one of these hypothetical network IDs. Because that network uses only 1,000 of its 65,536 host addresses, more than 64,000 IP addresses would be wasted.

As a solution to this problem, the idea of IP address classes was introduced. The IP protocol defines five different address classes: A, B, C, D, and E. Each of the first three classes, A–C, uses a different size for the network ID and host ID portion of the address. Class D is for a special type of address called a *multicast address.* Class E is an experimental address class that isn't used.

The first four bits of the IP address are used to determine into which class a particular address fits:

- If the first bit is 0, the address is a Class A address.
- If the first bit is 1 and the second bit is 0, the address is a Class B address.
- If the first two bits are both 1 and the third bit is 0, the address is a Class C address.
- If the first three bits are all 1 and the fourth bit is 0, the address is a Class D address.
- If the first four bits are all 1, the address is a Class E address.

Because Class D and E addresses are reserved for special purposes, I focus the rest of this discussion on Class A, B, and C addresses. Table 6-1 summarizes the details of each address class.

TABLE 6-1 IP Address Classes

Class	Address Range	Starting Bits	Length of Network ID	Number of Networks	Number of Hosts
A	1–126.*x.y.z*	0	8	126	16,777,214
B	128–191.*x.y.z*	10	16	16,384	65,534
C	192–223.*x.y.z*	110	24	2,097,152	254

Class A addresses

Class A addresses are designed for very large networks. In a Class A address, the first octet of the address is the network ID, and the remaining three octets are the host ID. Because only eight bits are allocated to the network ID and the first of