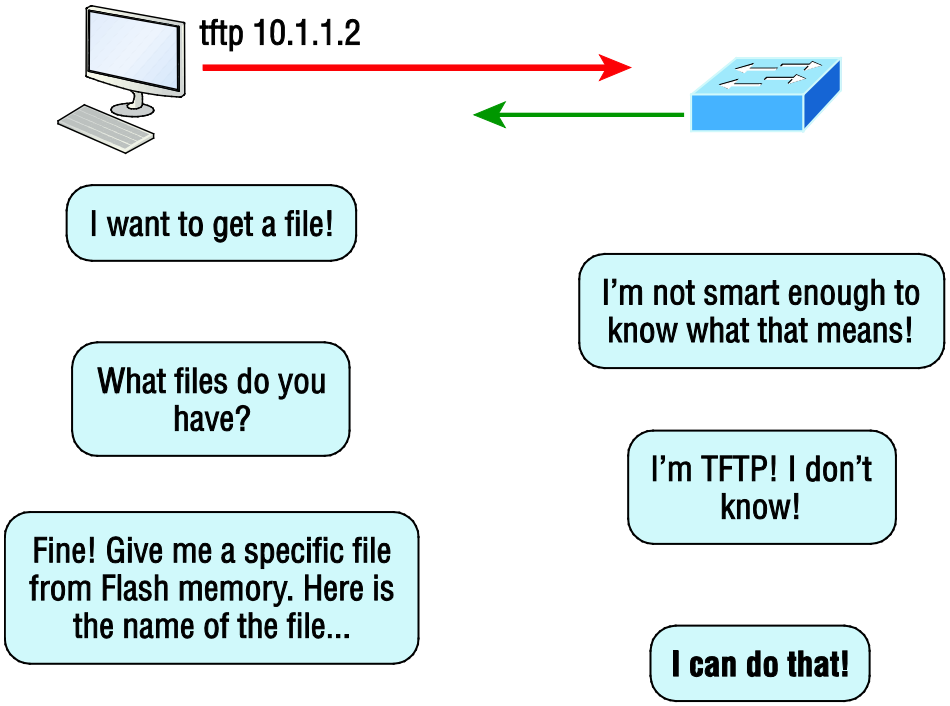
Figure 3.5: FTP



FTP also allows for access to both directories and files and can accomplish certain types of directory operations, such as relocating into different ones.

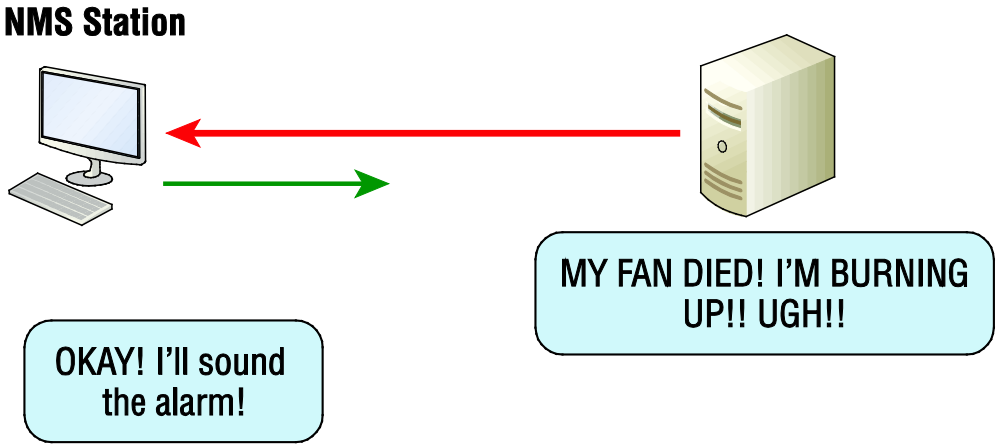
Figure 3.6: TFTP



TFTP doesn't offer the abundance of functions that FTP does because it has no directory-browsing abilities, meaning that it can only send and receive files.

Figure 3.7: SNMP

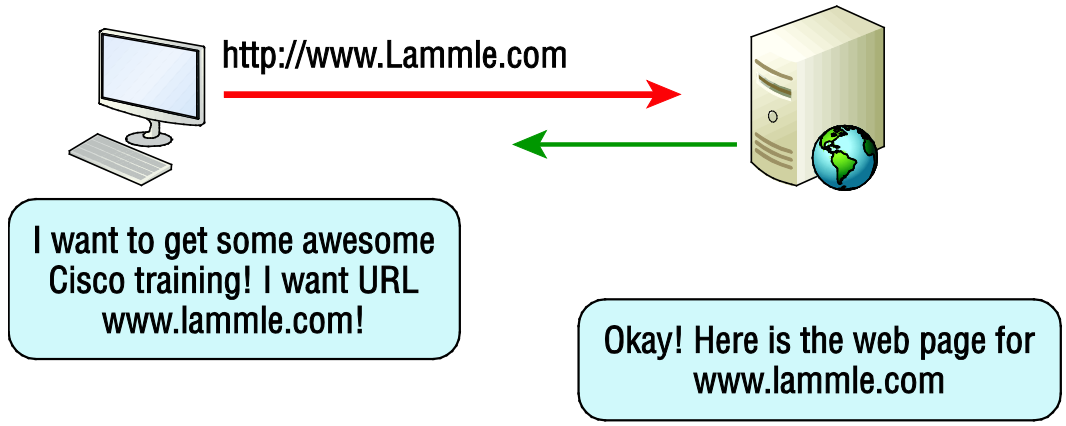
Simple Network Management Protocol (SNMP) collects and manipulates valuable network information, as you can see in Figure 3.7.



It gathers data by polling the devices on the network from a network management station (NMS) at fixed or random intervals, requiring them to disclose certain information, or even asking for certain information from the device.

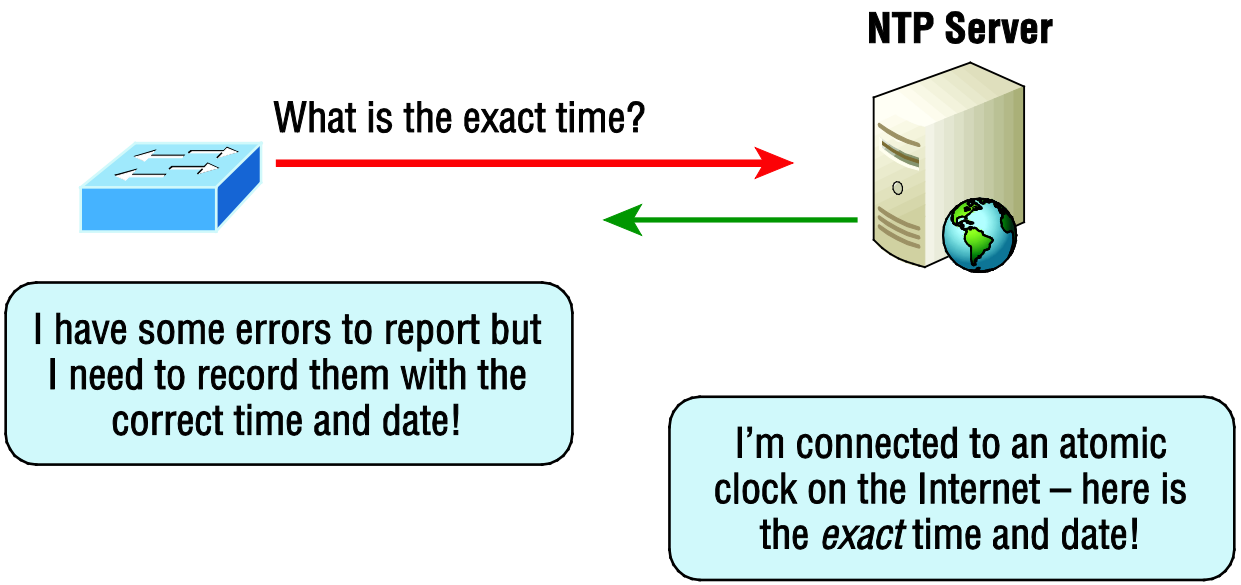
Figure 3.8: HTTP

All those snappy websites comprising a mélange of graphics, text, links, ads, and so on rely on the *Hypertext Transfer Protocol (HTTP)* to make it all possible



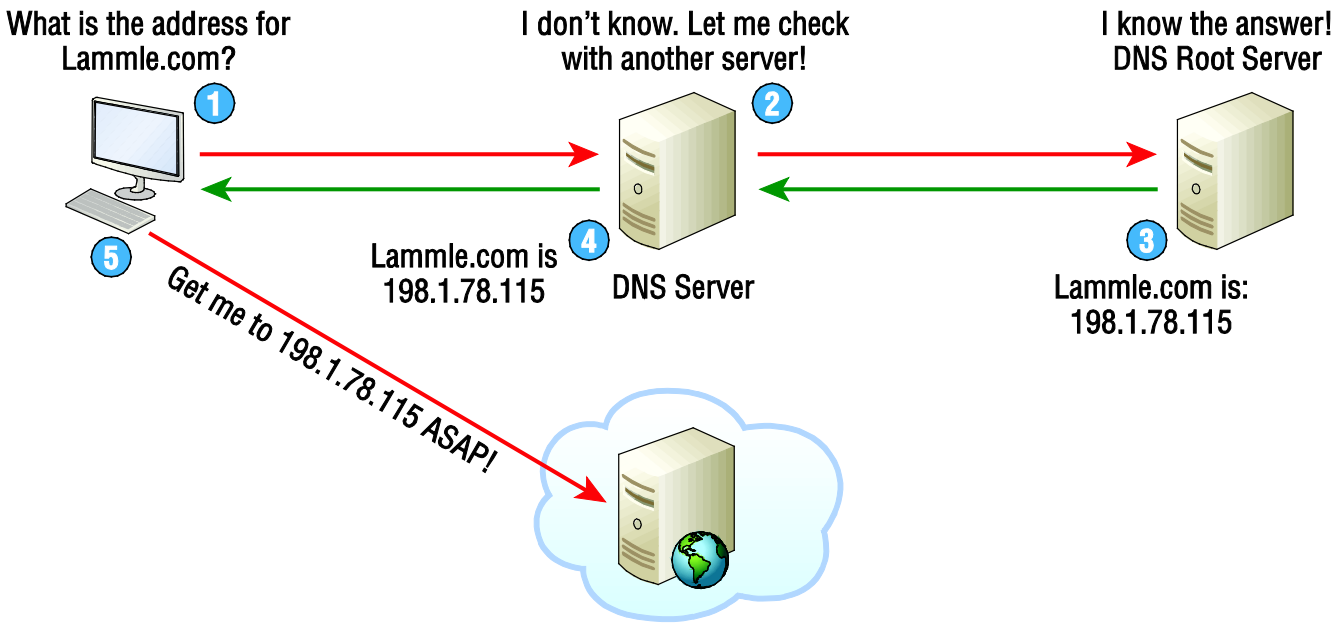
Your browser can understand what you need when you enter a Uniform Resource Locator (URL), which we usually refer to as a web address, e.g. `http://www.lammle.com/forum` and `http://www.lammle.com/blog`.

Figure 3.9: NTP



Network Time Protocol (NTP) works by synchronizing devices to ensure that all computers on a given network agree on the time.

Figure 3.10: DNS



Domain Name Service (DNS) resolves hostnames—specifically, Internet names, such as www.lammle.com. But you don't have to actually use DNS. You just type in the IP address of any device you want to communicate with and find the IP address of a URL by using the Ping program. For example, `>ping www.cisco.com` will return the IP address resolved by DNS.

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Figure 3.11: DHCP client four-step process

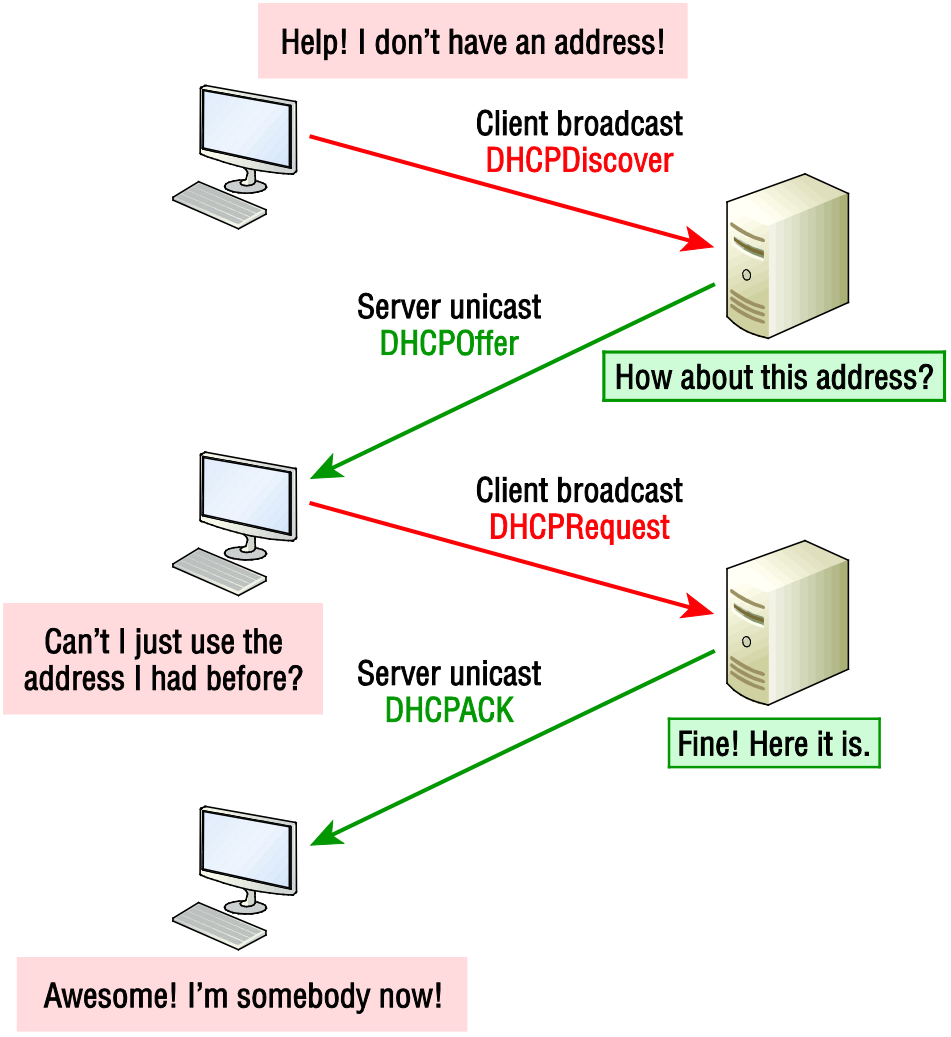

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Figure 3.12: TCP segment format

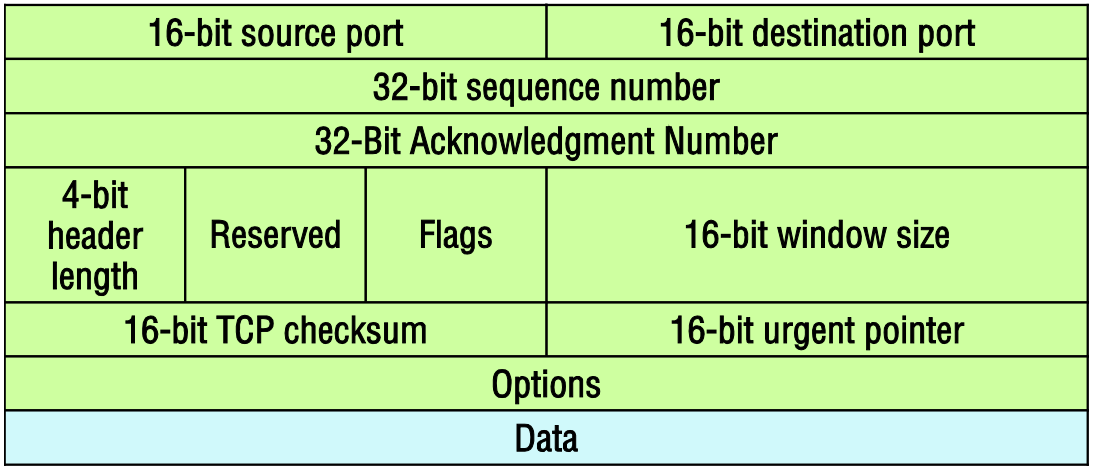

Figure 3.12 shows the TCP segment format and shows the different fields within the TCP header.

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Figure 3.13: UDP segment

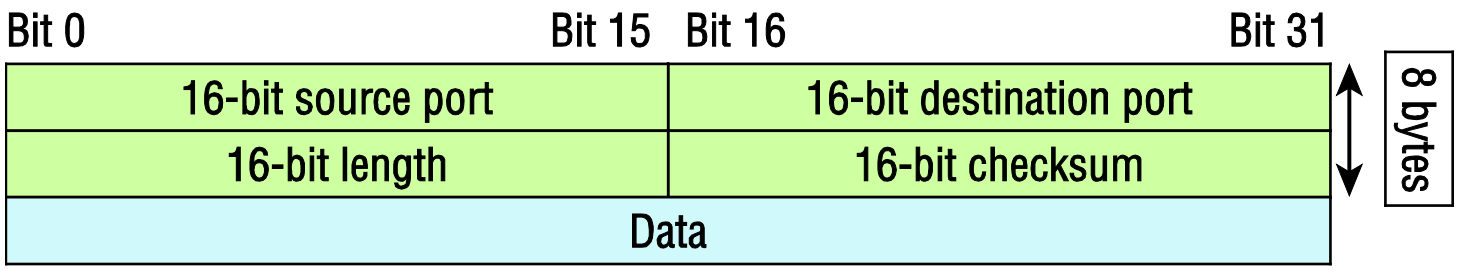

Figure 3.13 clearly illustrates UDP's markedly lean overhead as compared to TCP's hungry requirements. Look at the figure carefully—can you see that UDP doesn't use windowing or provide for acknowledgments in the UDP header?

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Figure 3.15: IP header

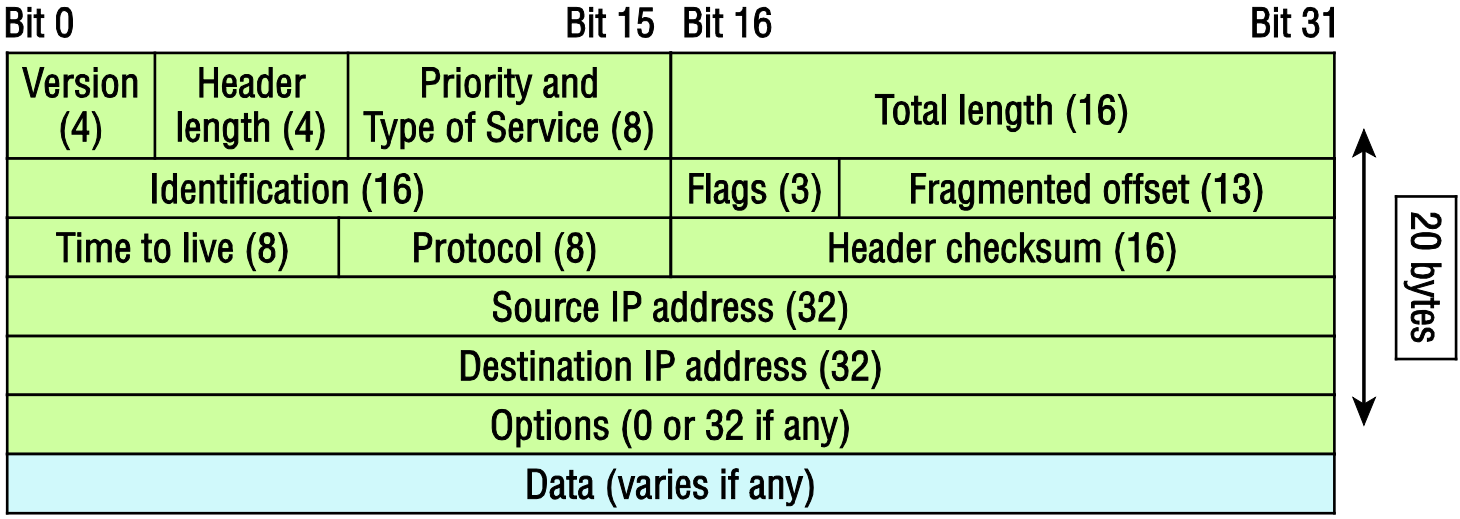

Figure 3.15 shows an IP header. This will give you a picture of what the IP protocol has to go through every time user data that is destined for a remote network is sent from the upper layers.

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Figure 3.17: ICMP error message is sent to the sending host from the remote router.

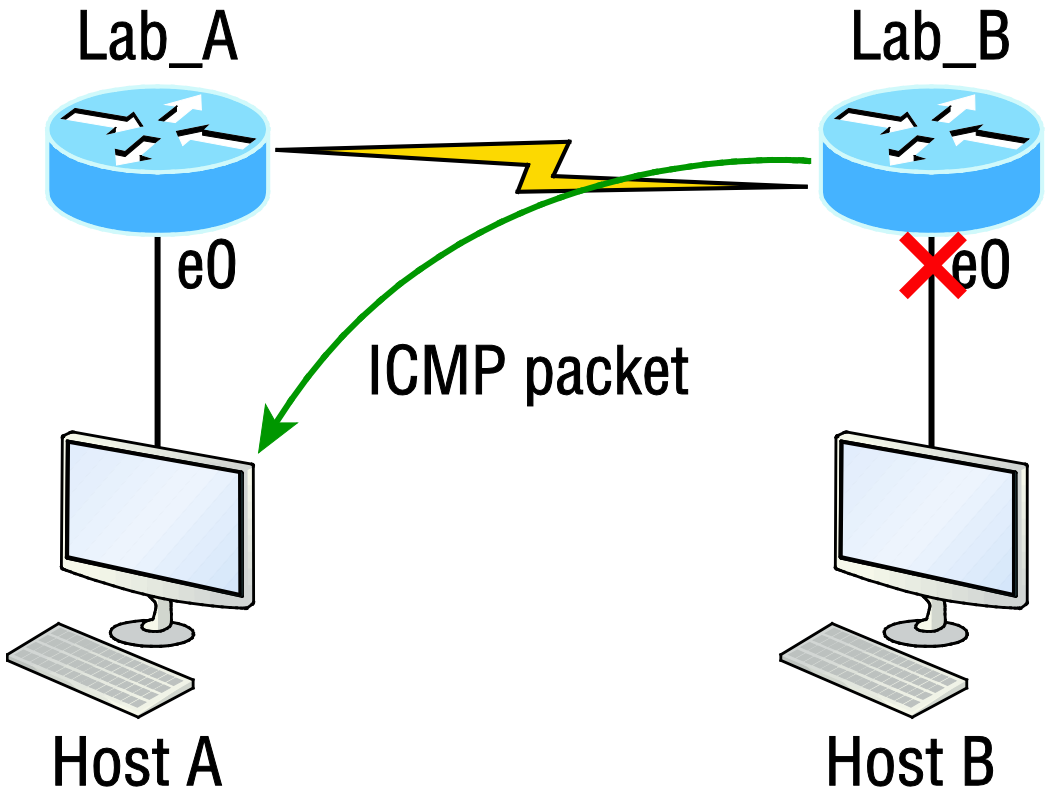

Figure 3.18: ICMP in action

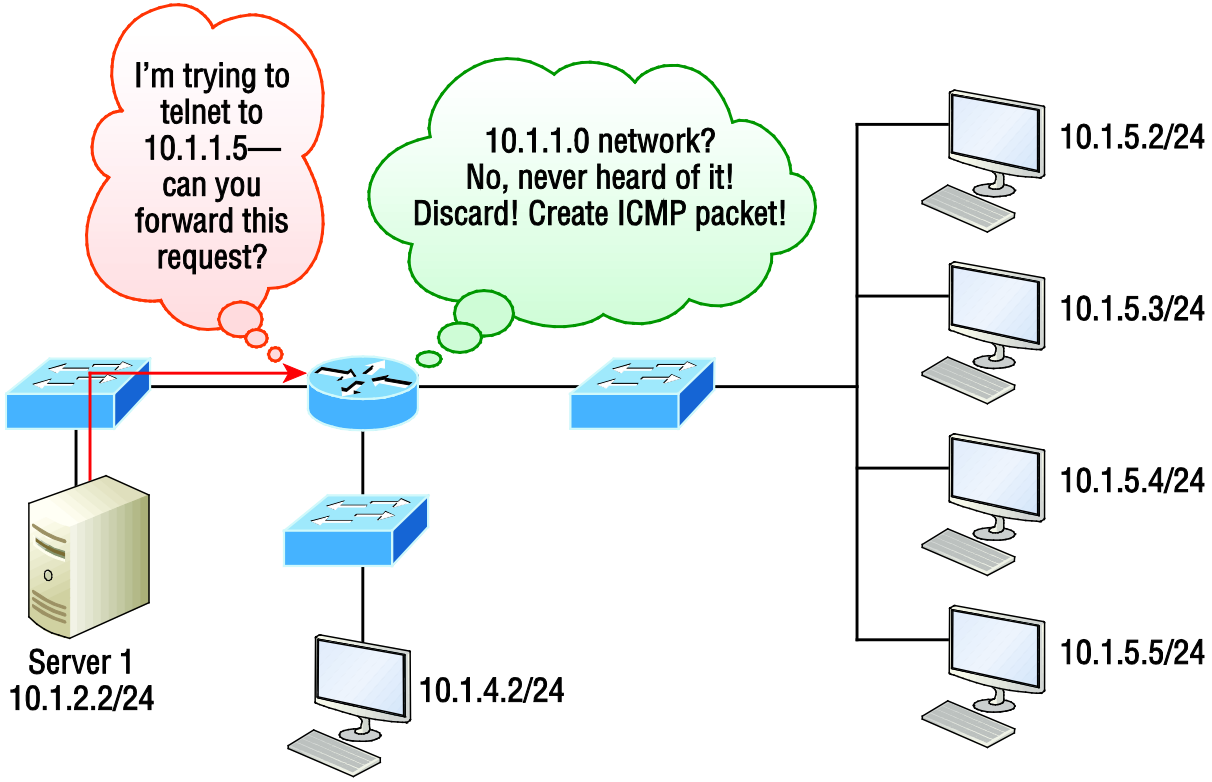

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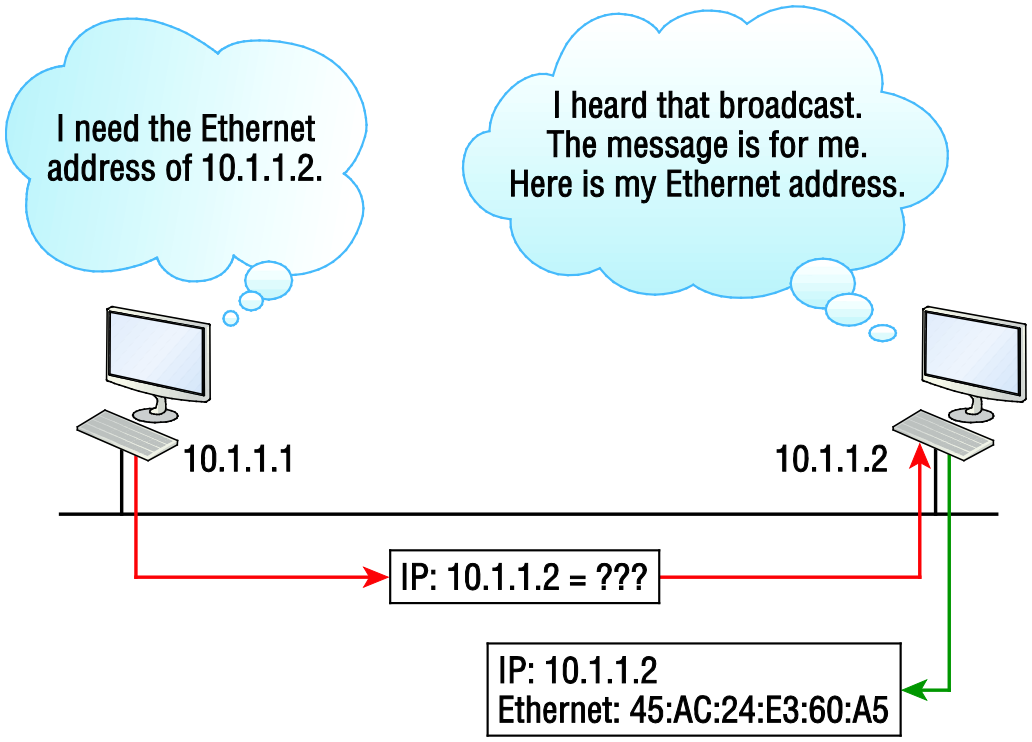
Figure 3.19: Local ARP broadcast



ARP resolves IP addresses to Ethernet (MAC) addresses.

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Figure 3.20: Summary of the three classes of networks

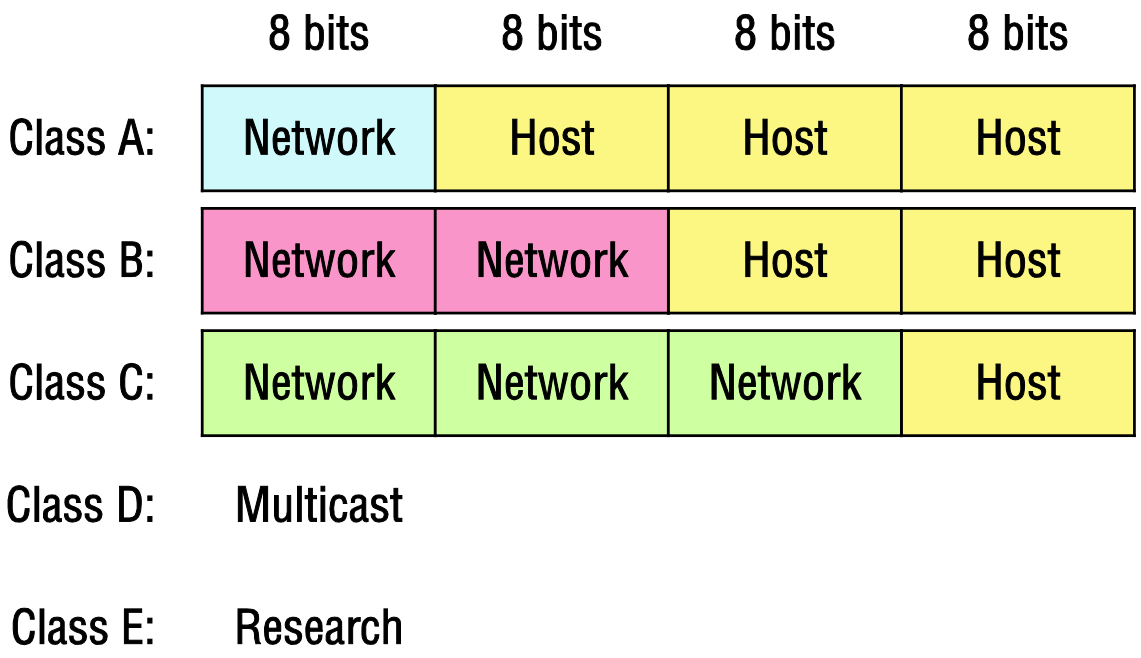

Figure 3.20 summarizes the three classes of networks used to address hosts

Written Labs and Review Questions

- Read through the Exam Essentials section together in class.
- Open your books and go through all the written labs and the review questions.
- Review the answers in class.