CSC411: Advanced Networks

Internet Protocol (IP)

Note: **This class lecture will be recorded!**
If you do not consent to this recording, please do not ask questions via your video, audio or public chat; send your question to the instructor using the private chat.

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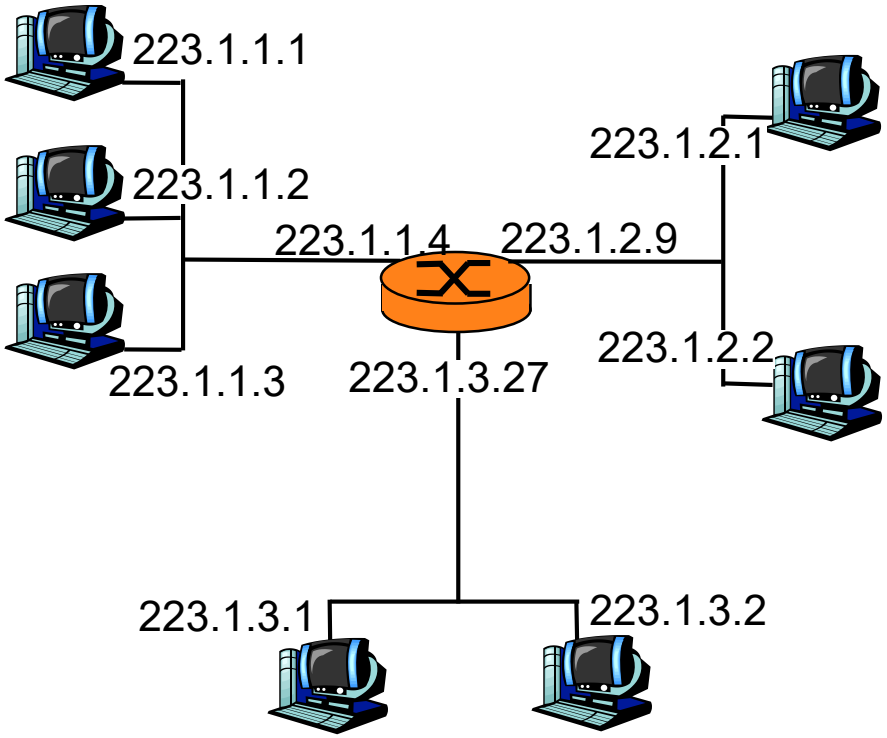
INTERNET PROTOCOL (IP) OVERVIEW

- Primary network-layer protocol
- Unreliable, connectionless delivery mechanism
- Packet routing
- Packet Fragmentation

Network Layer – Source to Destination



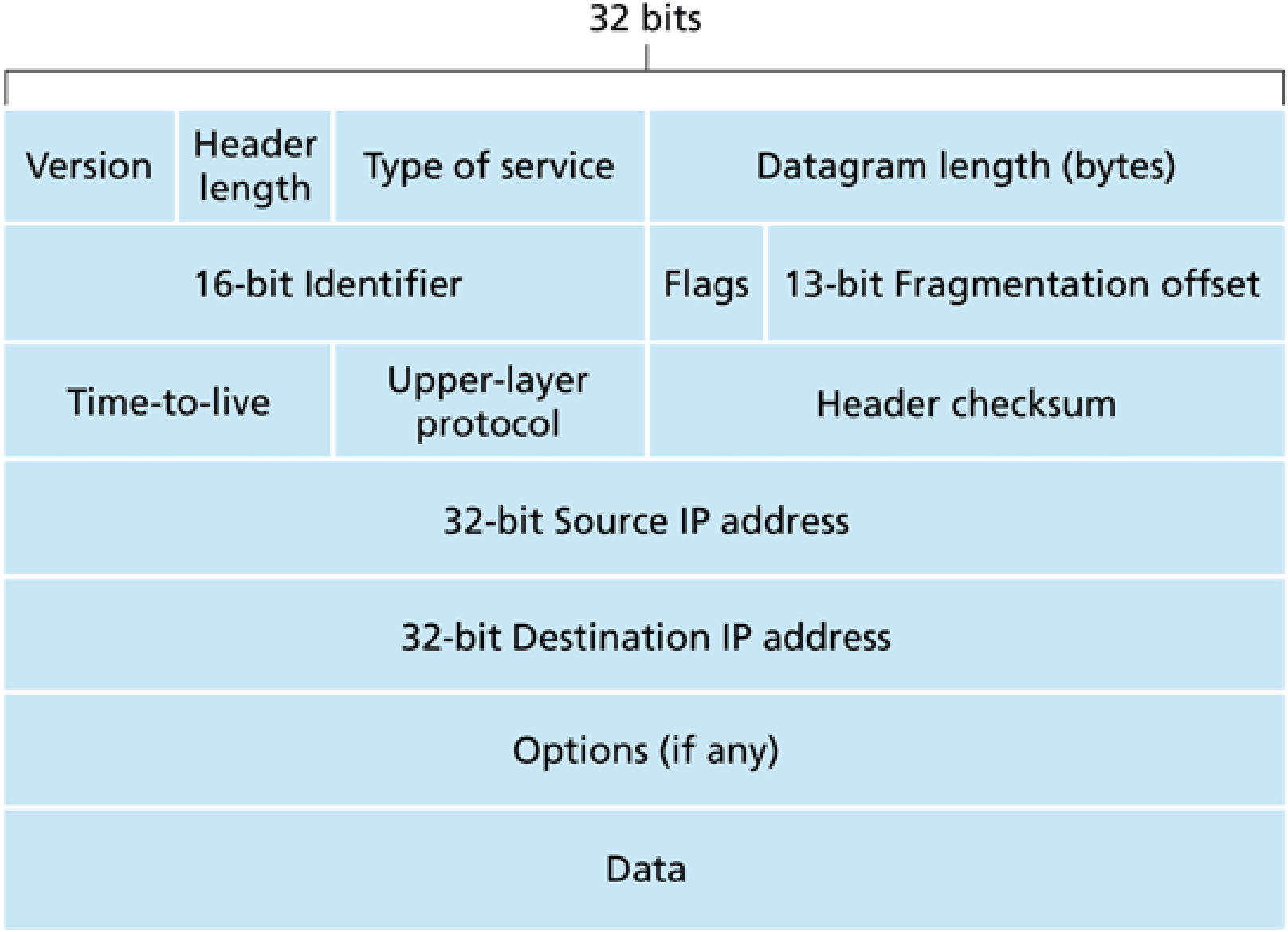
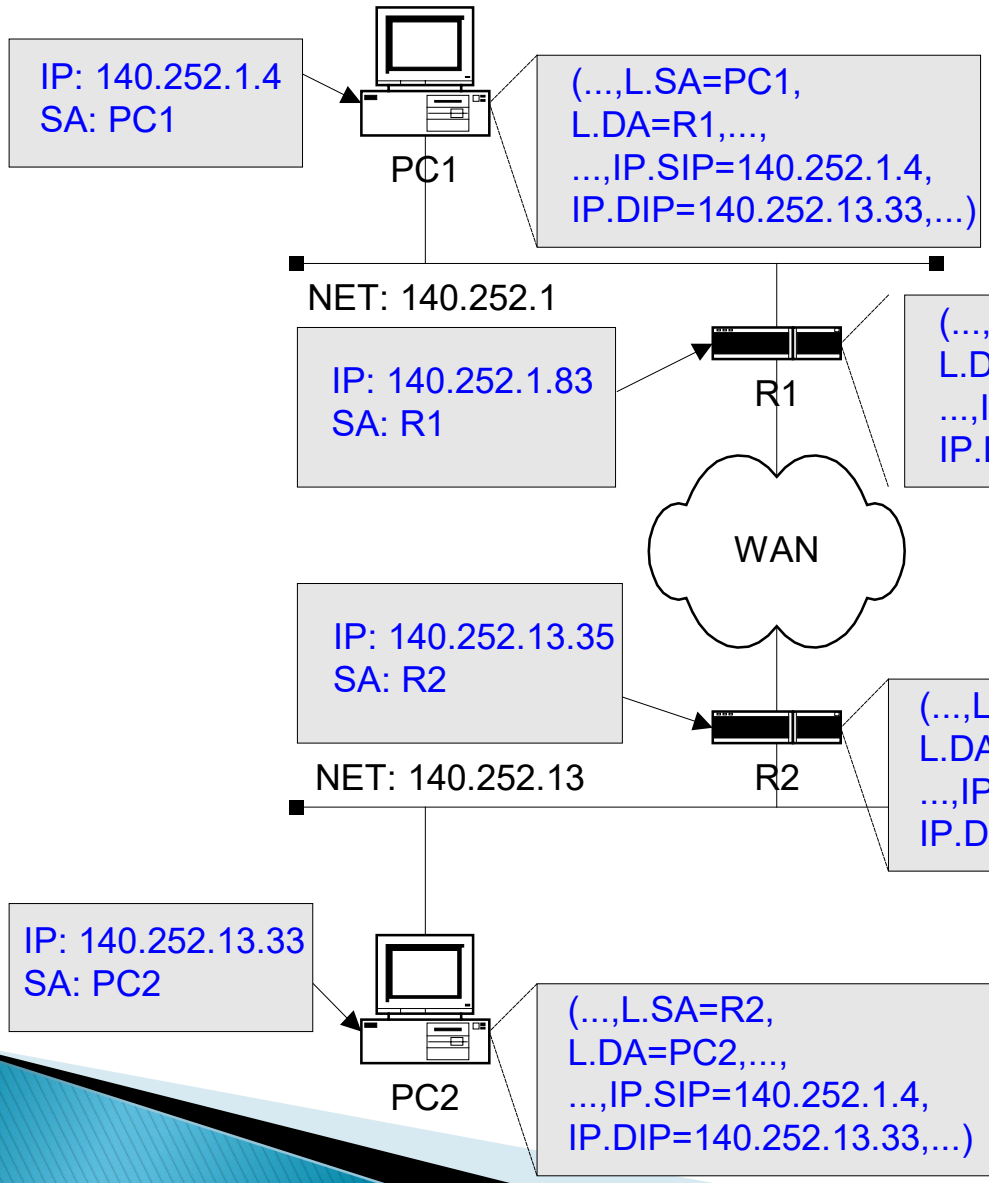


Figure 4.13 ♦ IPv4 datagram format

- Suppose Host A sends Host B a TCP segment encapsulated in an IP datagram. When Host B receives the datagram, how does the network layer in Host B know it should pass the segment to TCP rather than to UDP or something else?

IP Routing



1. A packet is sent between PC1 and PC2. The packet must route through 140.252.1.83 first.

2. A packet arrives at router R1. IP decides to route it to 140.252.13.35.

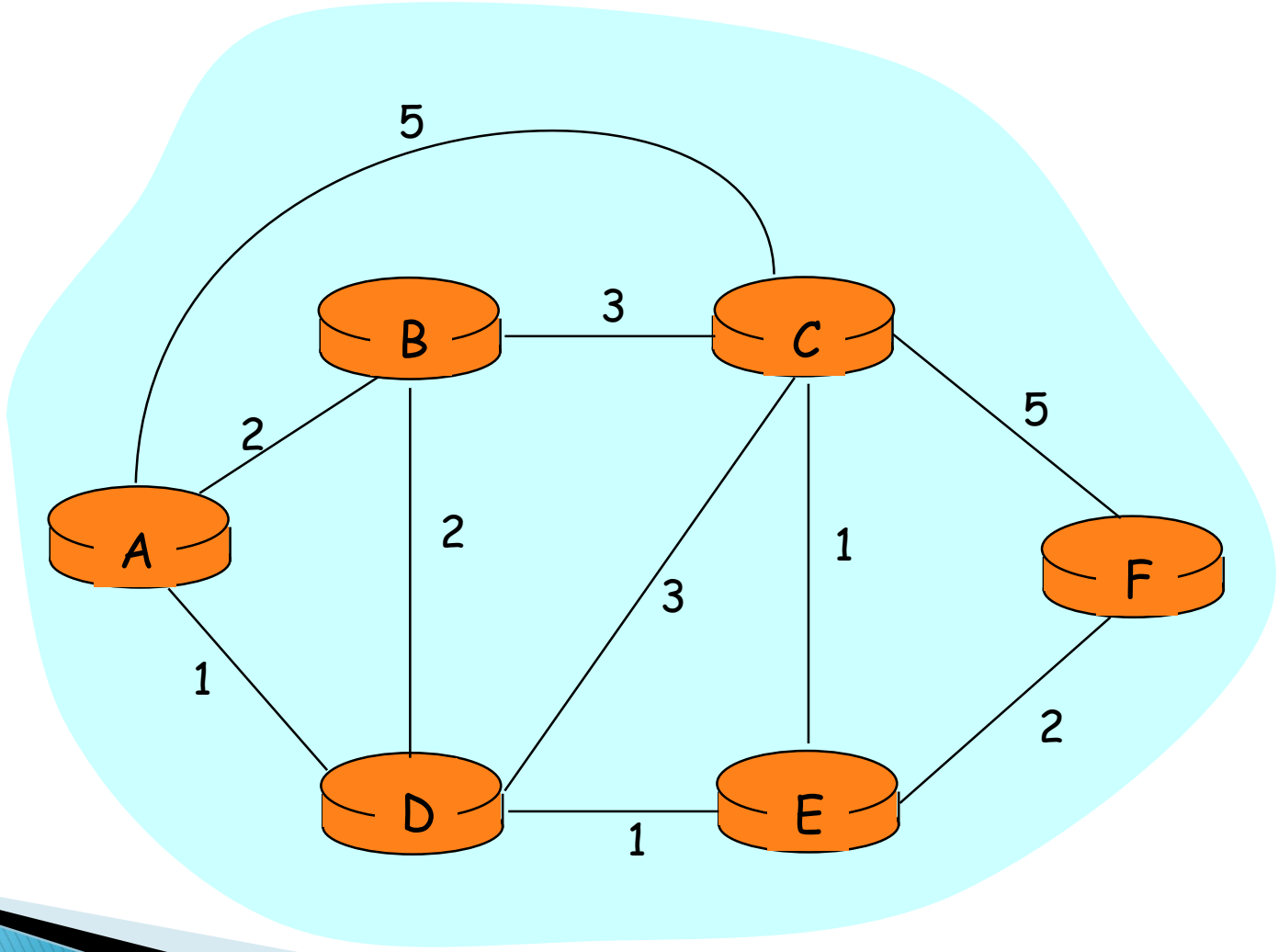
3. A packet arrives at router R2. IP decides to route it to 140.252.13.33.

4. A packet arrives at destination PC2.

Routing Protocols

- Learn routes
- Select routes
- Maintain routes

Routing Algorithms



IPv6

- 32-bit address space of IPv4 was being used up
- Uses 128-bit addresses

IPv6 Datagram Format

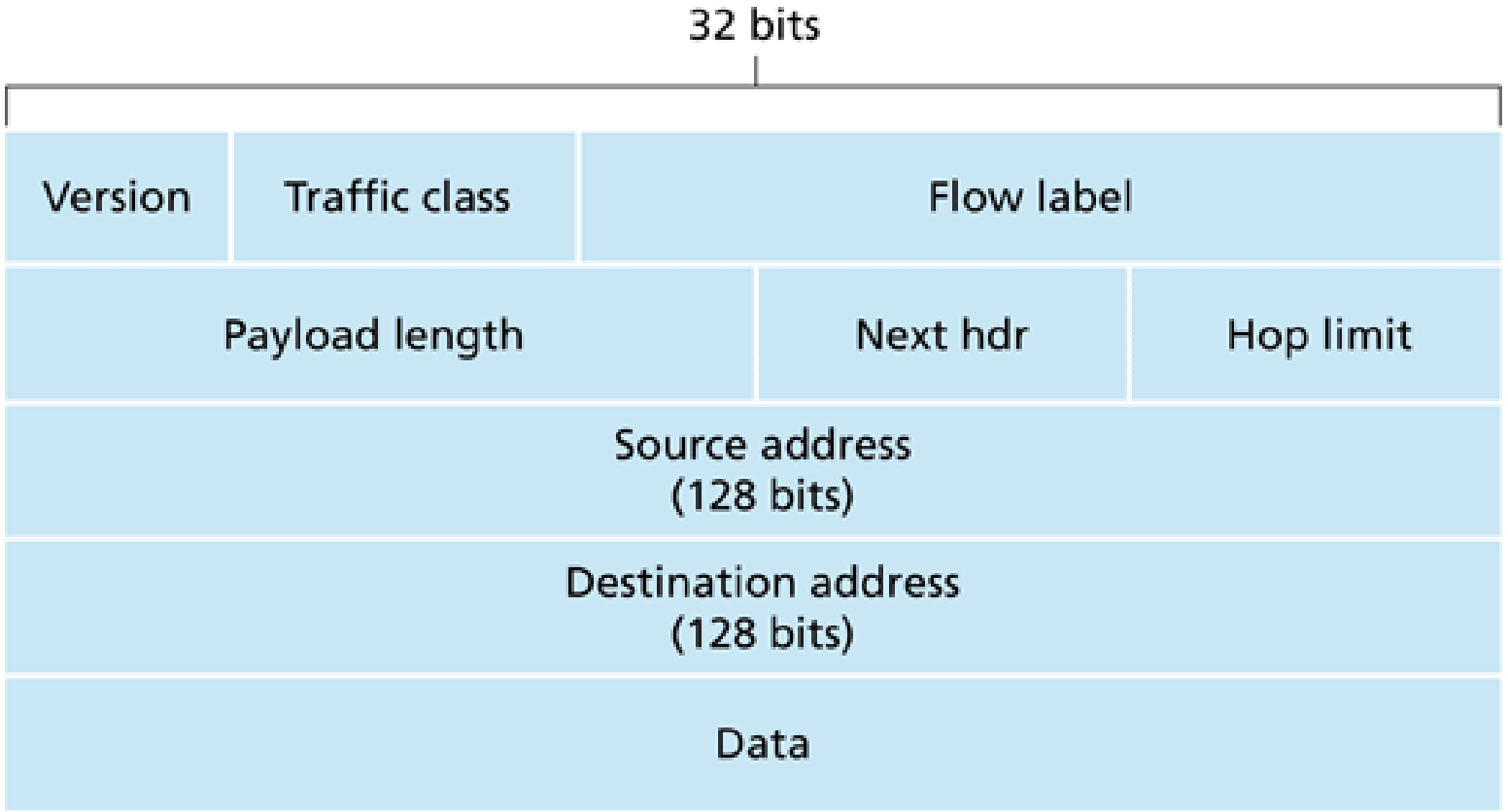


Figure 4.24 ♦ IPv6 datagram format

New Features

- Expanded IP address size
- Streamlined 40-byte header
- New type of address – anycast address
- Dropped some IPv4 header fields
  - Fragmentation / Reassembly
  - Header checksum
  - Options
- Flow labeling and priority
- New version of ICMP

Migrating to IPv6

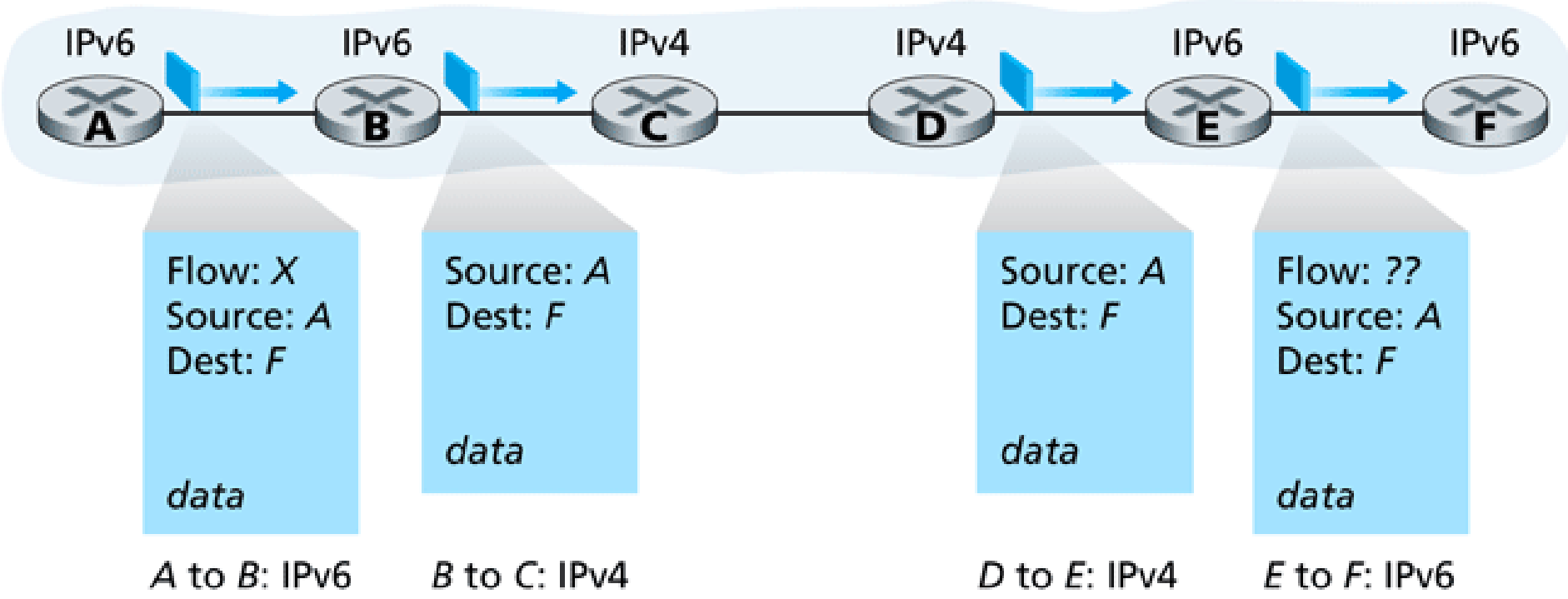


Figure 4.25 ♦ A dual-stack approach

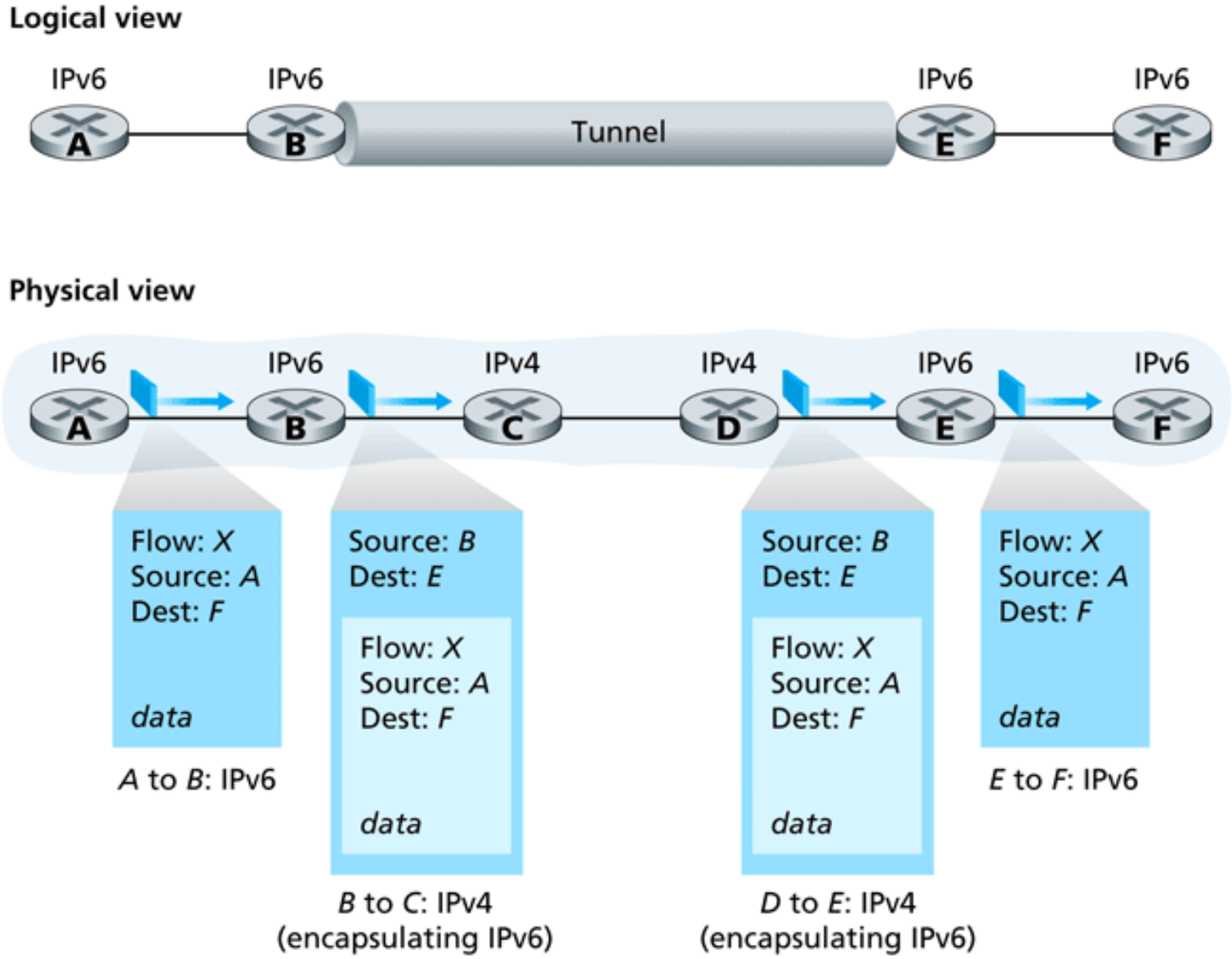


Figure 4.26 ♦ Tunneling