

- 2.17. We have seen that in order to deal with lost packets, TFTP implements a timeout-and-retransmit scheme, by setting a retransmission timer when it transmits a packet to the remote host. Most TFTP implementations set this timer to a fixed value of about 5 seconds. Discuss the advantages and the disadvantages of using a fixed value for the retransmission timer.
- 2.18. TFTP's timeout-and-retransmission scheme implies that all data packets will eventually be received by the destination host. Will these data also be received uncorrupted? Why or why not?
- 2.19. This problem concerns material in Appendix E. Based on the principles enunciated in Table E.1.
 - a. Design an architecture with eight layers and make a case for it.
 - b. Design one with six layers and make a case for that.

2.10 SOCKETS PROGRAMMING ASSIGNMENTS

- 2.1. Determining a local machine's IP address is useful when you are handling network communication tasks. Write code to find the IP address of a local machine. Hint: You may use some public DNS, for example, Google public DNS is 8.8.8.8.
- 2.2. Write a sockets program to get a host name for a given IP address.
- 2.3. How to broadcast a message on the Internet? Two questions need to be answered: What address should be used as the broadcast address. How to send data to the broadcast address? A broadcast address is the subnet's network number with all one-bits set for the host portion of the address. For instance, if a network IP address is 192.168.1.0, and the netmask is 255.255.255.0, the last byte of the address is the host number (because the first three bytes, according to the netmask, correspond to the network number). So the broadcast address is 192.168.1.255. Under Unix, the `ifconfig` command will actually give you all this information.
 - a. Determine the broadcast address of your local machine;
 - b. Send a broadcast packet to your broadcast address. Write a code to implement this task.
- 2.4. Write a stream-based echo server and a client sending messages to it, and receiving back each message in turn. Hint: Modify the stream-based TCP client and server programs in this chapter or similar programs to transfer multiple messages back and forth (until the client terminates the connection).
- 2.5. Modify the server program from Exercise 2.4 to set the TCP window size for the server socket. Hint: Set the `SO_RCVBUF` size through a call to `setsockopt()`. Be aware that setting the TCP window size in this way would not guarantee the size for the entire life of the socket because of the inherent TCP window flow control. This exercise solely intends to demonstrate the use of `setsockopt()` and `getsockopt()` calls.
- 2.6. Use `poll()` function and socket programming to receive out-of-band data. Out-of-band data is also called urgent data in TCP, and is often received with first priority via a separate data stream. Hint: Check events and select `POLLPRI`.

APPENDIX 2A THE TRIVIAL FILE TRANSFER PROTOCOL

This appendix provides an overview of the Internet standard Trivial File Transfer Protocol (TFTP), defined in RFC 1350. Our purpose is to give the reader some flavor for the elements of a protocol. TFTP is simple enough to provide a concise example, but includes most of the significant elements found in other, more complex, protocols.