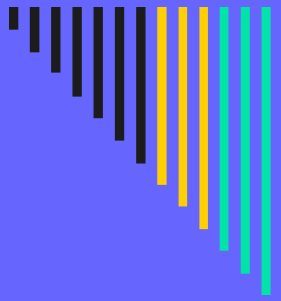
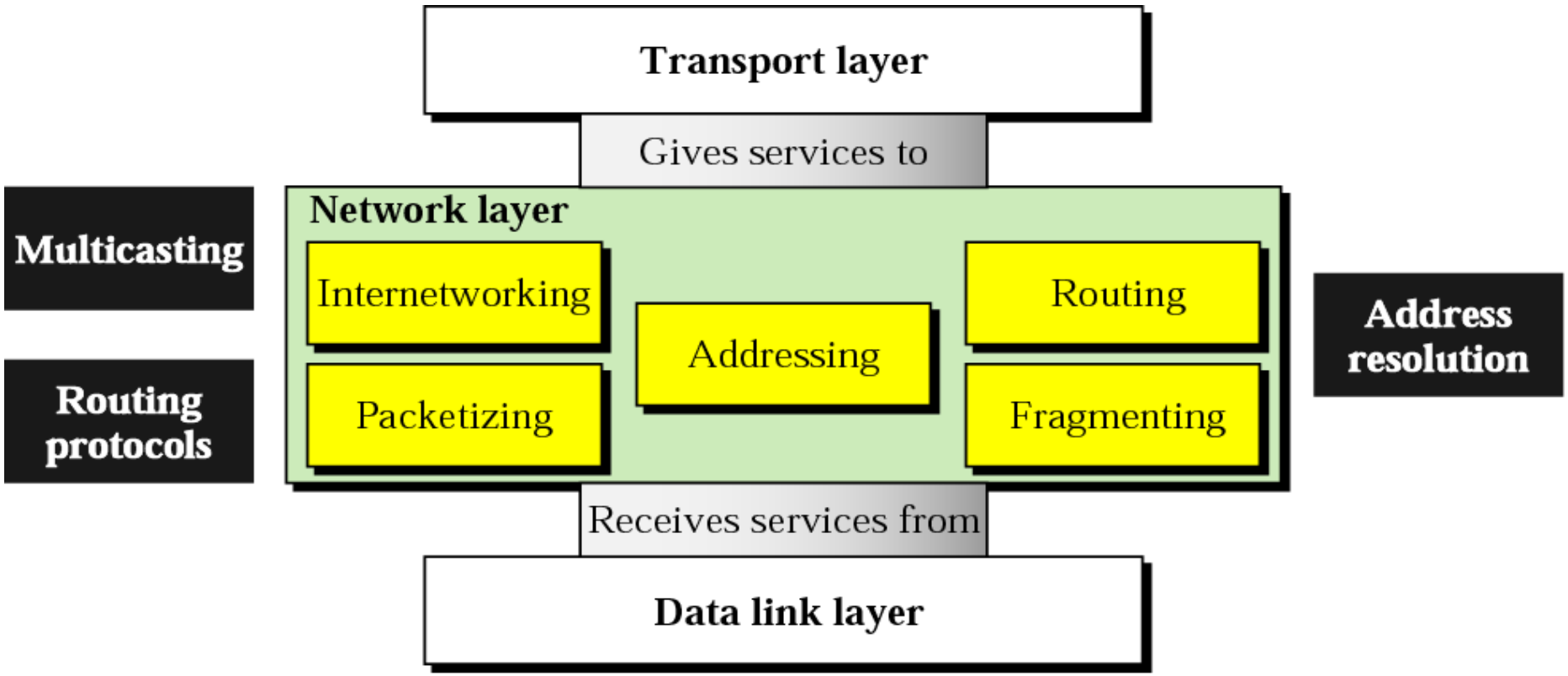


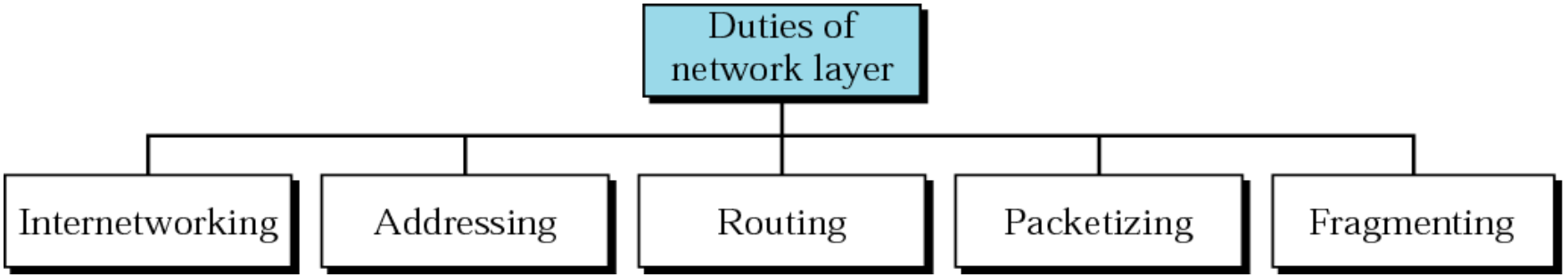
PART IV

Network Layer

Position of network layer



Network layer duties



Chapter 19

Host-to-Host Delivery: Internetworking, Addressing, and Routing

Figure 19.1 Internetwork

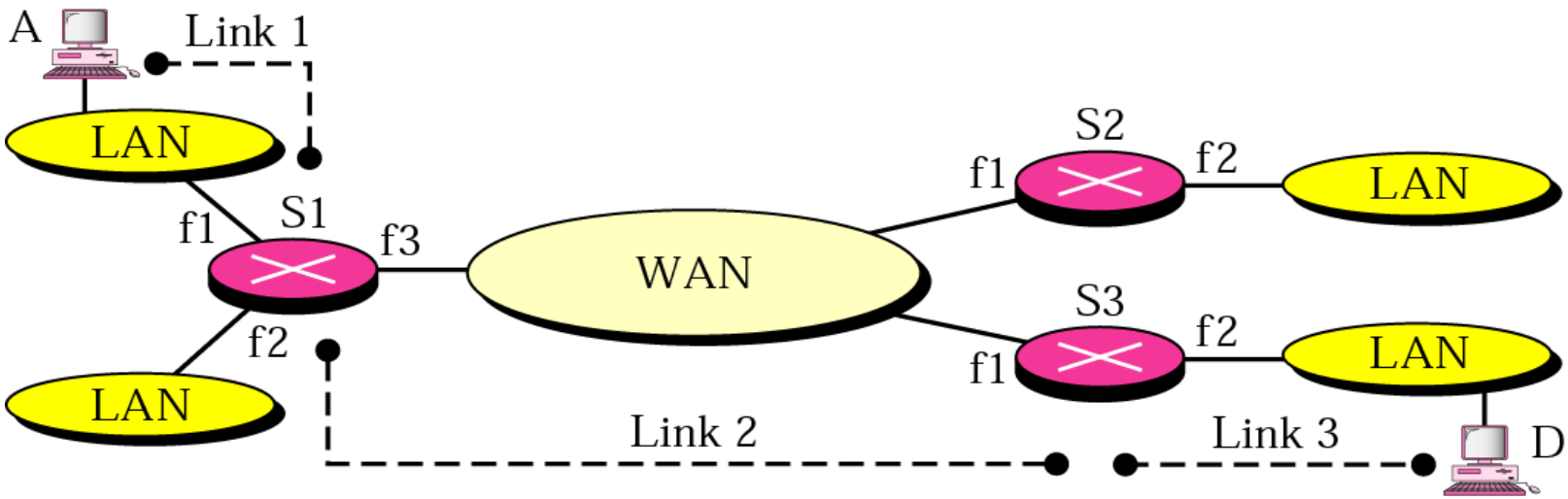


Figure 19.2 Links in an internetwork

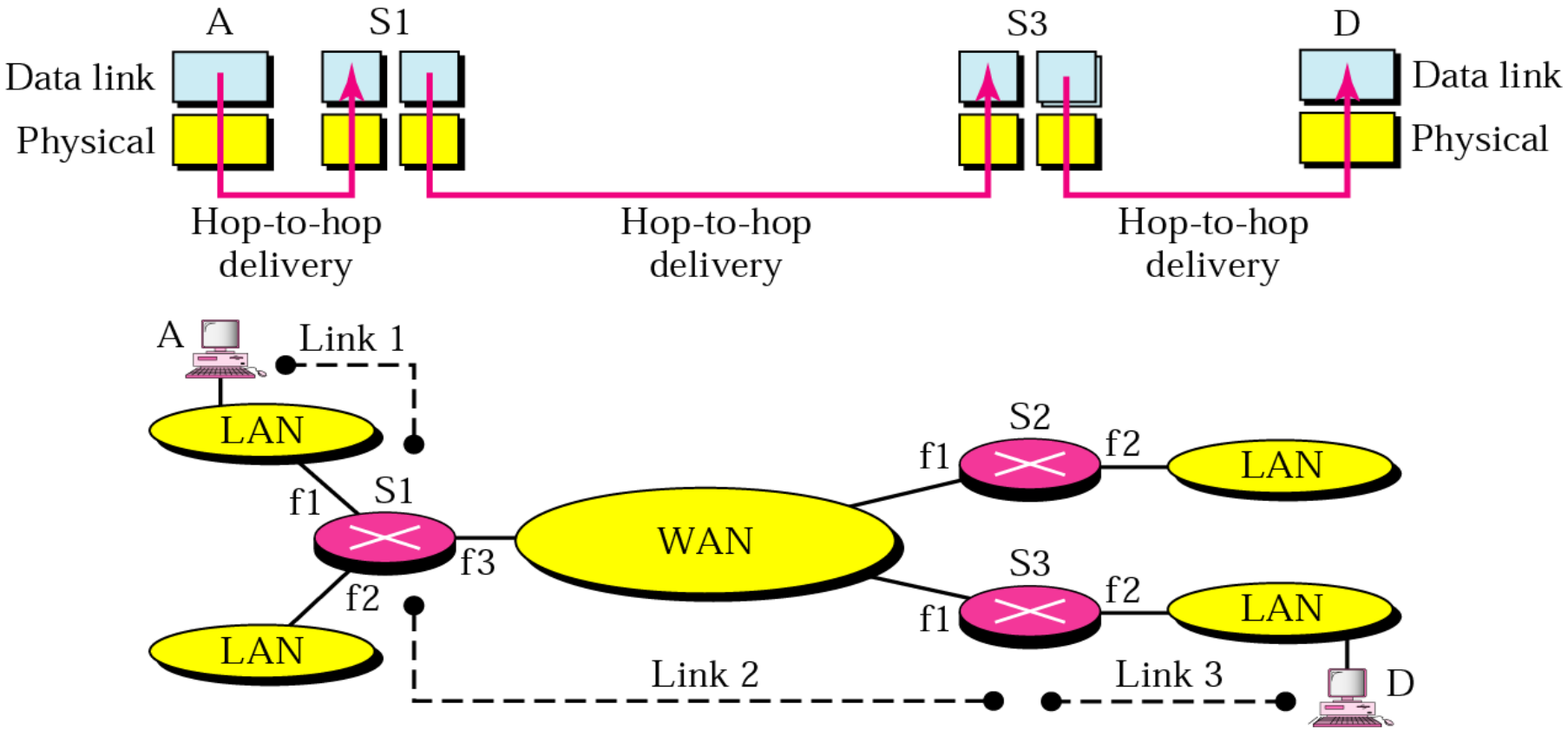


Figure 19.3 Network layer in an internetwork

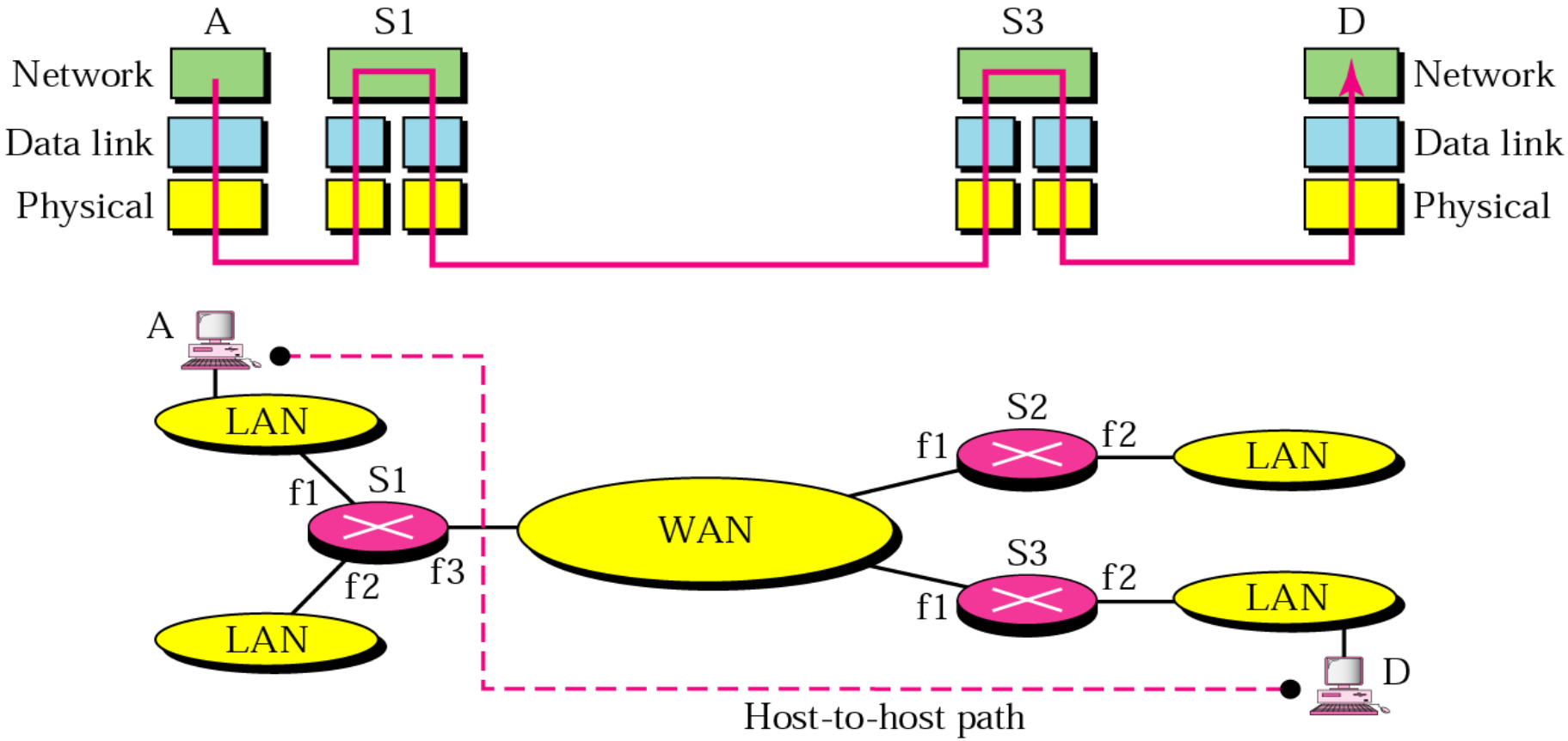


Figure 19.4 Network layer at the source

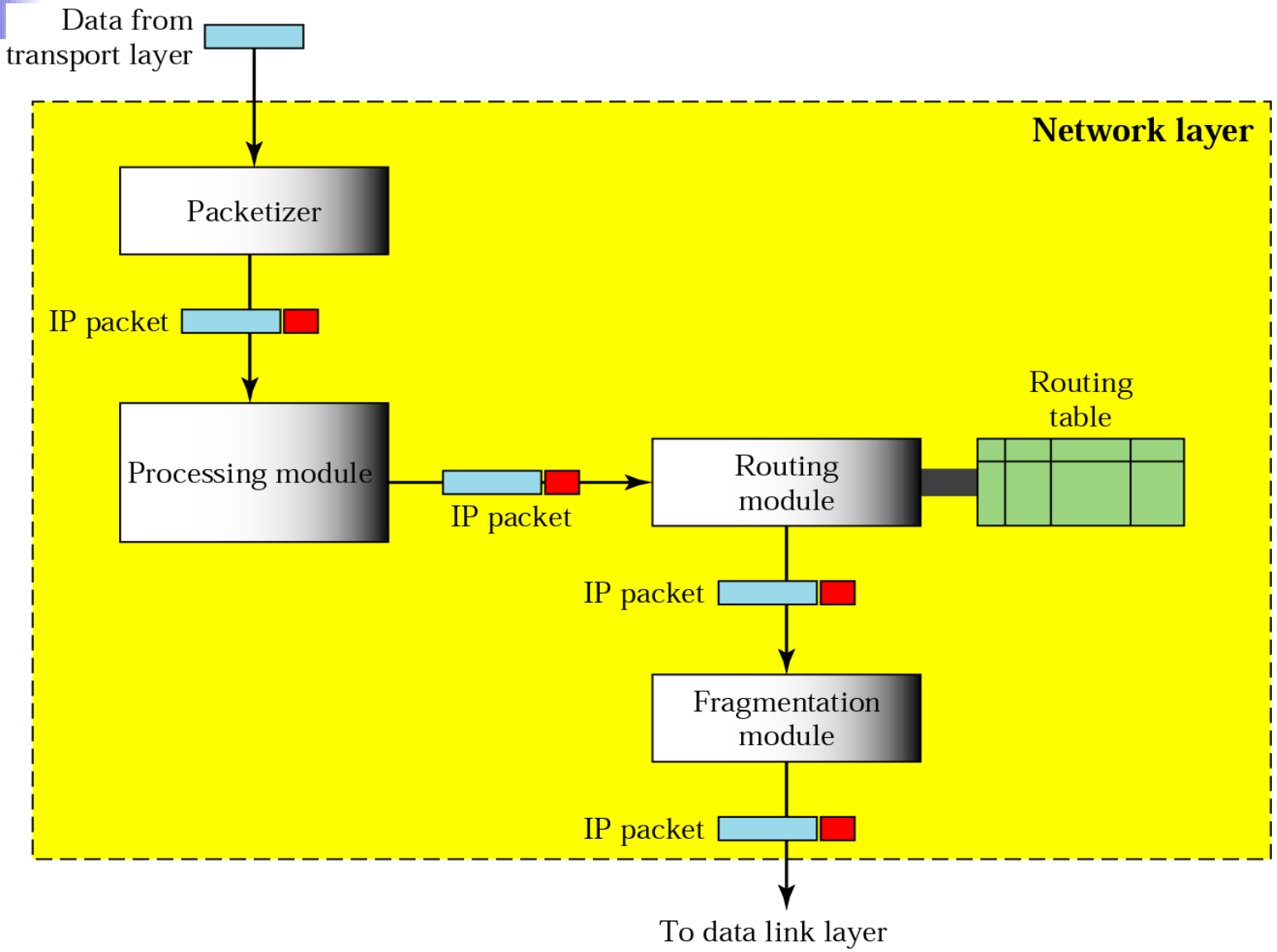


Figure 19.5 Network layer at a router

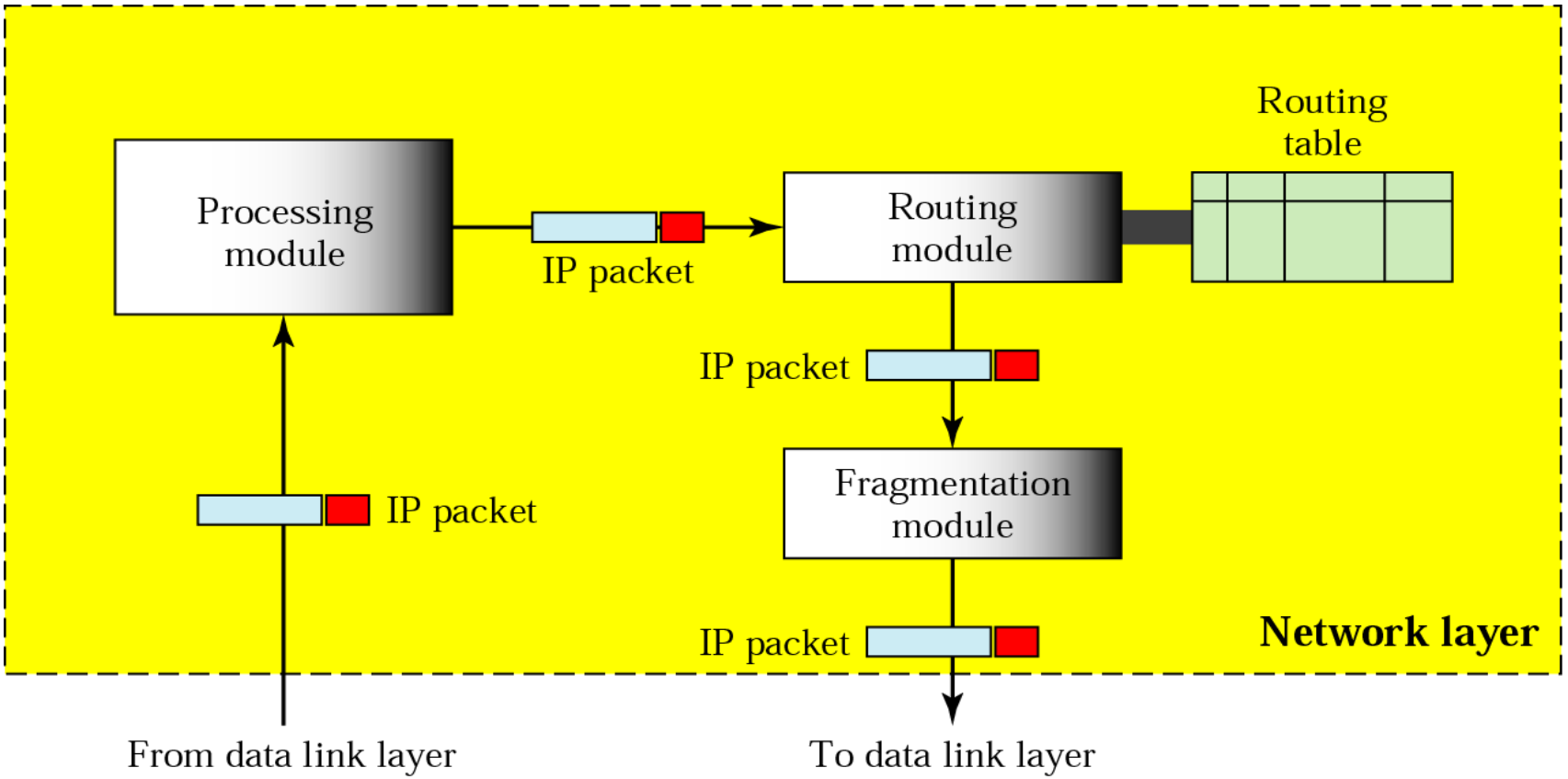


Figure 19.6 Network layer at the destination

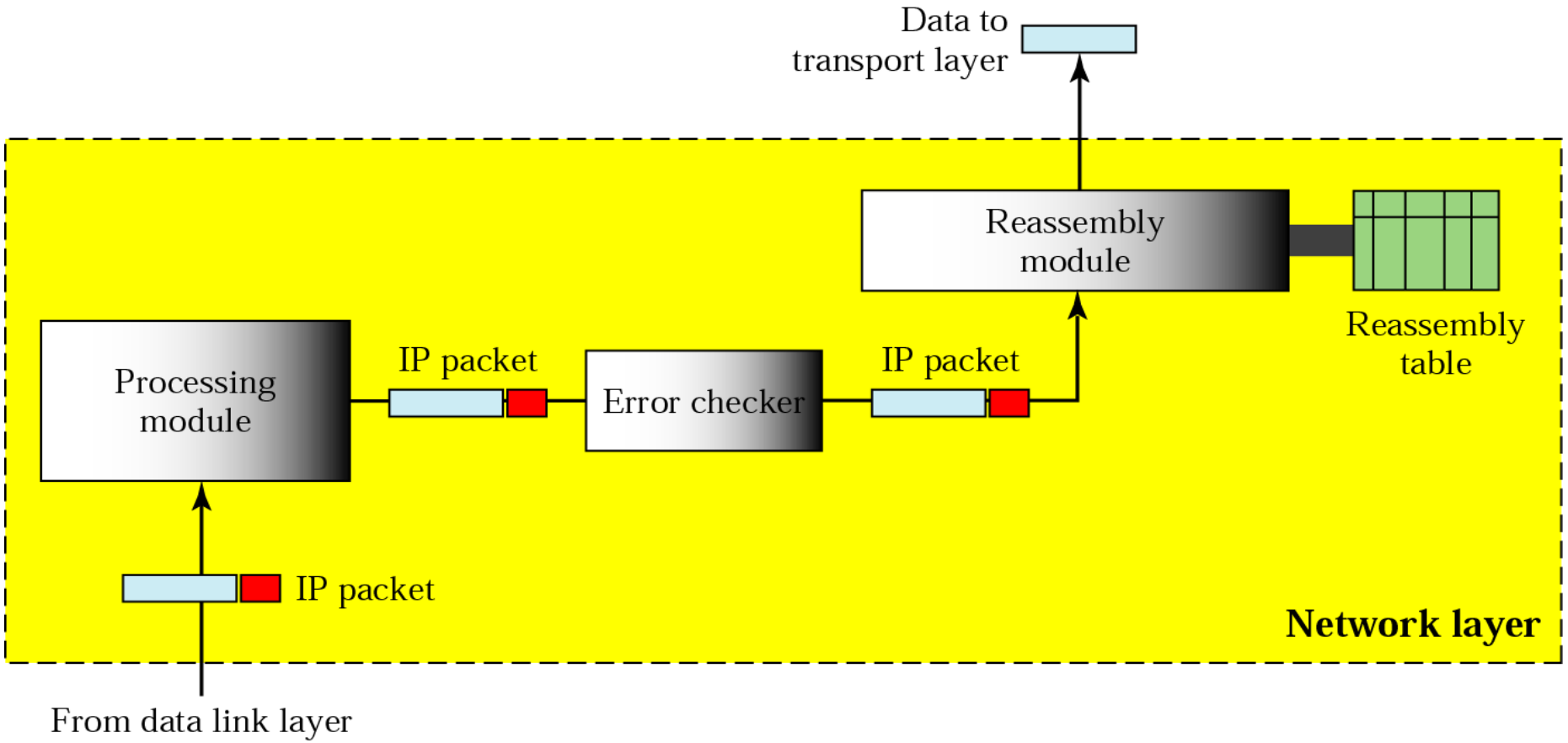


Figure 19.7 Switching

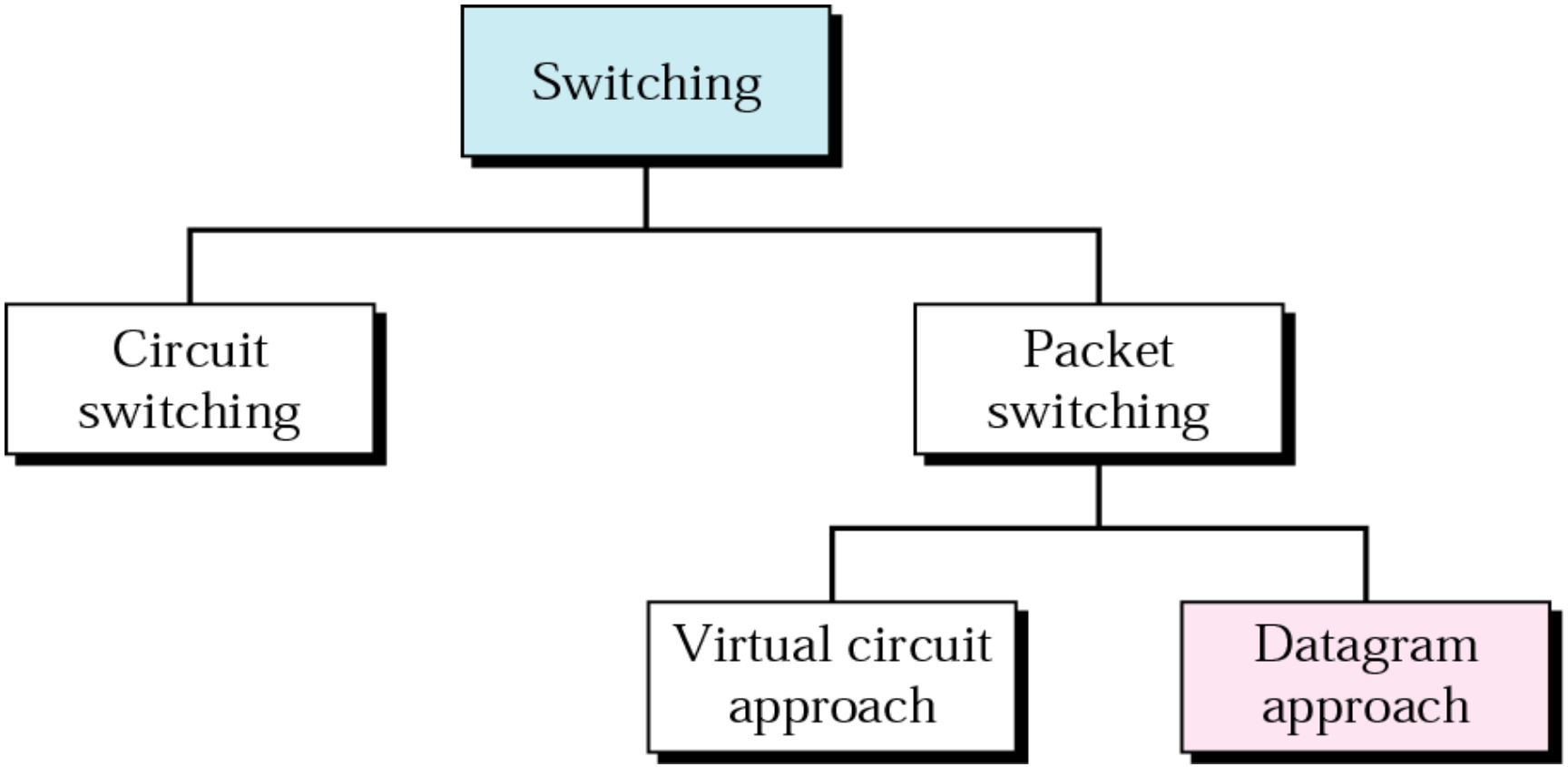
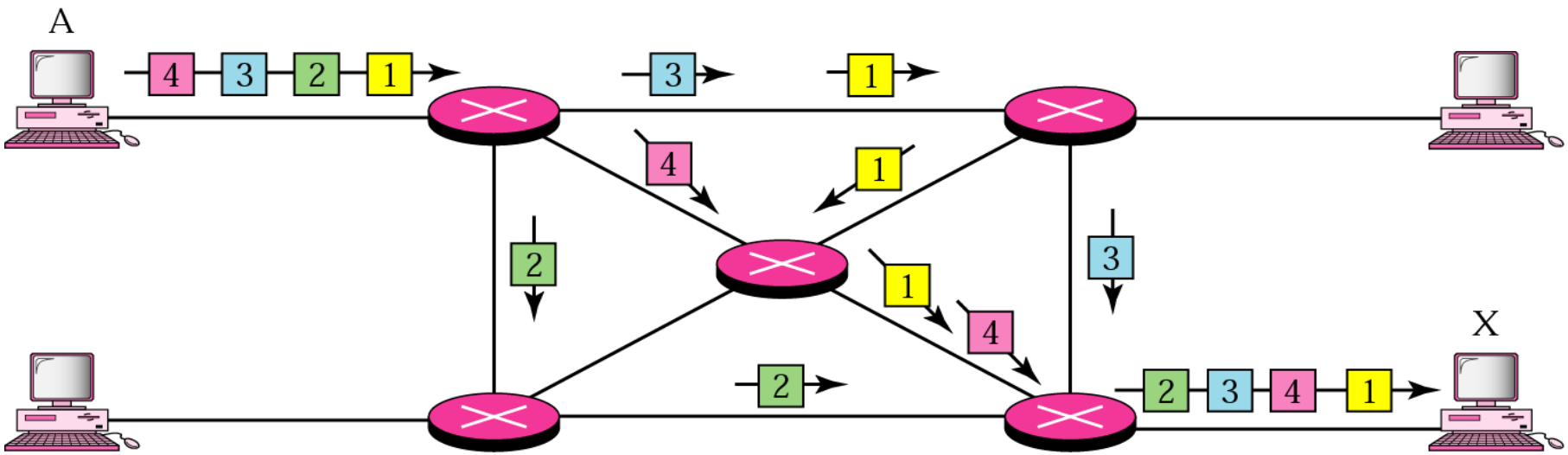


Figure 19.8 Datagram approach



Switching at the network layer in the Internet is done using the datagram approach to packet switching.

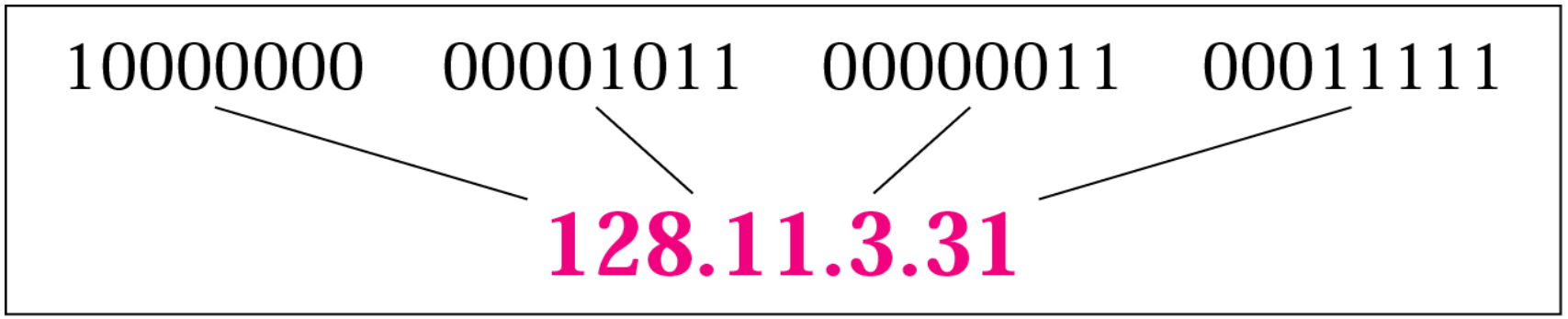
Note:

Communication at the network layer in the Internet is connectionless.

An IP address is a 32-bit address.

The IP addresses are unique and universal.

Figure 19.9 Dotted-decimal notation



Example 1

Change the following IP addresses from binary notation to dotted-decimal notation.

a. 10000001 00001011 00001011 11101111

b. 11111001 10011011 11111011 00001111

Solution

We replace each group of 8 bits with its equivalent decimal number (see Appendix B) and add dots for separation:

a. 129.11.11.239

b. 249.155.251.15

Example 2

Change the following IP addresses from dotted-decimal notation to binary notation.

a. 111.56.45.78

b. 75.45.34.78

Solution

We replace each decimal number with its binary equivalent (see Appendix B):

a. 01101111 00111000 00101101 01001110
b. 01001011 00101101 00100010 01001110

Note:

In classful addressing, the address space is divided into five classes: A, B, C, D, and E.

Figure 19.10 Finding the class in binary notation

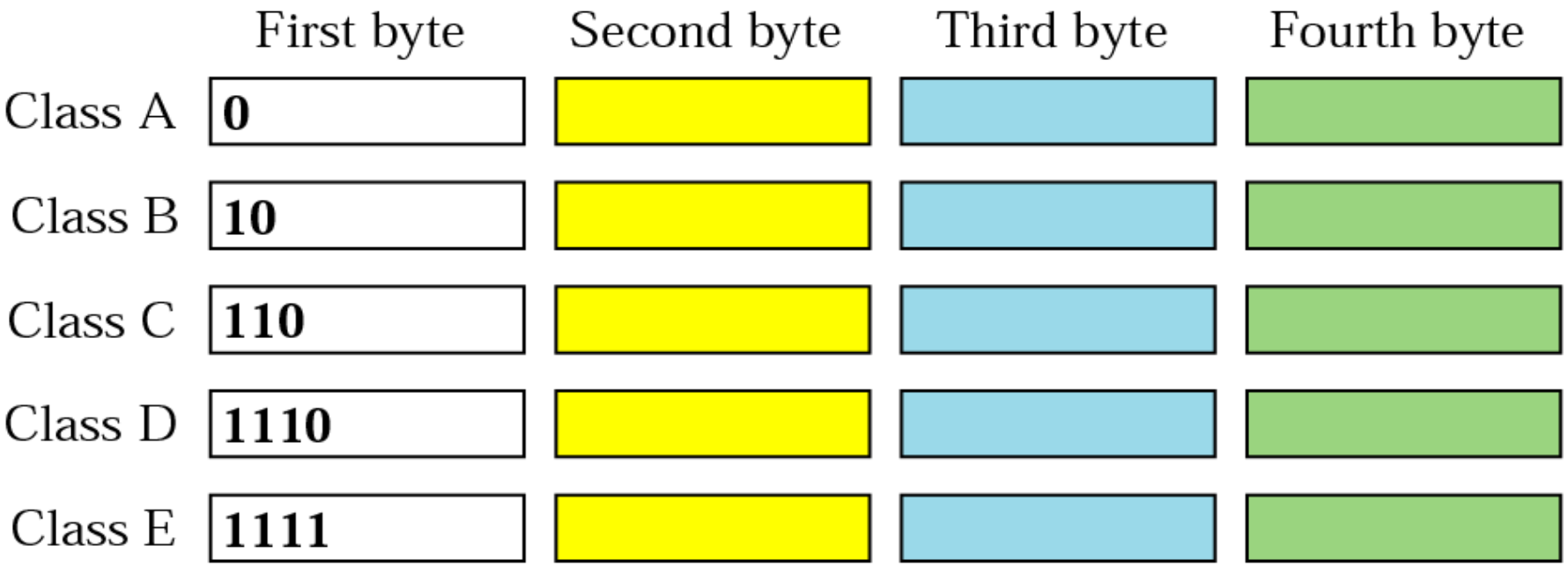
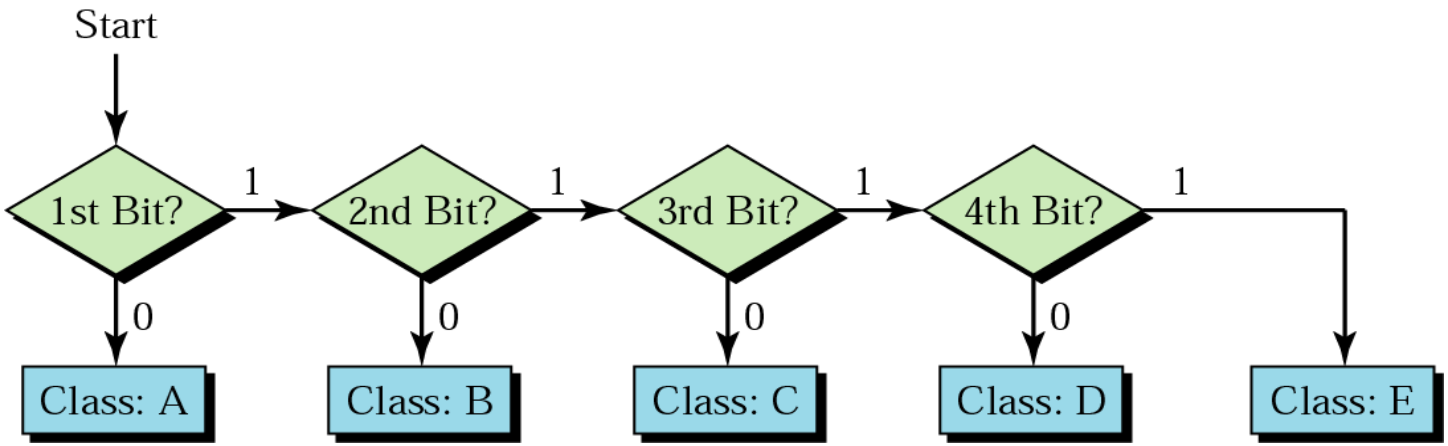


Figure 19.11 Finding the address class



Example 3

Find the class of each address:

a. **0**0000001 00001011 00001011 11101111

b. **1111**0011 10011011 11111011 00001111

Solution

See the procedure in Figure 19.11.

a. The first bit is 0; this is a class A address.

b. The first 4 bits are 1s; this is a class E address.

Figure 19.12 Finding the class in decimal notation