Example 3.10

An ISP is granted a block of addresses starting with 190.100.0.0/16 (65,536 addresses). The ISP needs to distribute these addresses to three groups of customers as follows:

a. The first group has 64 customers; each needs 256 addresses.

b. The second group has 128 customers; each needs 128 addresses.

c. The third group has 128 customers; each needs 64 addresses.

Design the subblocks and find out how many addresses are still available after these allocations.

Example 3.10 (continued)

Solution

Figure 3.9 shows the situation.

Group 1

For this group, each customer needs 256 addresses. This means that 8 (log2 256) bits are needed to define each host. The prefix length is then 32 − 8 = 24. The addresses are

1st Customer:	*190.100.0.0/24*	*190.100.0.255/24*
2nd Customer:	*190.100.1.0/24*	*190.100.1.255/24*
. . .		
64th Customer:	*190.100.63.0/24*	*190.100.63.255/24*
Total = 64 × 256 = 16,384		

Example 3.10 (continued)

Group 2

For this group, each customer needs 128 addresses. This means that 7 (log2 128) bits are needed to define each host. The prefix length is then 32 − 7 = 25. The addresses are

1st Customer:	*190.100.64.0/25*	*190.100.64.127/25*
2nd Customer:	*190.100.64.128/25*	*190.100.64.255/25*
. . .		
128th Customer:	*190.100.127.128/25*	*190.100.127.255/25*
Total = 128×128 = *16,384*		

Example 3.10 (continued)

Group 3

For this group, each customer needs 64 addresses. This means that 6 ($\log_2 64$) bits are needed to each host. The prefix length is then 32 − 6 = 26. The addresses are

1st Customer:	*190.100.128.0/26*	*190.100.128.63/26*
2nd Customer:	*190.100.128.64/26*	*190.100.128.127/26*
. . .		
128th Customer:	*190.100.159.192/26*	*190.100.159.255/26*
Total = 128 × 64 = 8192		

Number of granted addresses to the ISP: 65,536
Number of allocated addresses by the ISP: 40,960
Number of available addresses: 24,576

Figure 3.9 *An example of address allocation and distribution by an ISP*

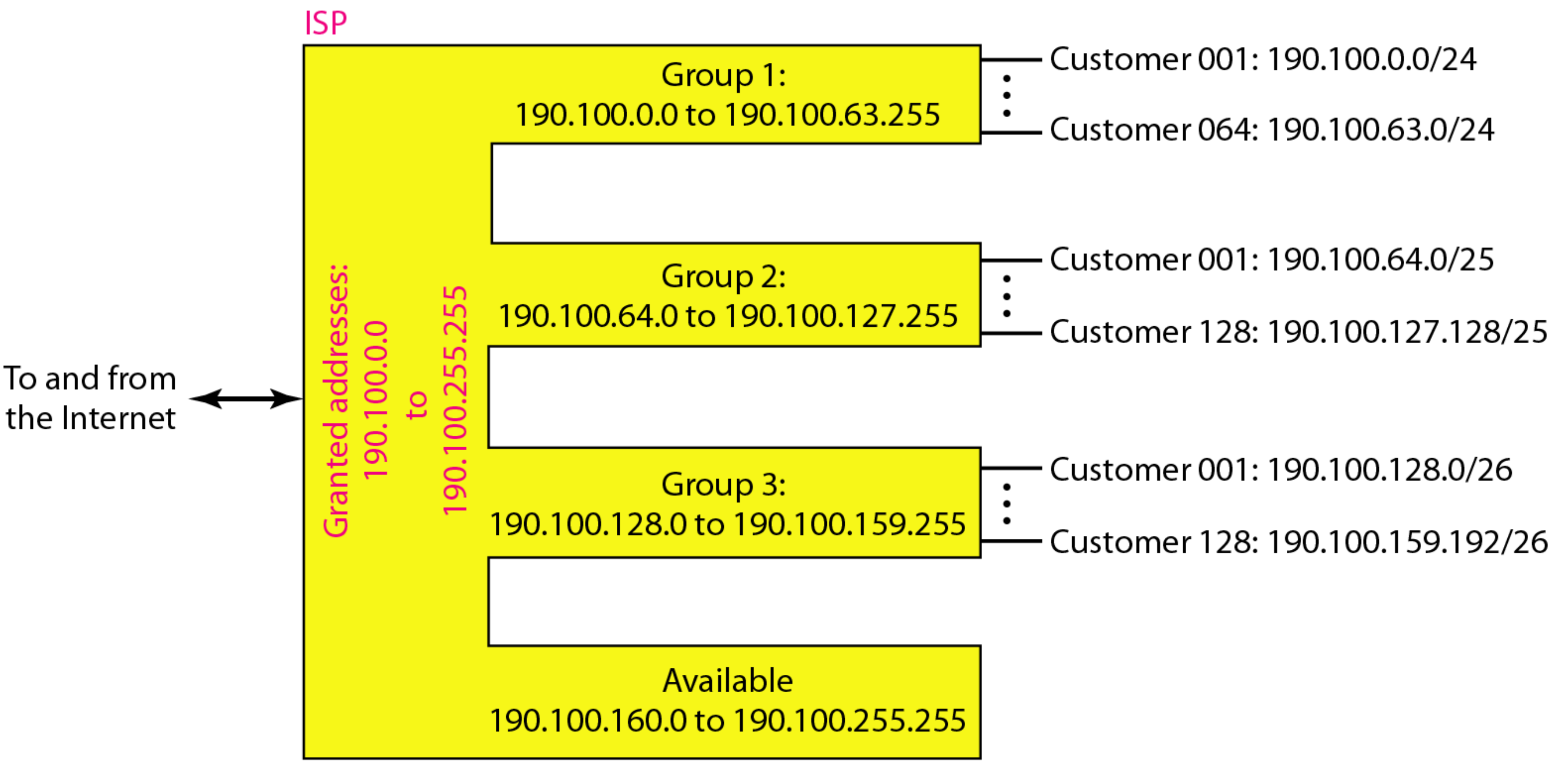

Table 3.3 ***Addresses for private networks***

Range			*Total*
10.0.0.0	to	10.255.255.255	2^{24}
172.16.0.0	to	172.31.255.255	2^{20}
192.168.0.0	to	192.168.255.255	2^{16}

Example 3.11 :A company is granted the site address 211.80.64.0 .The company needs six subnets. Design the subnets?

Solution:

No. of subnet must be power of 2 therefore we design 8 subnets

No.of subnet bits=Log2(8)=3 bits

Ip address 211.80.64.0 is class c

Net	Sub	Host
24 Bit	**3 Bit**	**8 Bit**

Subnet	NET .	Subnet .	Host	Subnet IP
Subnet 0	211.80.64	000	00000	211.80.64.0
	211.80.64	000	11111	211.80.64.31
Subnet 1	211.80.64	001	00000	211.80.64.32
	211.80.64	001	11111	211.80.64. 63
Subnet 2	211.80.64	010	00000	211.80.64.64
	211.80.64	010	11111	211.80.64. 95
Subnet 3	211.80.64	011	00000	211.80.64.96
	211.80.64	011	11111	211.80.64. 127
Subnet 4	211.80.64	100	00000	211.80.64. 128
	211.80.64	100	11111	211.80.64. 159
Subnet 5	211.80.64	101	00000	211.80.64. 160
	211.80.64	101	11111	211.80.64. 191
Subnet 6	211.80.64	110	00000	211.80.64. 192
	211.80.64	110	11111	211.80.64. 223
Subnet 7	211.80.64	111	00000	211.80.64. 224
	211.80.64	111	11111	211.80.64. 255