



Computer Networks

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Protocols

- Used for communications between entities in a system
- Must speak the same language
- Entities - User applications, e-mail facilities, terminals
- Systems - Computer, Terminal, Remote sensor

Key Elements of a Protocol

- Syntax
 - Data formats
 - Signal levels
- Semantics
 - Control information
 - Error handling
- Timing
 - Speed matching
 - Sequencing

Protocol Architecture

- Task of communication broken up into modules
- Well-designed Protocol Suite
 - Efficient
 - Effective
 - Easy replacement of modules
 - Handle hardware failures

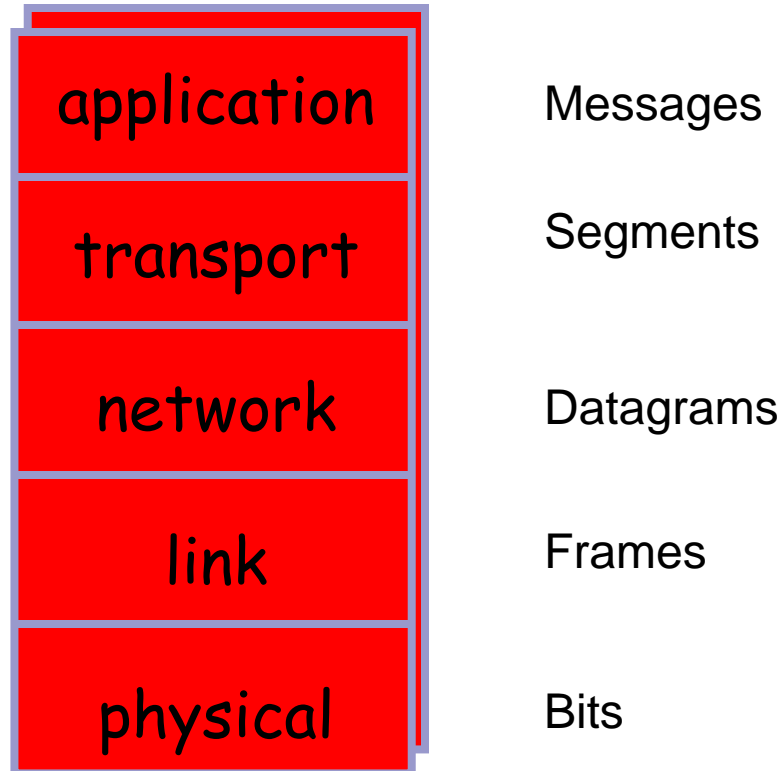


Layered Protocol Architecture

- Each layer is layer-n
- Layer-n Protocol Data Units or PDUs

- Protocol Stack

The Internet Protocol Stack



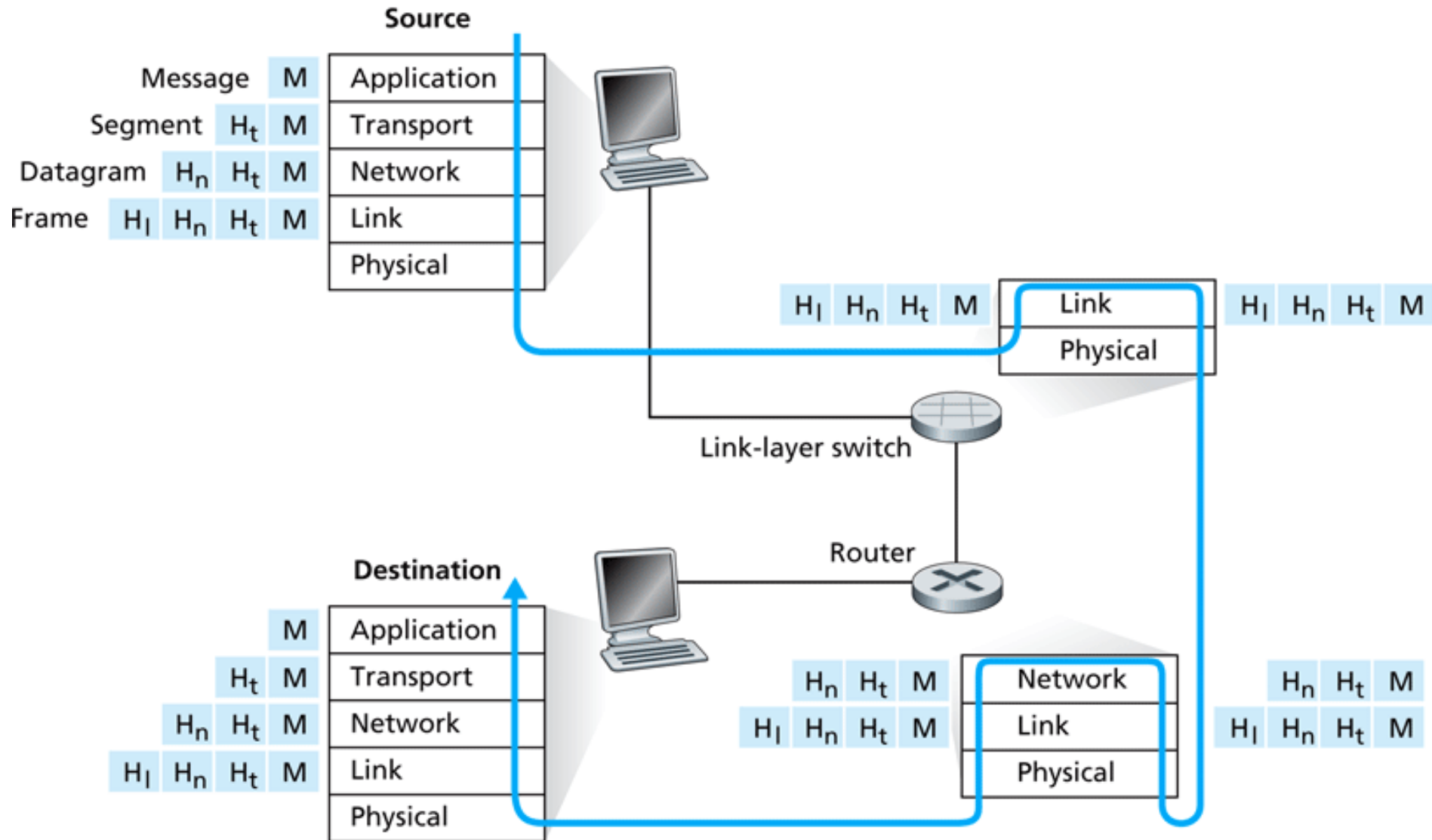
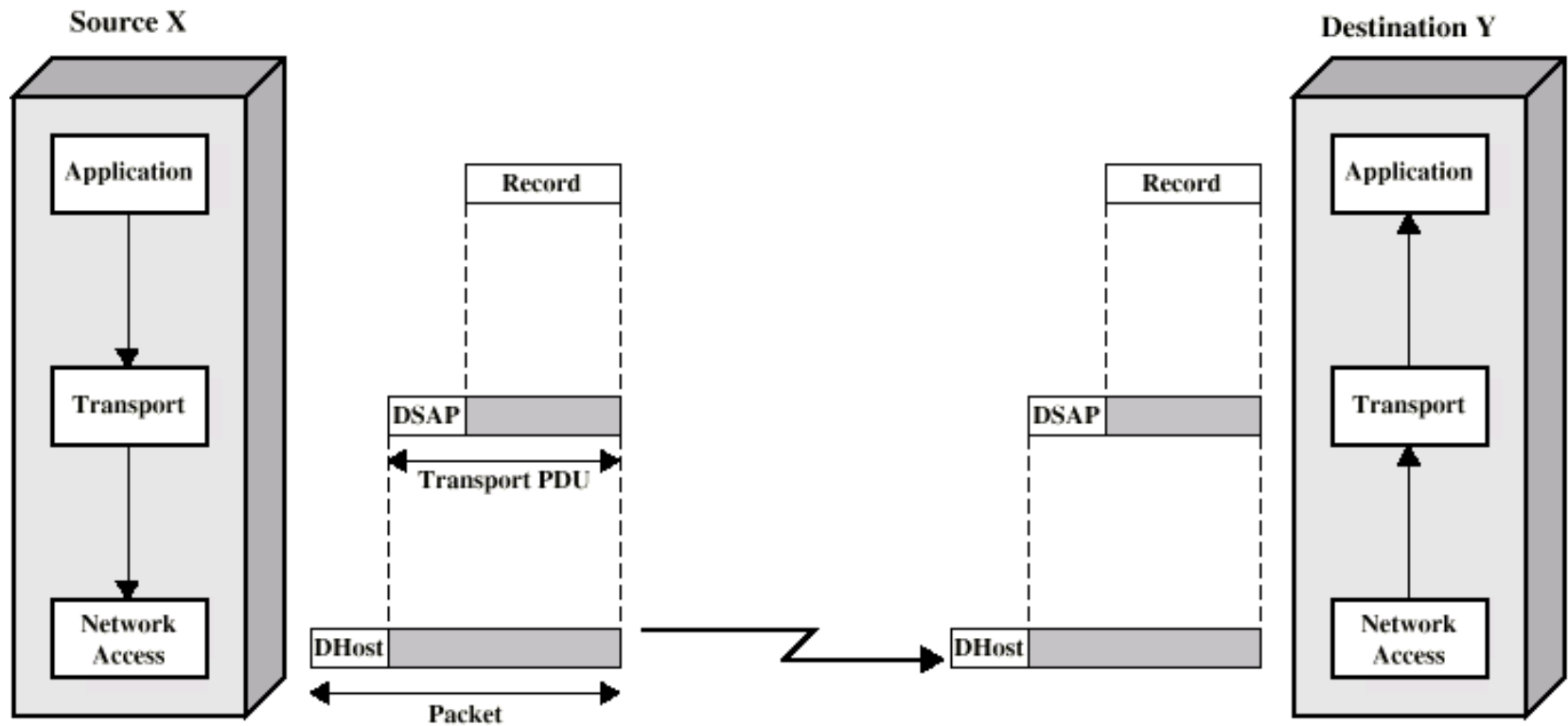


Figure 1.20 ♦ Hosts, routers, and link-layer switches; each contains a different set of layers, reflecting their differences in functionality.

Encapsulation



Internet vs. OSI Stacks

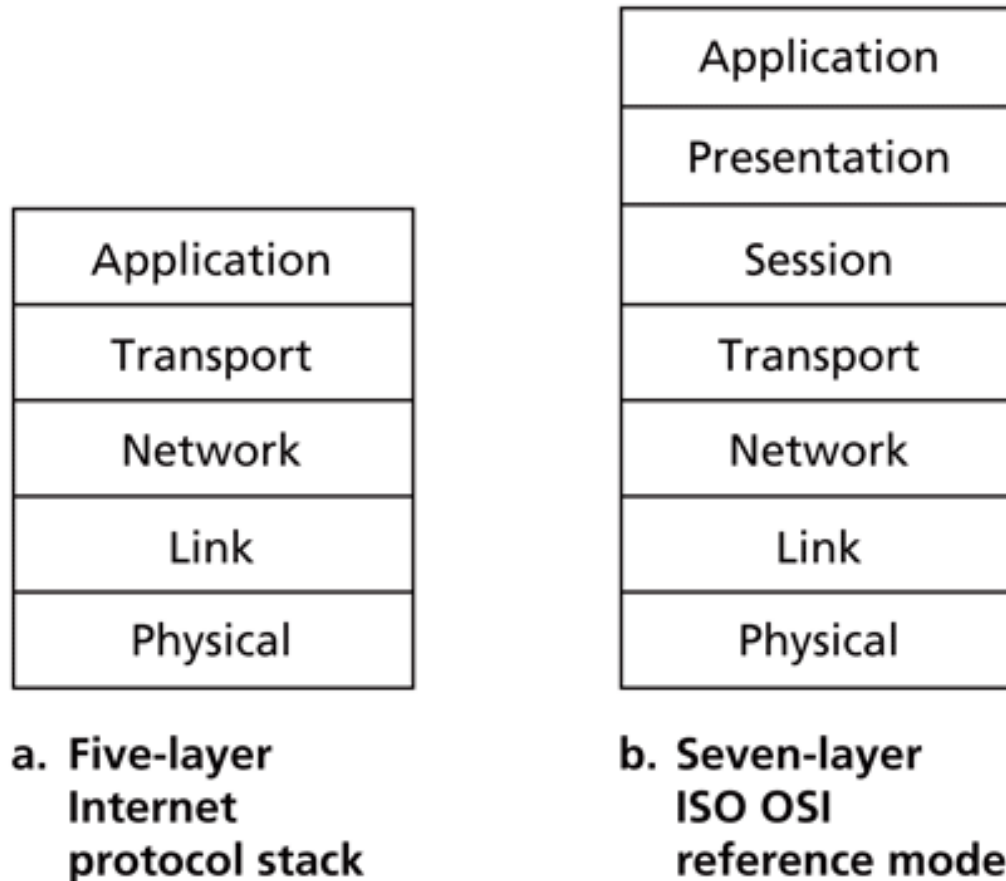



Figure 1.19 ♦ The Internet protocol stack (a) and OSI reference model (b)

OSI Reference Model

- Layer 7 *Application*
- Layer 6 *Presentation*
- Layer 5 *Session*
- Layer 4 *Transport*
- Layer 3 *Network*
- Layer 2 *Data Link*
- Layer 1 *Physical*

- Put the following layers of the Internet architecture stack in order, with the top layer being the “user” layer.
 1. Link
 2. Application
 3. Physical
 4. Network
 5. Transport





- What is the name of an application-layer packet?

1. Datagram
2. Frame
3. Packet
4. Segment
5. Message
6. PDU



■ What is the name of a network-layer packet?

1. Datagram
2. Frame
3. Packet
4. Segment
5. Message
6. PDU





- What is the name of a transport-layer packet?

1. Datagram
2. Frame
3. Packet
4. Segment
5. Message
6. PDU





- What is the name of a link-layer packet?

1. Datagram
2. Frame
3. Packet
4. Segment
5. Message
6. PDU

