Virtual Private Networks and Network Address Translation

Objectives

Upon completion you will be able to:

- *Understand the difference between an internet and an extranet*
- *Understand private, hybrid, and virtual private networks*
- *Understand how VPN can guarantee privacy*
- *Understand the mechanism of NAT*

26.1   PRIVATE NETWORKS

A private network is designed to be used only inside an organization. It allows access to shared resources and, at the same time, provides privacy.

The topics discussed in this section include:

Intranet
Extranet
Addressing

Table 26.1 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}

26.2   VIRTUAL PRIVATE NETWORKS (VPN)

Virtual private network (VPN) is a technology for large organizations that use the global Internet for both intra- and interorganization communication, but require privacy in their intraorganization communication.

The topics discussed in this section include:

Achieving Privacy
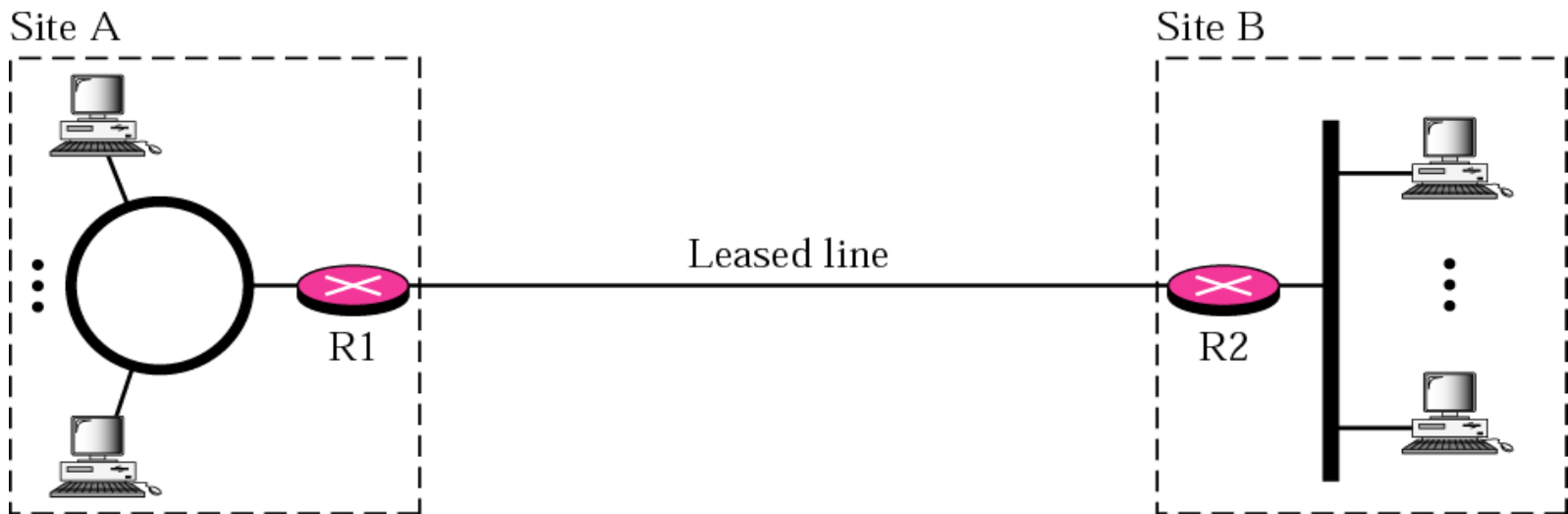*VPN Technology*

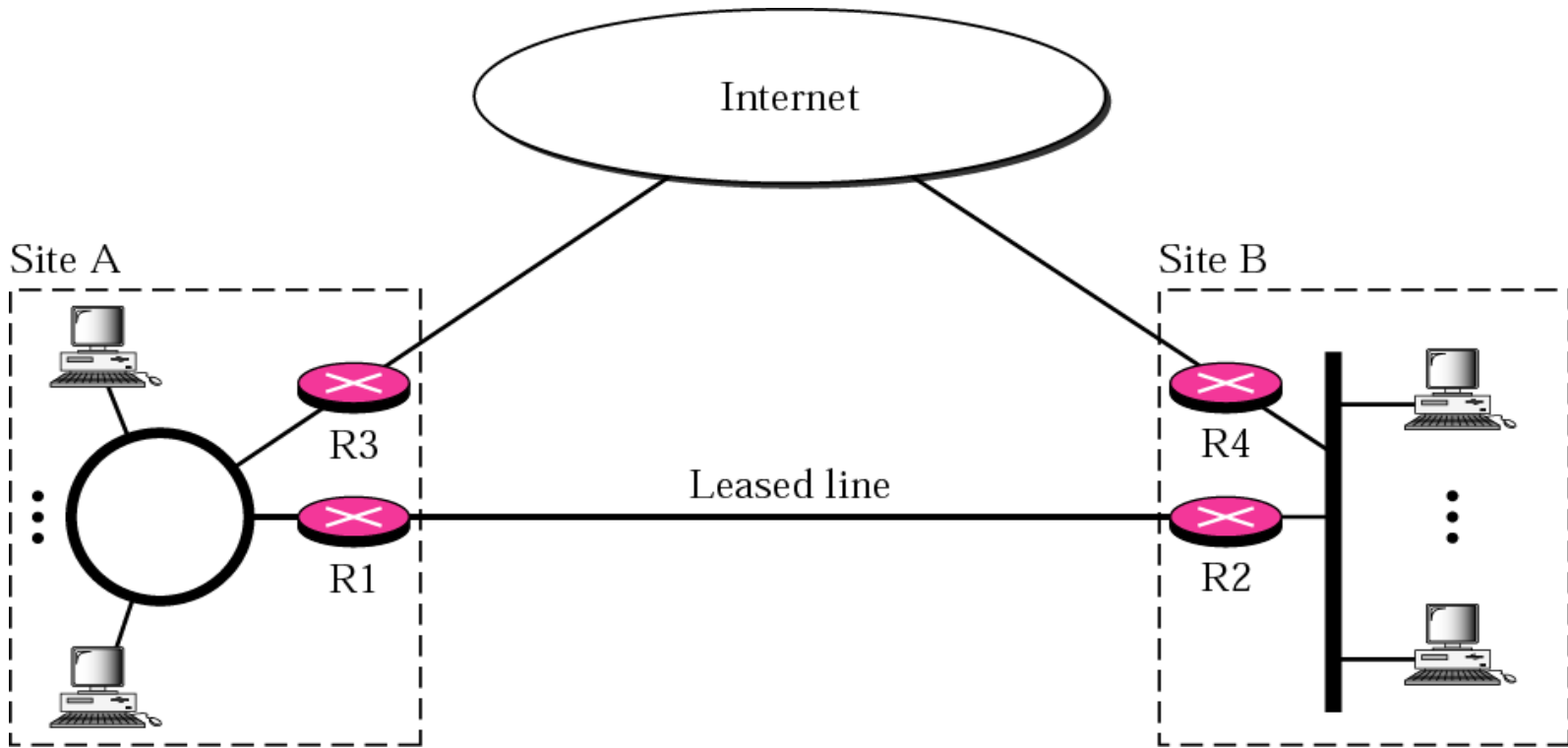**Figure 26.1   *Private network***

Figure 26.2   Hybrid network

Internet

Site A

R3

R1

Leased line

Site B

R4

R2

TCP/IP Protocol Suite

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Figure 26.3 *Virtual private network*

Figure 26.4 *Tunneling*

Inner Datagram (encrypted)

| IP Header | Data and TCP Header |

Outer Datagram (encrypted)

IP Header
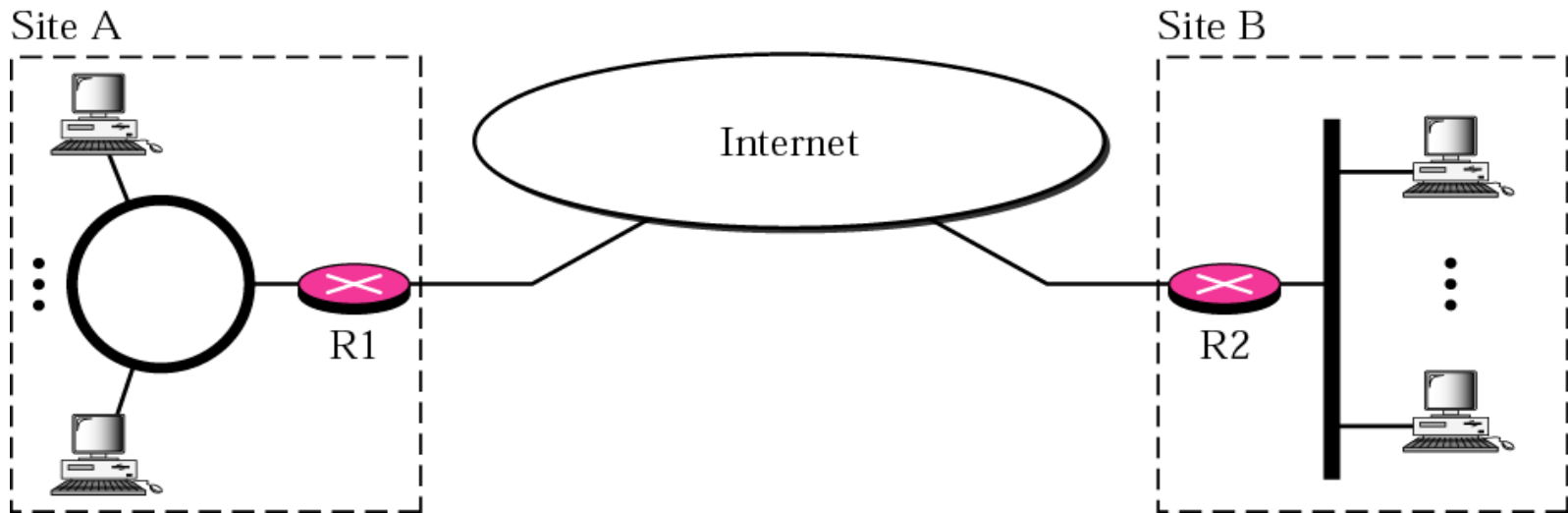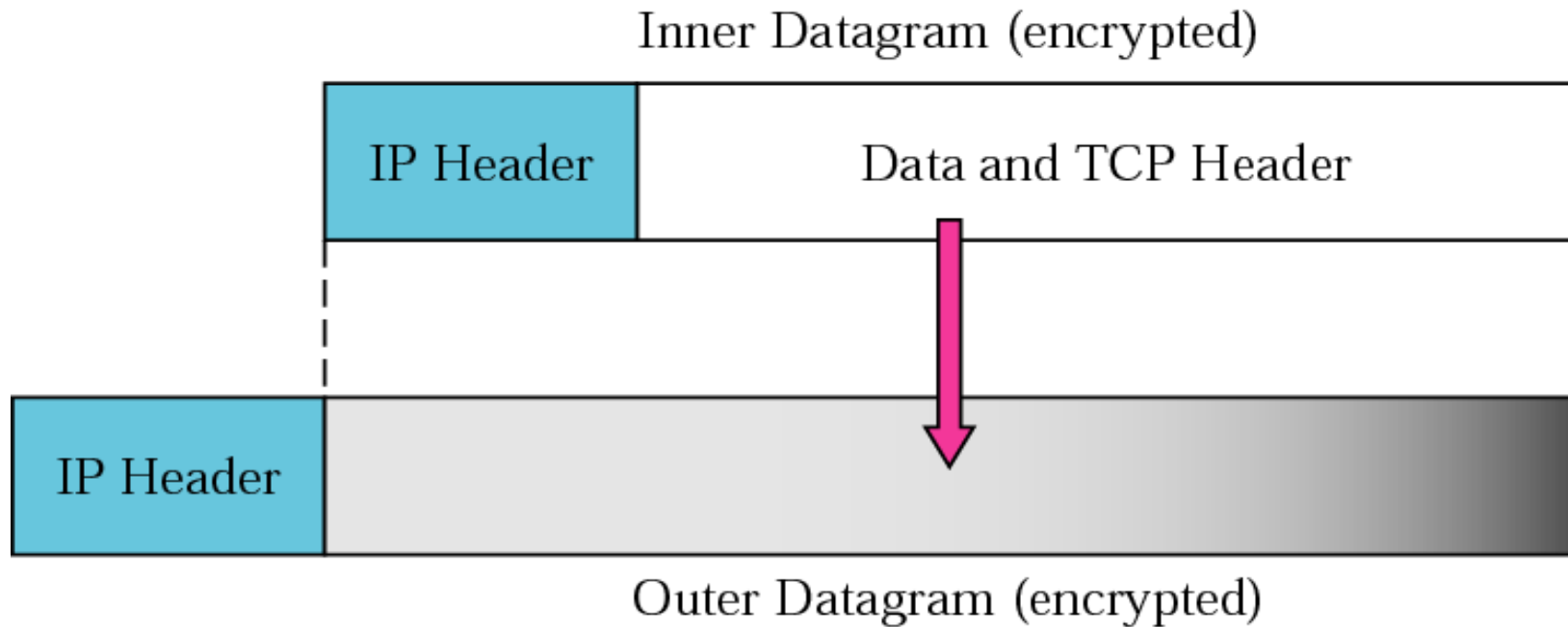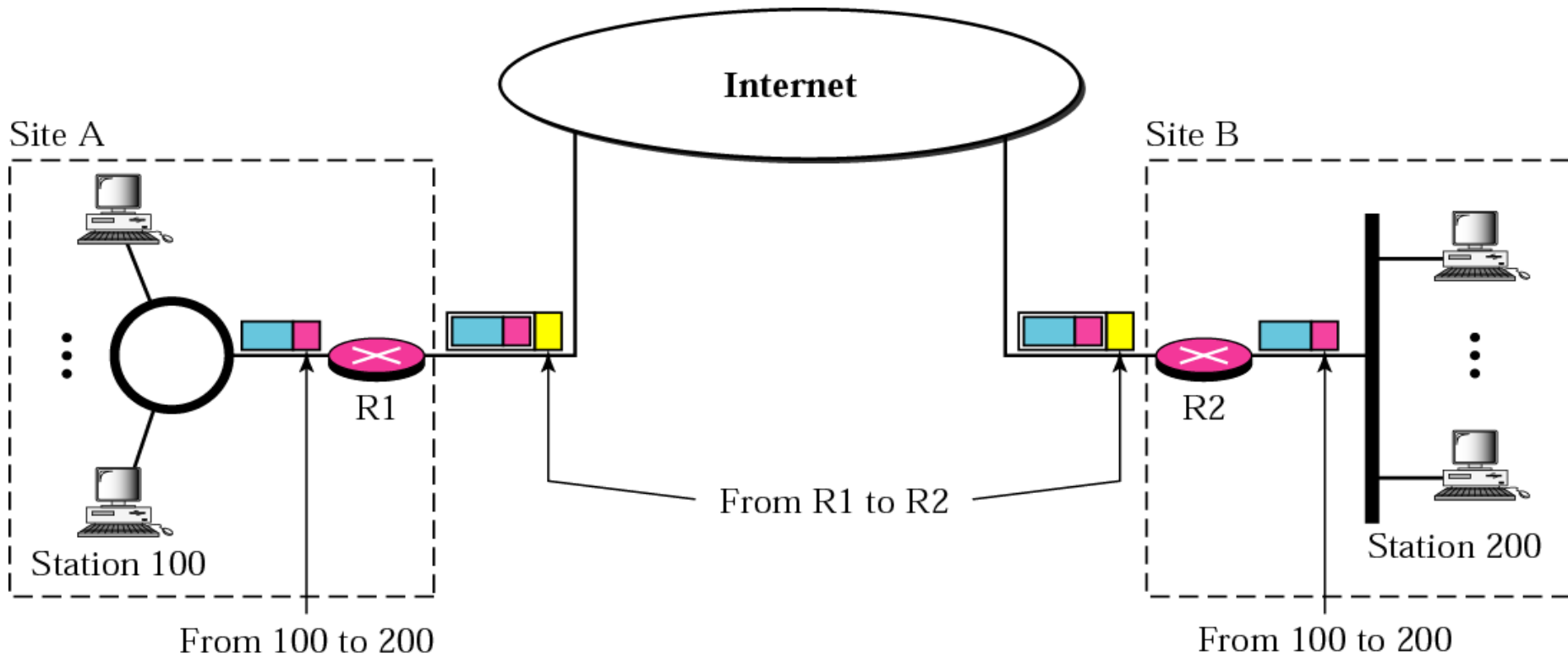
Figure 26.5   Addressing in a VPN

26.3 NETWORK ADDRESS TRANSLATION (NAT)

Network address translation (NAT) allows a site to use a set of private addresses for internal communication and a set of global Internet addresses for communication with another site. The site must have only one single connection to the global Internet through a router that runs NAT software.

The topics discussed in this section include:

Address Translation
Translation Table
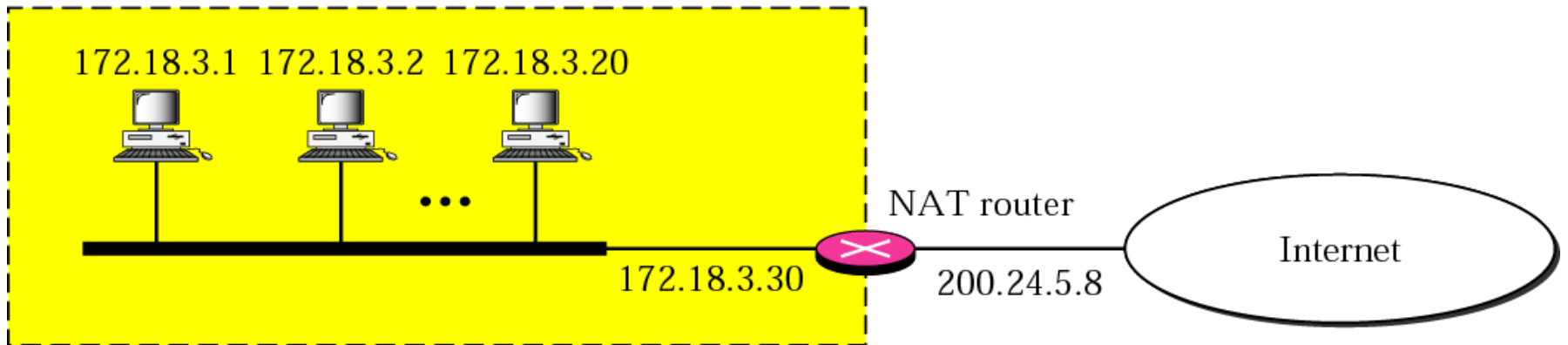*NAT and ISP*

Figure 26.6 *NAT*

Site using private addresses

172.18.3.1 172.18.3.2 172.18.3.20

• • •

172.18.3.30

NAT router

200.24.5.8

Internet

TCP/IP Protocol Suite   11

Figure 26.7 *Address translation*

TCP/IP Protocol Suite   12
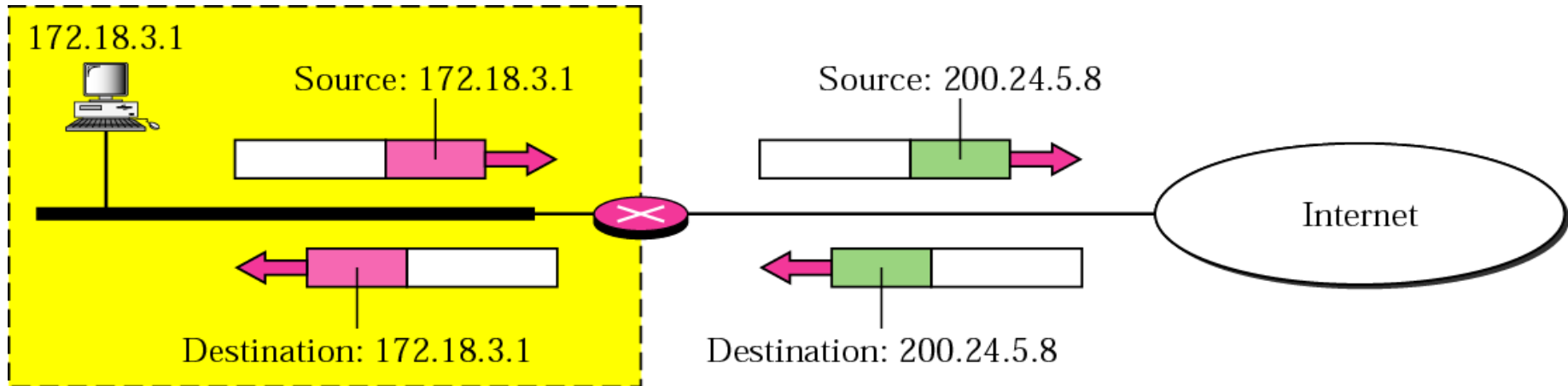
Figure 26.8 *Translation*
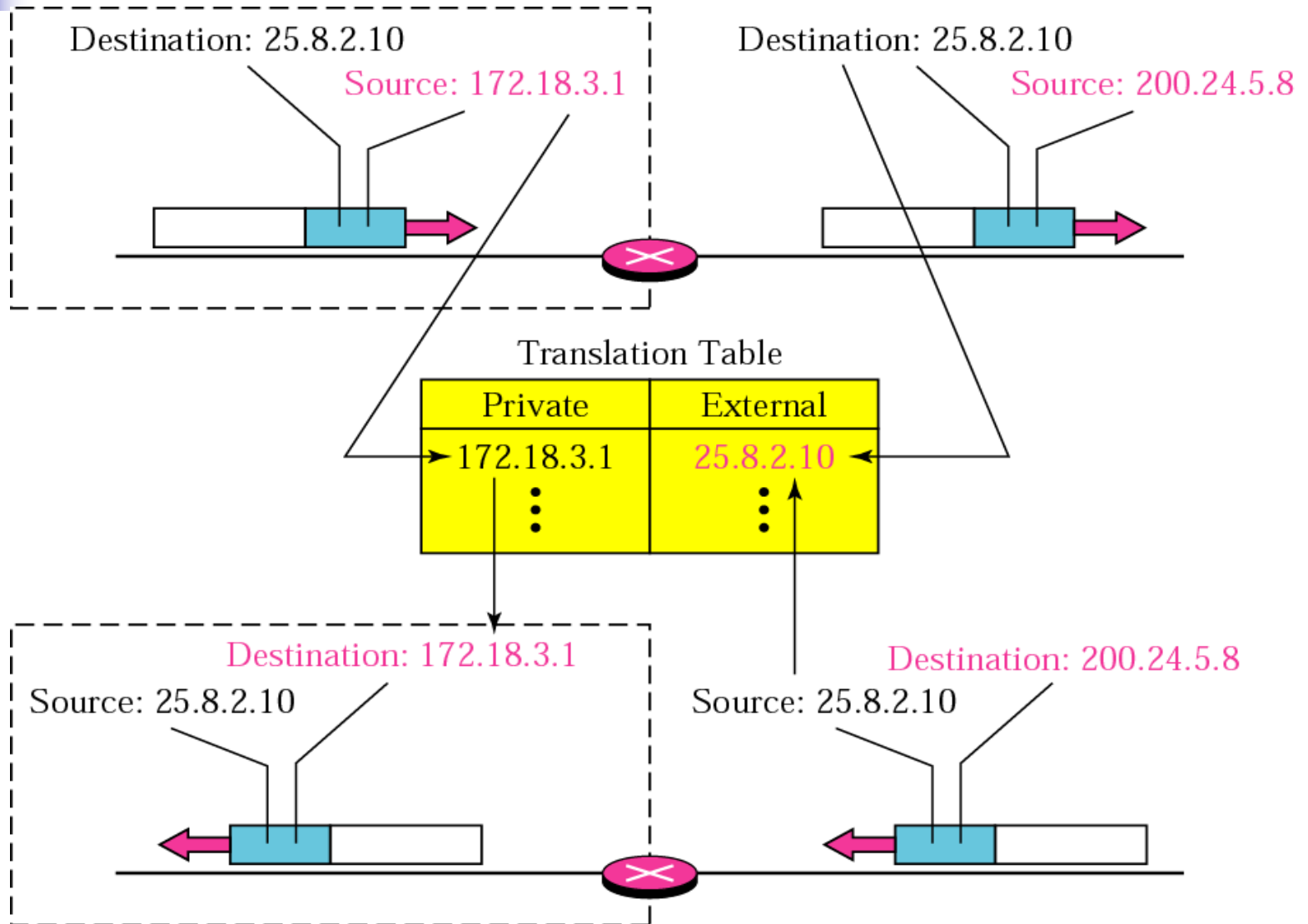
Table 26.2 *Five-column translation table*

Private Address	Private Port	External Address	External Port	Transport Protocol
172.18.3.1	1400	25.8.3.2	80	TCP
172.18.3.2	1401	25.8.3.2	80	TCP
. . .	. . .	. . .	. . .	. . .

Figure 26.9 *An ISP and NAT*

172.18.3.1

172.24.1.1

172.30.100

ISP
Site

1000
addresses

Internet

TCP/IP Protocol Suite

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