Introduction to Addressing

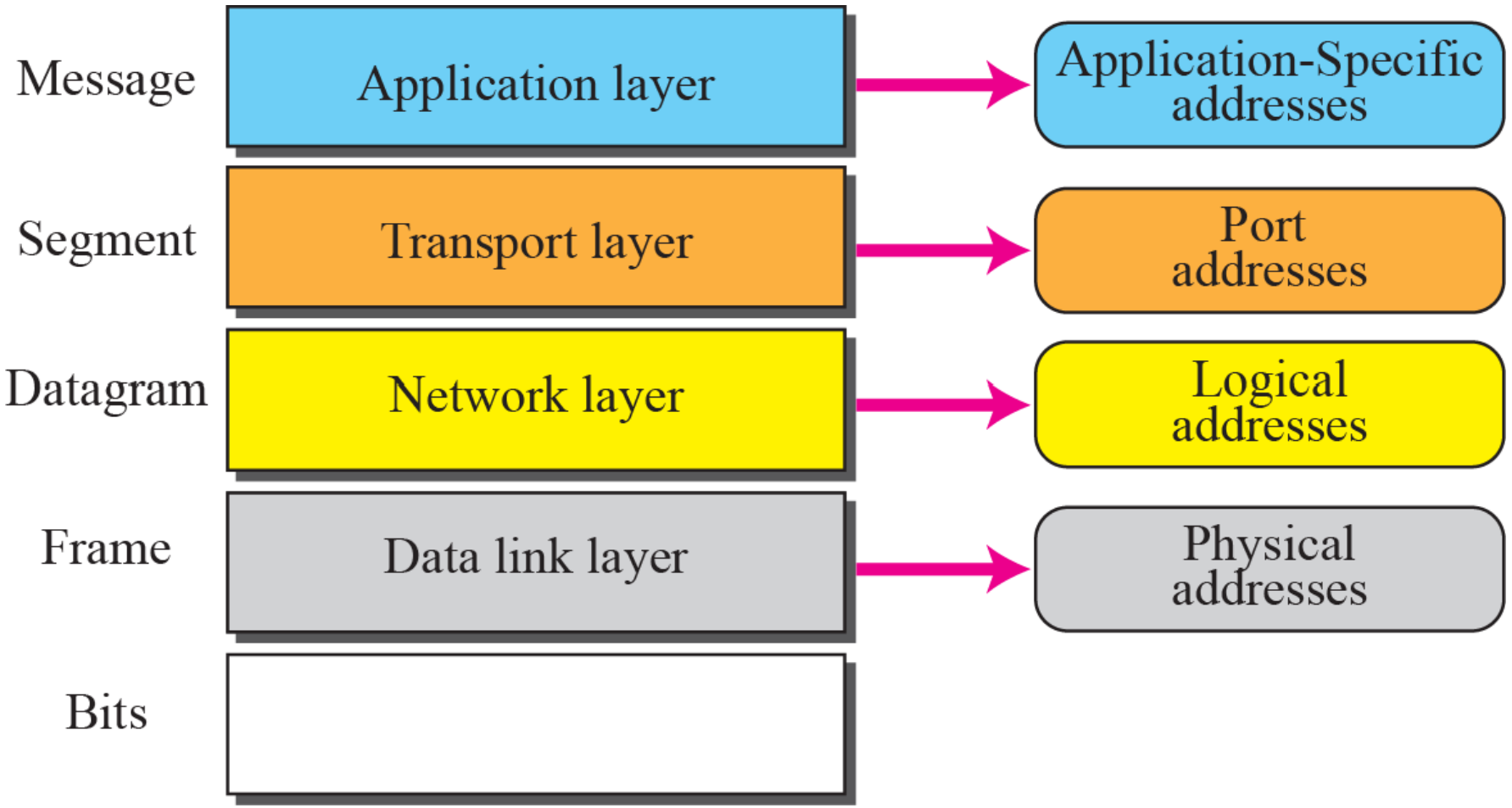
2-4 ADDRESSING

Four levels of addresses are used in an internet employing the TCP/IP protocols: physical address, logical address, port address, and application-specific address. Each address is related to a one layer in the TCP/IP architecture, as shown in Figure 2.15.

Topics Discussed in the Section

- ✓ Physical Addresses
- ✓ Logical Addresses
- ✓ Port Addresses
- ✓ Application-Specific Addresses

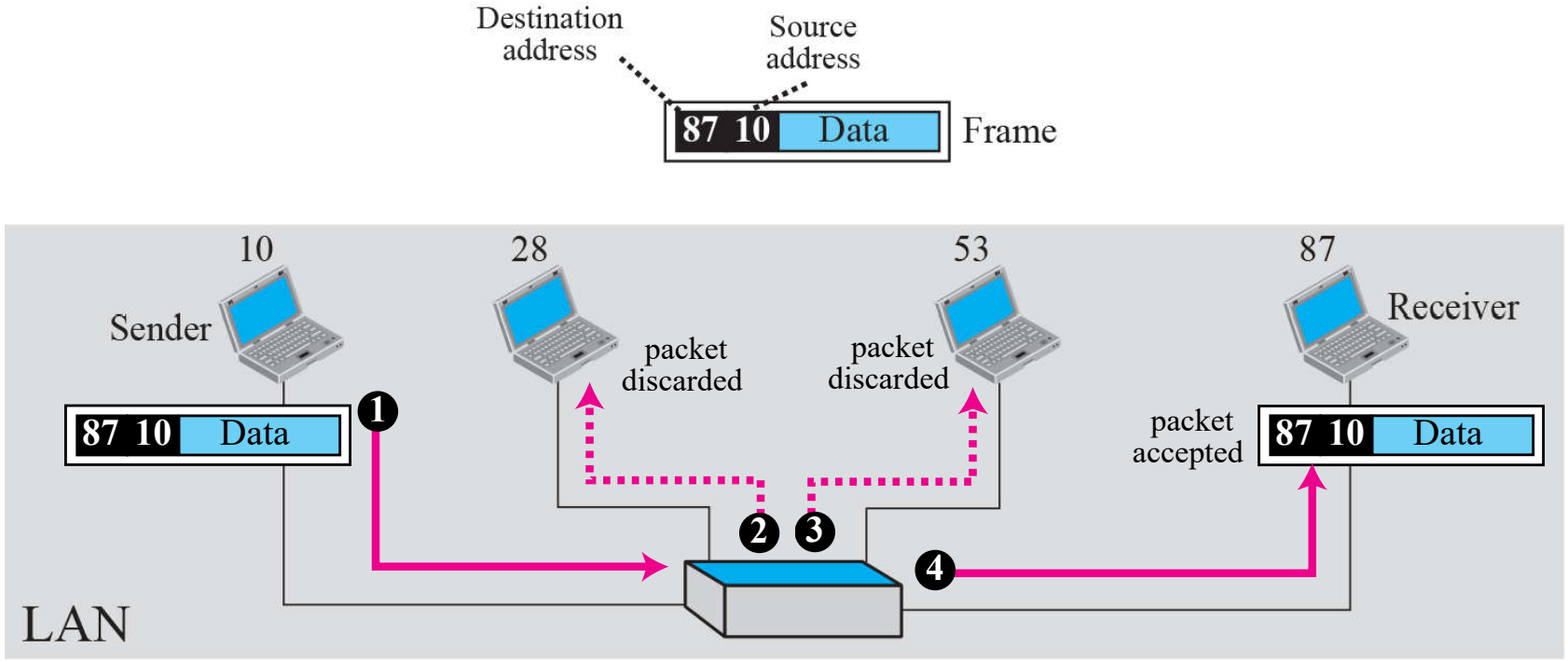
Figure 2.15 *Addresses in the TCP/IP protocol suite*



Example 2.3

- In Figure 2.16 a node with physical address 10 sends a frame to a node with physical address 87.
- The two nodes are connected by a link (a LAN).
- At the data link layer, this frame contains physical (link) addresses in the header.
- These are the only addresses needed.
- The rest of the header contains other information needed at this level.
- As the figure shows, the computer with physical address 10 is the sender, and the computer with physical address 87 is the receiver.
- The data link layer at the sender receives data from an upper layer. It encapsulates the data in a frame. The frame is propagated through the LAN.
- Each station with a physical address other than 87 drops the frame because the destination address in the frame does not match its own physical address.
- The intended destination computer, however, finds a match between the destination address in the frame and its own physical address.

Figure 2.16 *Example 2.3: physical addresses*



Example 2.4

As we will see in Chapter 3, most local area networks use a 48-bit (6-byte) physical address written as 12 hexadecimal digits; every byte (2 hexadecimal digits) is separated by a colon, as shown below:

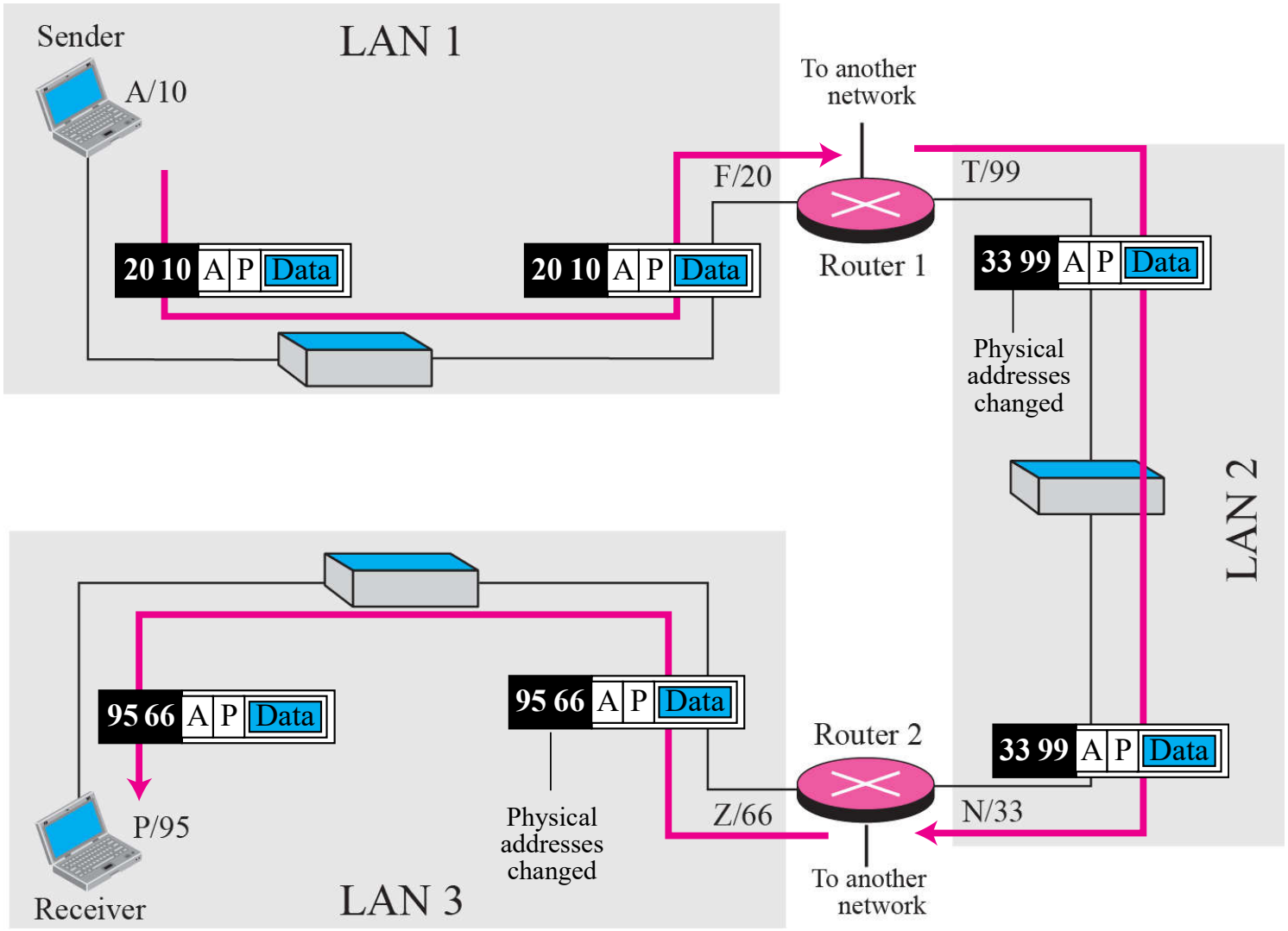
07:01:02:01:2C:4B

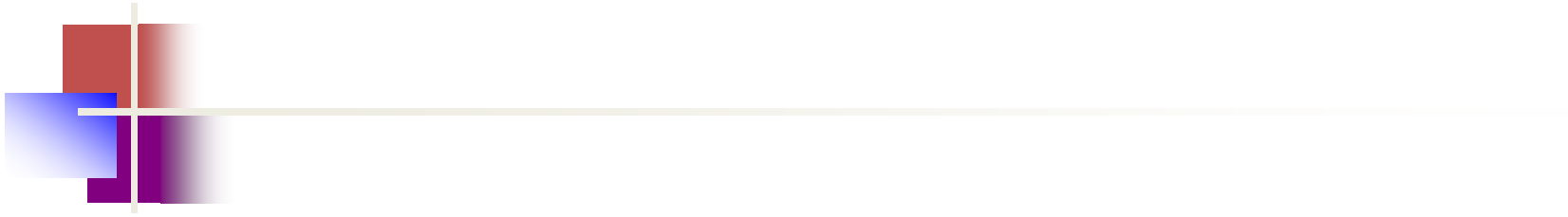
A 6-byte (12 hexadecimal digits) physical address

Example 2.5

- Figure 2.17 shows a part of an internet with two routers connecting three LANs.
- Each device (computer or router) has a pair of addresses (logical and physical) for each connection.
- In this case, each computer is connected to only one link and therefore has only one pair of addresses.
- Each router, however, is connected to three networks. So each router has three pairs of addresses, one for each connection.
- Although it may be obvious that each router must have a separate physical address for each connection, it may not be obvious why it needs a logical address for each connection.
- The computer with logical address A and physical address 10 needs to send a packet to the computer with logical address P and physical address 95.
- We use letters to show the logical addresses and numbers for physical addresses, but note that both are actually numbers.

Figure 2.17 *Example 2.5: logical addresses*





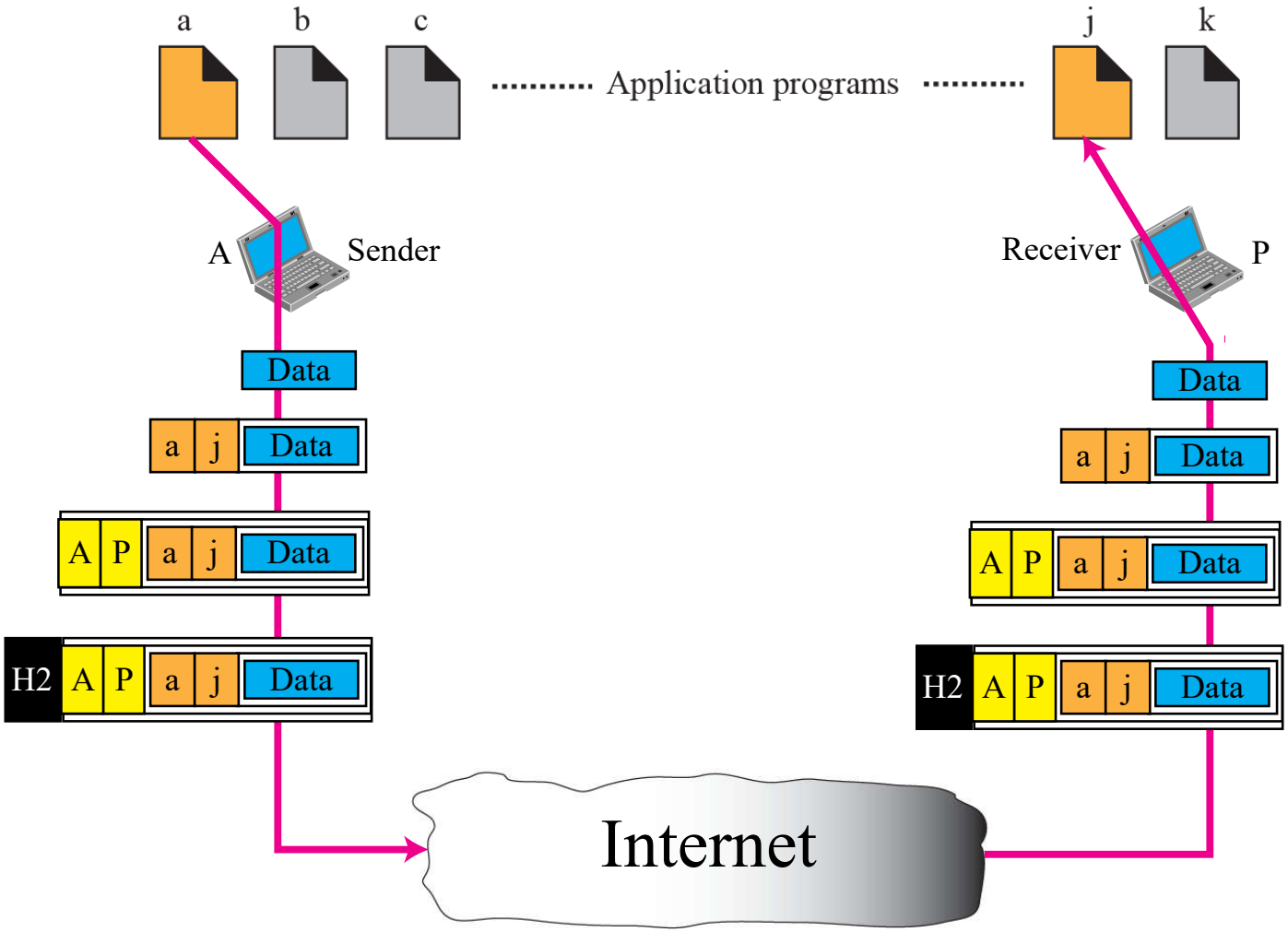
Note

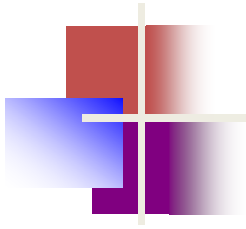
The physical addresses will change from hop to hop, but the logical addresses remain the same.

Example 2.6

- Figure 2.18 shows two computers communicating via the Internet.
- The sending computer is running three processes at this time with port addresses a, b, and c.
- The receiving computer is running two processes at this time with port addresses j and k.
- Process a in the sending computer needs to communicate with process j in the receiving computer.
- Note that although both computers are using the same application, FTP, for example, the port addresses are different because one is a client program and the other is a server program.

Figure 2.18 *Example 2.6: port numbers*





Note

The physical addresses change from hop to hop, but the logical and port addresses usually remain the same.

Example 2.7

As we will see in future chapters, a port address is a 16-bit address represented by one decimal number as shown.

753

A 16-bit port address represented as one single number