CHAPTER 11

UDP

### Exercises

1. Reliability is not of primary importance in applications such as echo, daytime, BOOTP, TFTP and SNMP. In custom software, reliability can be built into the client/server applications to provide a more reliable, low overhead service.

3. Port addresses do not need to be universally unique as long as each IP address/port address pair uniquely identify a particular process running on a particular host. A good example would be a network consisting of 50 hosts, each running echo server software. Each server uses the well known port number 7, but the IP address, together with the port number of 7, uniquely identify a particular server program on a particular host. Port addresses are shorter than IP addresses because their domain, a single system, is smaller than the domain of IP addresses, all systems on the Internet.

5. See Figure 11.1

Figure 11.1 *Exercise 5*

52010	69
48	0
Data **(40 bytes)**	
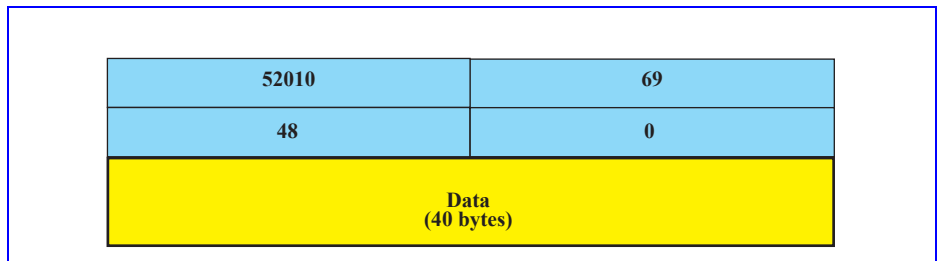
7. The server would use the IP address 130.45.12.7, combined with the well-known port number 69 for its source socket address and the IP address 14.90.90.33, combined with an ephemeral port number as the destination socket address.

9. Since the length of a datagram must be contained in a 2 byte field, the maximum size of a UDP datagram is 65,535 bytes (header plus data). However, given that the IP layer must also store the total length of the packet in a 2 byte field, the maximum length would be 20 bytes less than this, or 65,515 bytes, to leave room for the IP header. The implementation may impose a smaller limit than this.

11. The largest amount of process data that can be encapsulated in a UDP datagram is 65,507 bytes. (65,535 minus 8 bytes for the UDP header minus 20 bytes for the IP header). The implementation may impose a smaller limit than this.

13. 16 bytes of data / 24 bytes of total length = 0.666

15. 16 bytes of data / 72 byte minimum frame size = 0.222