# Solution #2 : NAT

# Network Address Translation - Concepts

- To assign each company a single IP address ( or at most, a small number of them ) for internet traffic
- Within company every computer gets an **unique IP address**
- When a packet exits the company and goes to the ISP, an **address translation** takes place

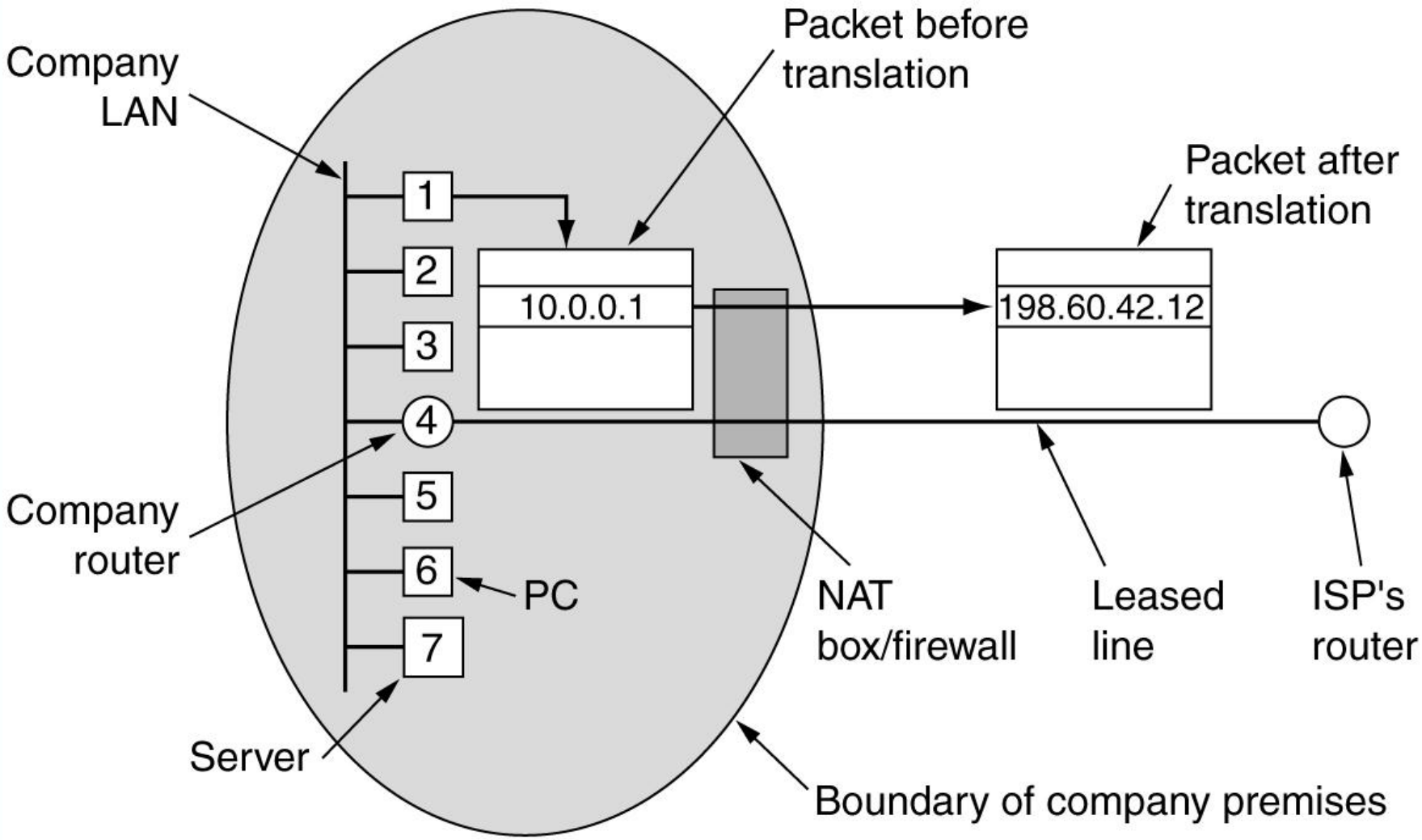
# Network Address Translation - Concepts

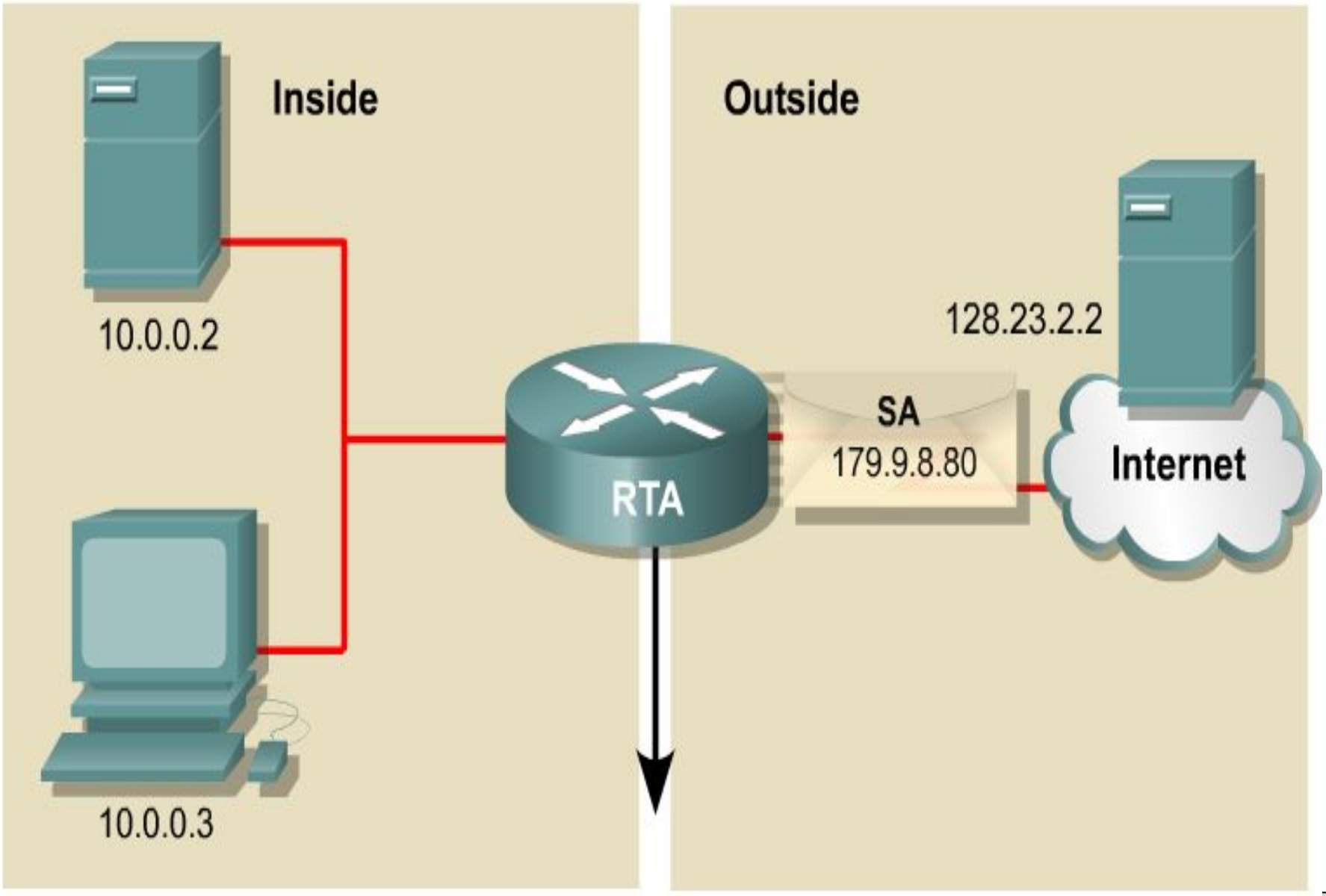
- To make this scheme possible, 3 ranges of IP addresses have been declared as private

# Private addressing

| Class | RFC 1918 Internal Address Range | No of hosts |
|---|---|---|
| A | 10.0.0.0 - 10.255.255.255 | 16,777,216 |
| B | 172.16.0.0 - 172.31.255.255 | 1,048,576 |
| C | 192.168.0.0 - 192.168.255.255 | 65,536 |

# NAT – Network Address Translation



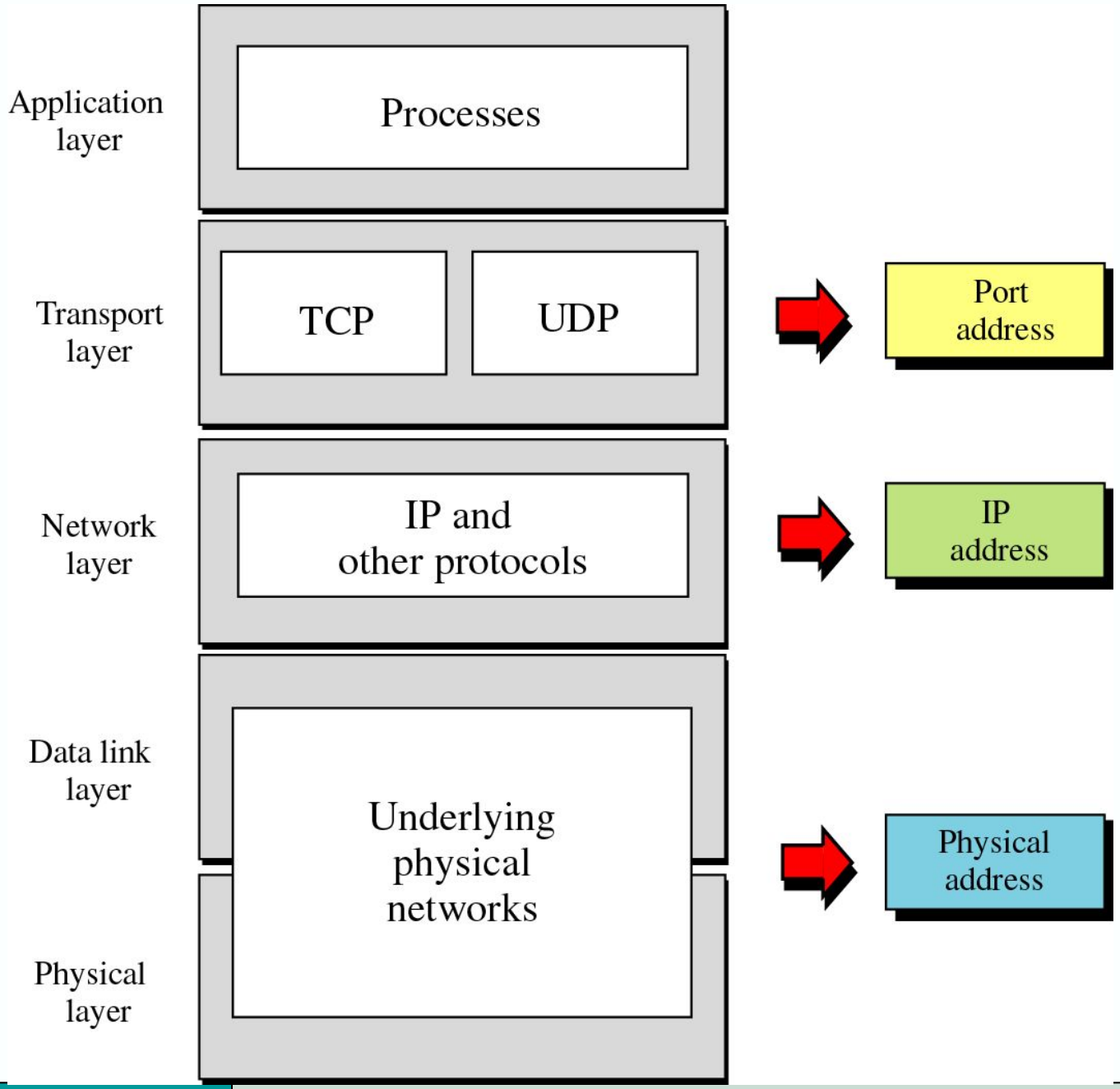

Inside
Outside
10.0.0.2
10.0.0.3
RTA
SA
179.9.8.80
128.23.2.2
Internet

Translating the IP address for an outgoing connection is fine; but what happens when a reply comes back to the sender ?

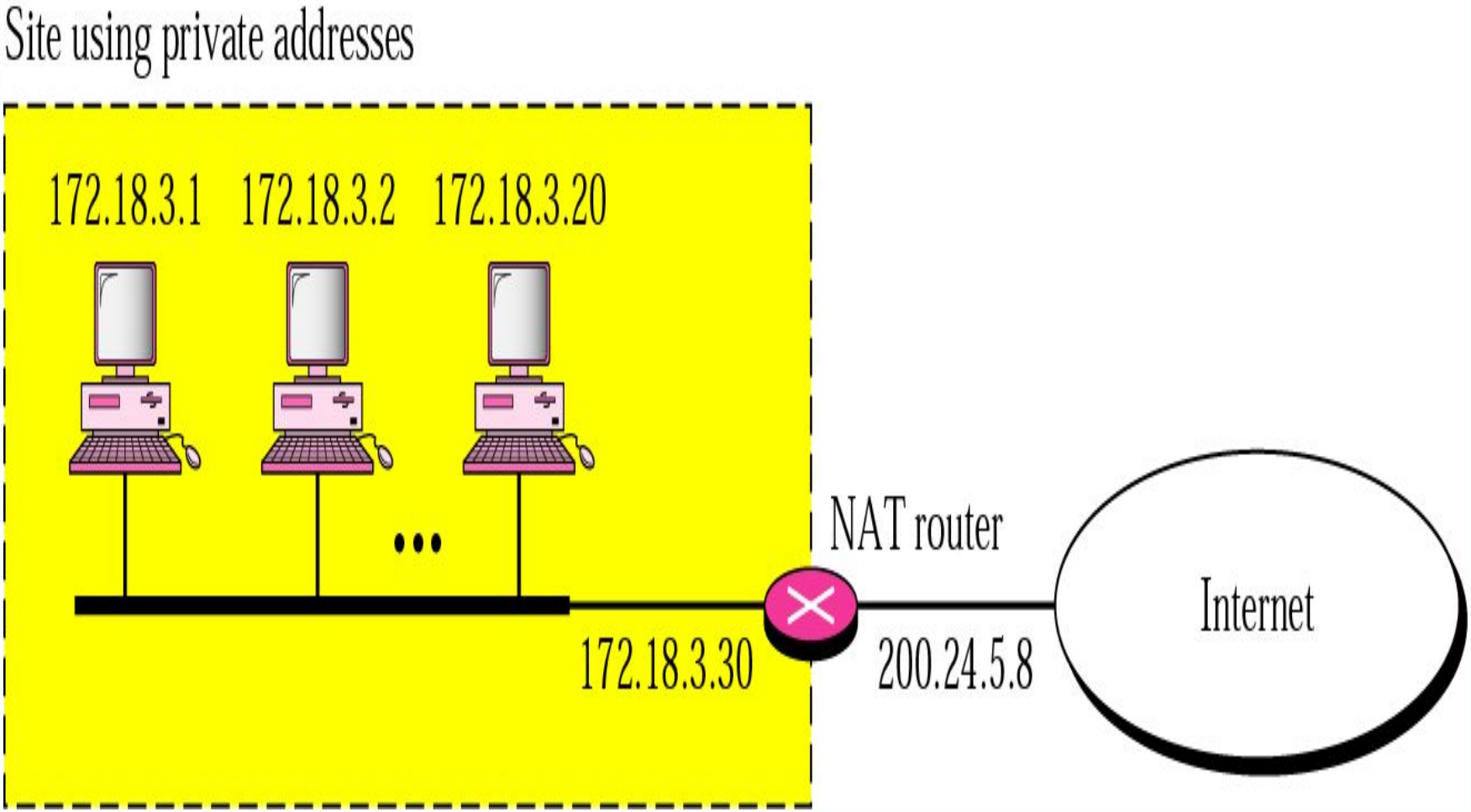
How does NAT know that this reply has to be send back to the respective sender ?

**Trick is to use the source port of TCP or UDP of the sender**

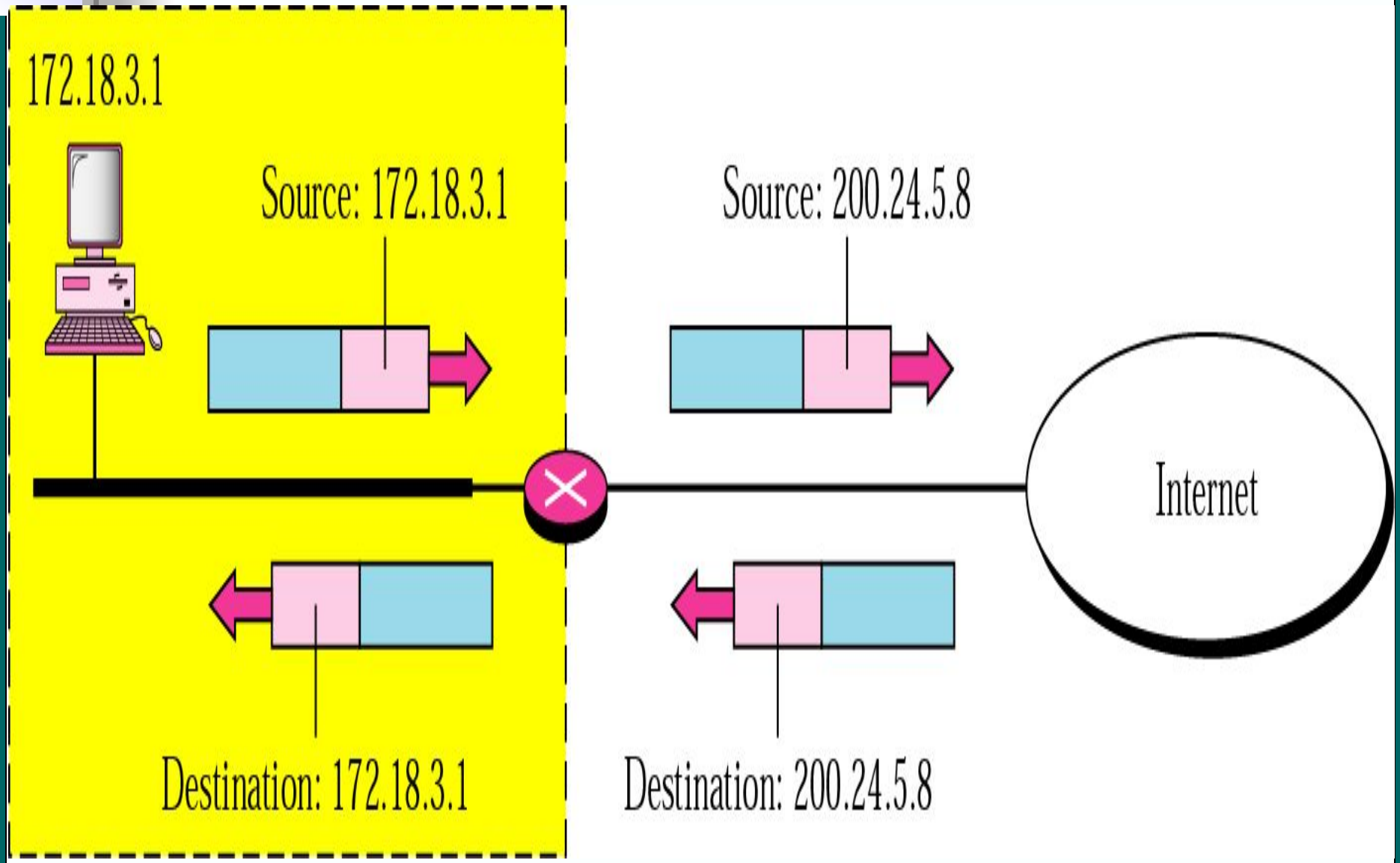
Figure 2-13


Application layer
Processes
Transport layer
TCP
UDP
Port address
Network layer
IP and other protocols
IP address
Data link layer
Underlying physical networks
Physical address
Physical layer

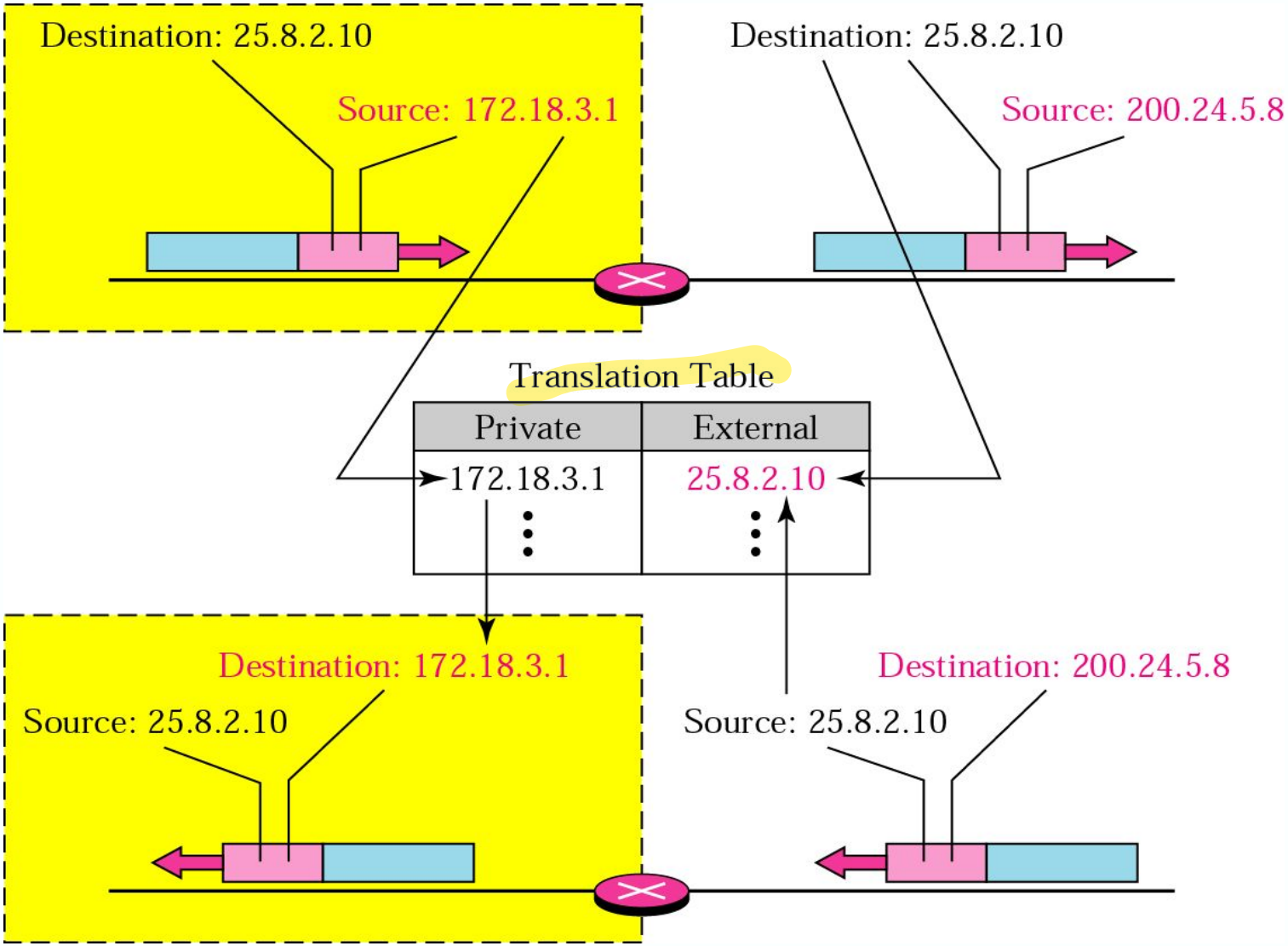
## Figure 19.25 NAT



## Figure 19.26 Address translation



## Figure 19.27 Translation



## *Table 19.3 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 |
| ... | ... | ... | ... | ... |