addresses for maintenance, testing, and debugging. Choosing to make all of a machine's addresses end with the same value makes it easier for humans to remember or guess the address of a particular interface.

5.25 Summary

TCP/IP protocols require each computer to have a unique binary address called an Internet Protocol address or IP address. IPv4 uses 32-bit addresses which are partitioned into two main pieces: a prefix identifies the network to which the computer attaches, and the suffix provides a unique identifier for a computer on that network. The original IPv4 addressing scheme is known as classful; a prefix belongs to one of three primary classes. Later variations extended the IPv4 addressing mechanism with subnet addressing and classless addressing. Classless IPv4 addressing uses a bit mask to specify how many bits correspond to a prefix.

To make addresses easier for humans to understand, syntactic forms have been invented. IPv4 addresses are written in dotted decimal notation in which each octet is written in decimal, with the values separated by decimal points. IPv6 addresses are written in colon hex notation, with octets represented in hexadecimal separated by colons.

IP addresses refer to network connections rather than individual hosts. Therefore, a router or multihomed host has multiple IP addresses.

Both IPv4 and IPv6 include special addresses. IPv4 permits network-specific, subnet-specific, and local broadcast as well as multicast. IPv6 has link-local addresses and anycast as well as multicast. A set of IPv4 prefixes has been reserved for use on private intranets.

EXERCISES

5.1 How many class *A*, *B*, and *C* networks can exist? How many hosts can a network in each class have? Be careful to allow for broadcast as well as class *D* and *E* addresses.

5.2 If your site uses IPv4, find out what size address mask is used. How many hosts does it permit your site to have?

5.3 Does your site permit IPv4 directed broadcast packets? (Think of a way to test by using ping.)

5.4 If your site uses IPv6, try sending a ping to the all-nodes multicast address. How many responses are received?

5.5 If your site uses IPv6, find out when IPv6 was first deployed.

5.6 What is the chief difference between the IP addressing scheme and the U.S. telephone numbering scheme?