SNS COLLEGE OF ENGINEERING

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE NAME :19IT401 COMPUTER NETWORKS

II YEAR /IV SEMESTER

Unit 1- **INTRODUCTION AND PHYSICAL LAYER**

Topic 5:OSI Model

The OSI Model

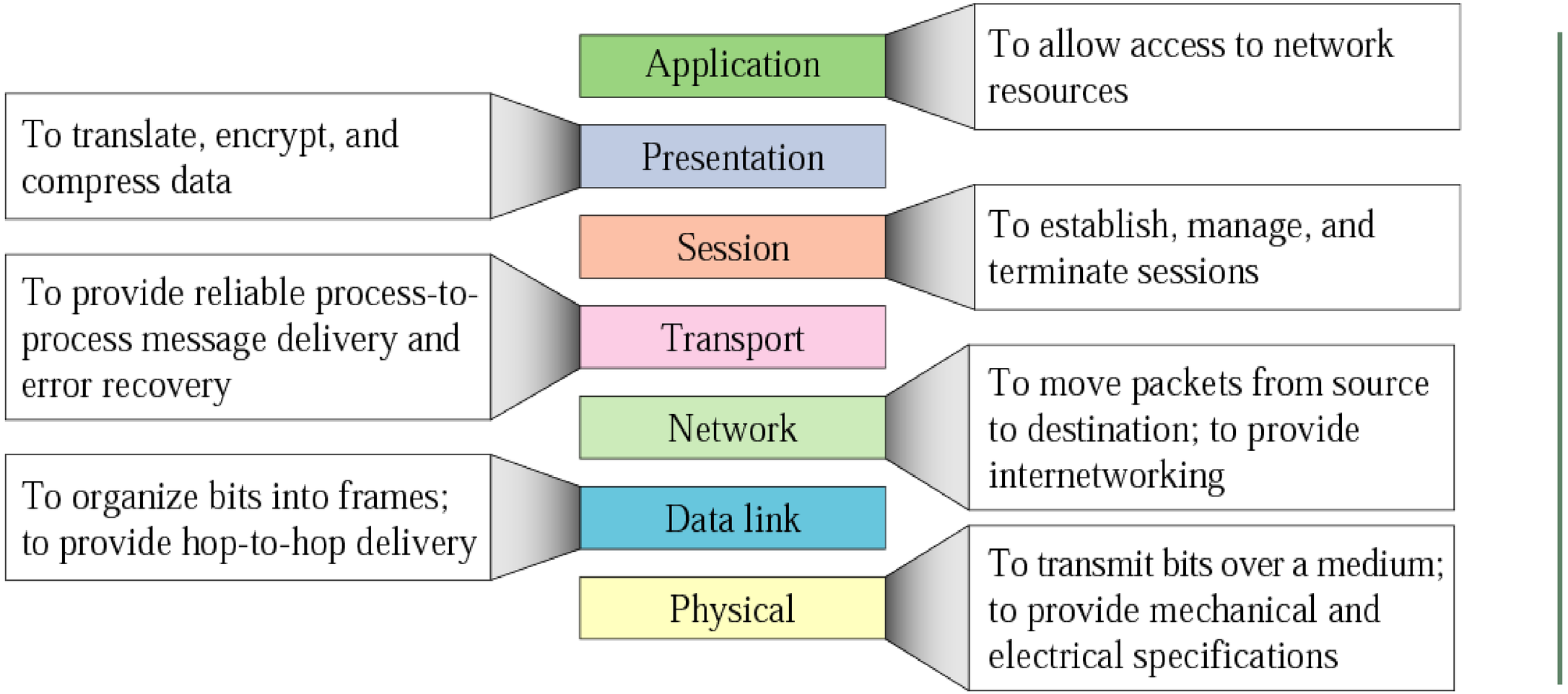
1. Open Systems Interconnection (OSI).
2. Developed by the International Organization for Standardization (ISO).
3. Model for understanding and developing computer-to-computer communication architecture that is flexible, robust and interoperable.
4. It is not a protocol.
5. Developed in the 1980s.
6. Divides network architecture into seven layers.

Layer	Name	Function	Protocols
Layer 7	Application	To allow access to network resources.	SMTP, HTTP, FTP, POP3, SNMP
Layer 6	Presentation	To translate, encrypt and compress data.	MPEG, ASCH, SSL, TLS
Layer 5	Session	To establish, manage, and terminate the session	NetBIOS, SAP
Layer 4	Transport	The transport layer builds on the network layer to provide data transport from a process on a source machine to a process on a destination machine.	TCP, UDP
Layer 3	Network	To provide internetworking. To move packets from source to destination	IPV5, IPV6, ICMP, IPSEC, ARP, MPLS.
Layer 2	Data Link	To organize bits into frames. To provide hop-to-hop delivery	RAPA, PPP, Frame Relay, ATM, Fiber Cable, etc.
Layer 1	Physical	To transmit bits over a medium. To provide mechanical and electrical specifications	RS232, 100BaseTX, ISDN, 11.

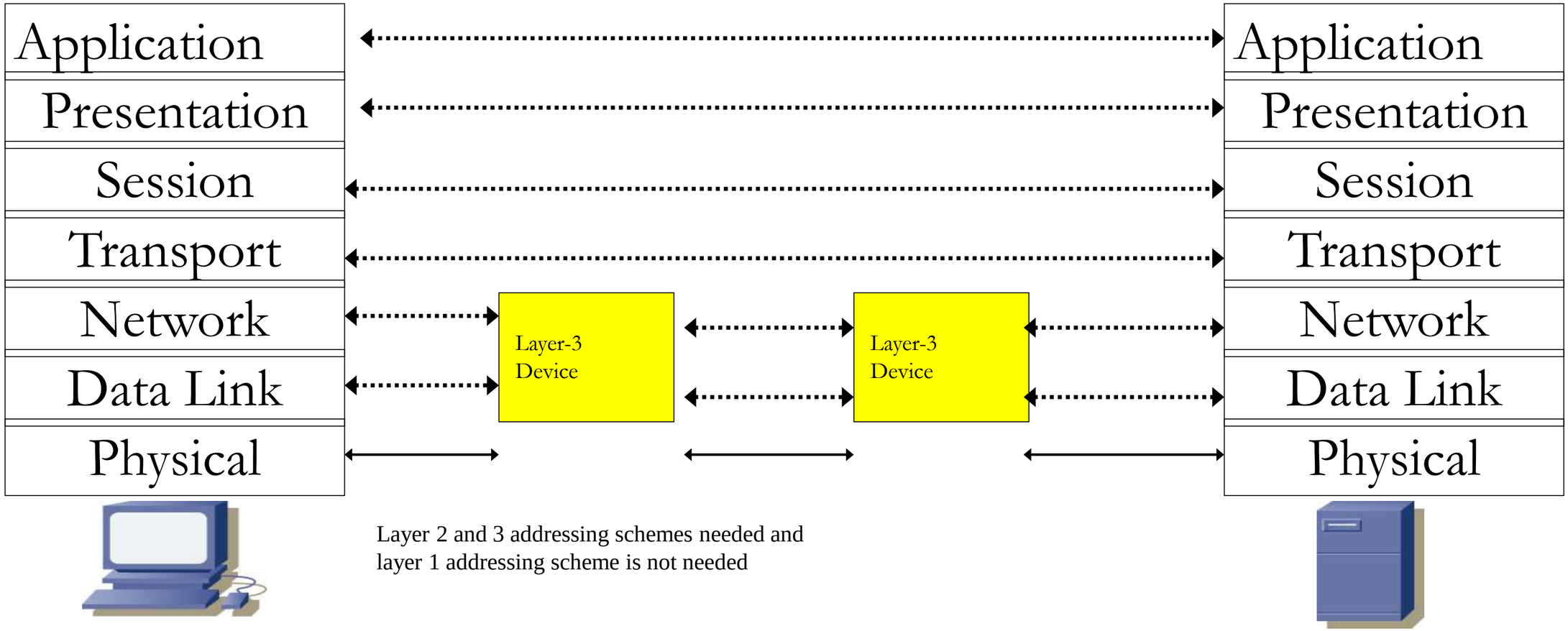
The OSI Model

1. Each layer performs a subset of the required communication functions
2. Each layer relies on the next lower layer to perform more primitive functions
3. Each layer provides services to the next higher layer
4. Changes in one layer should not require changes in other layers
5. Layer 1,2,3 are the network support layer, deals with the physical aspects of moving data from one device to another.
6. Layer 5,6,7 are the user support layer, allow the interoperability among unrelated software.
7. Layer 4 ensures that what the lower layer have transmitted is in a form that the upper layers can use.

The OSI Model- OSI layers functions



OSI Model



Layer 2 and 3 addressing schemes needed and layer 1 addressing scheme is not needed

TCP/IP Protocol Suite

TCP/IP is a protocol suite (a set of protocols organized in different layers) used in the Internet today. It is a hierarchical protocol made up of interactive modules, each of which provides a specific functionality

The TCP/IP protocol suite is a hierarchical protocol , made of five layers:

- **Physical layer**
- **Data link layer**
- **Network layer**
- **Transport layer**
- **Application layer.**

TCP/IP layers functions

1. The physical layer coordinates the functions required to transmit a bit stream over a physical medium.
2. The data-link layer is responsible for delivering data units from one station to the next without errors.
3. The network layer is responsible for the source-to-destination delivery of a packet across multiple network links.
4. The transport layer is responsible for the process-to-process delivery of the entire message.
5. The application layer enables the users to access the network.

TCP/IP Model

1. Using logical connections makes it easier for us to think about the duty of each layer.
2. The duty of the application, transport, and network layers is end-to-end.
3. The duty of the data-link and physical layers is hop-to-hop, in which a hop is a host or router.
4. In other words, the domain of duty of the top three layers is the internet, and the domain of duty of the two lower layers is the link.
5. Another way of thinking of the logical connections is to think about the data unit created from each layer. In the top three layers, the data unit (packets) should not be changed by any router or link-layer switch.
6. In the bottom two layers, the packet created by the host is changed only by the routers, not by the link-layer switches

Figure 2.6 *Logical connections between layers of the TCP/IP protocol suite*

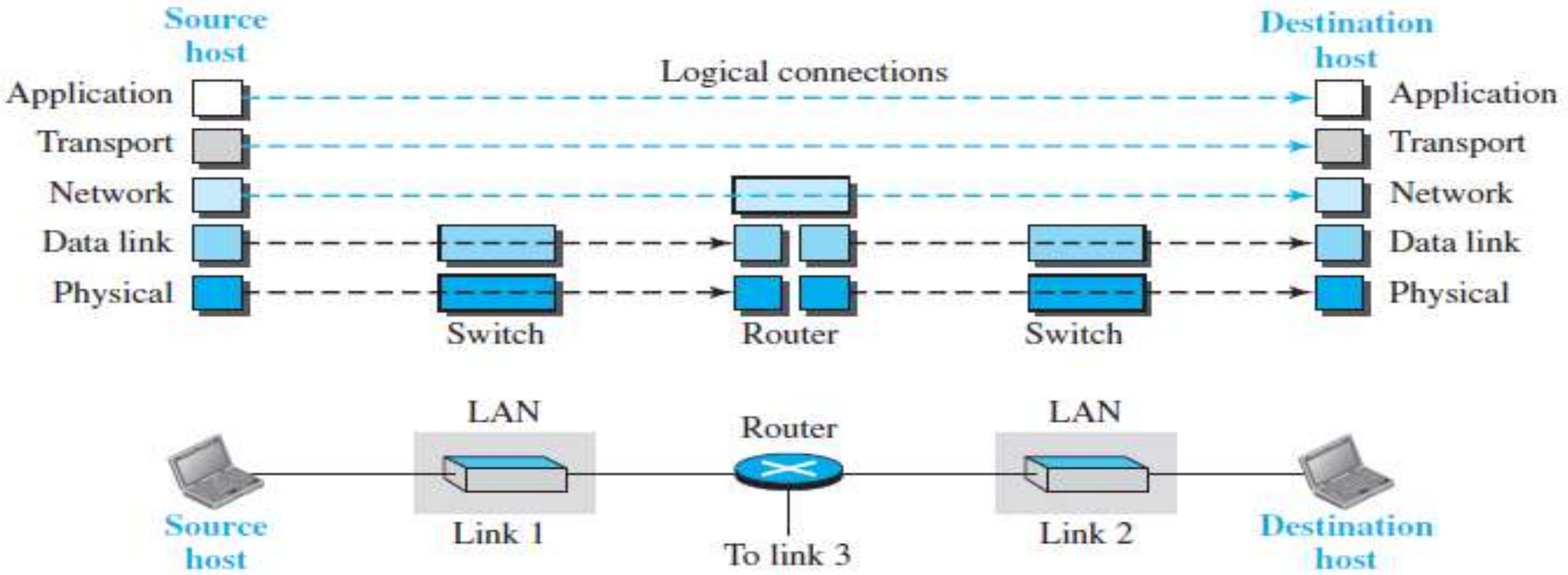
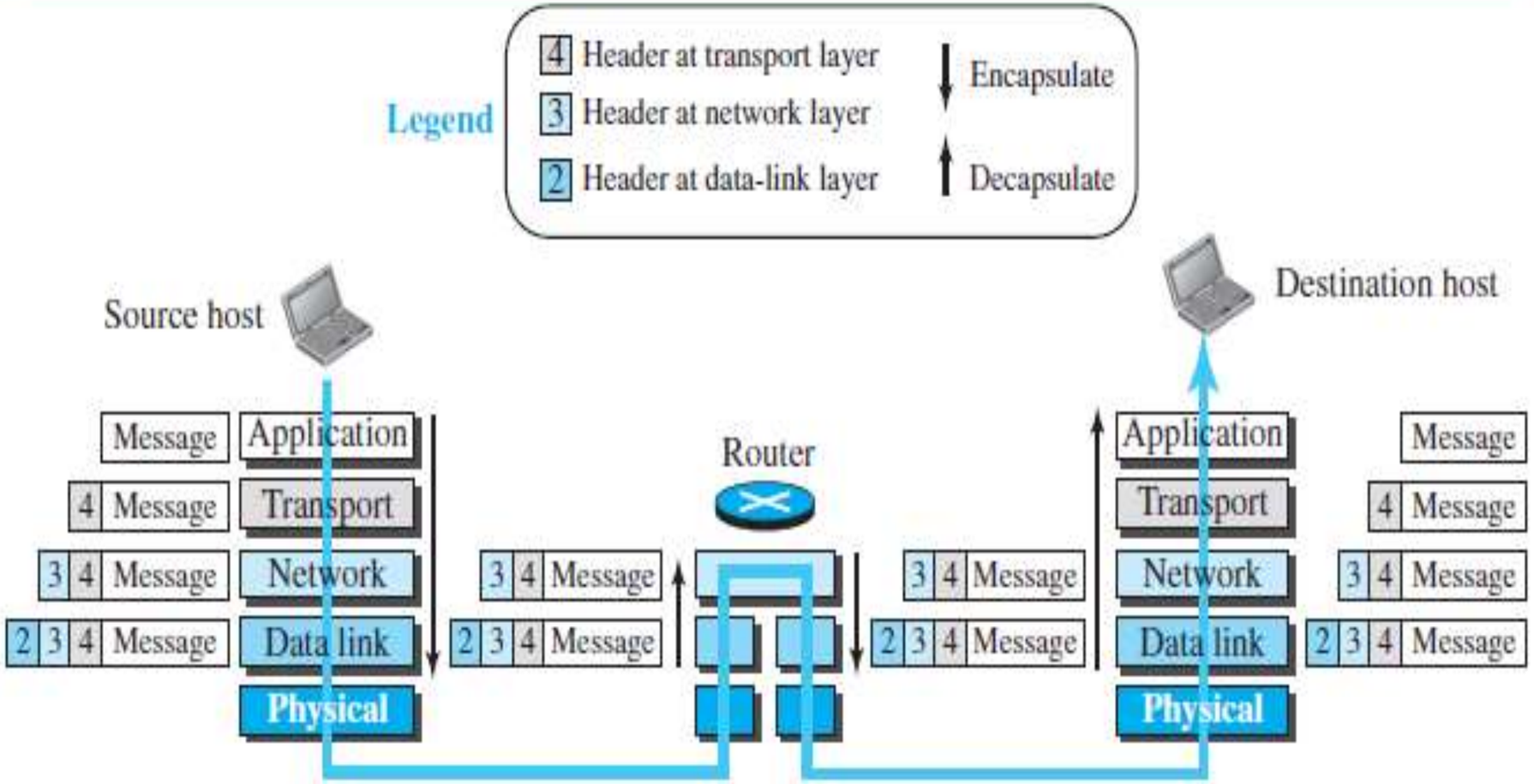
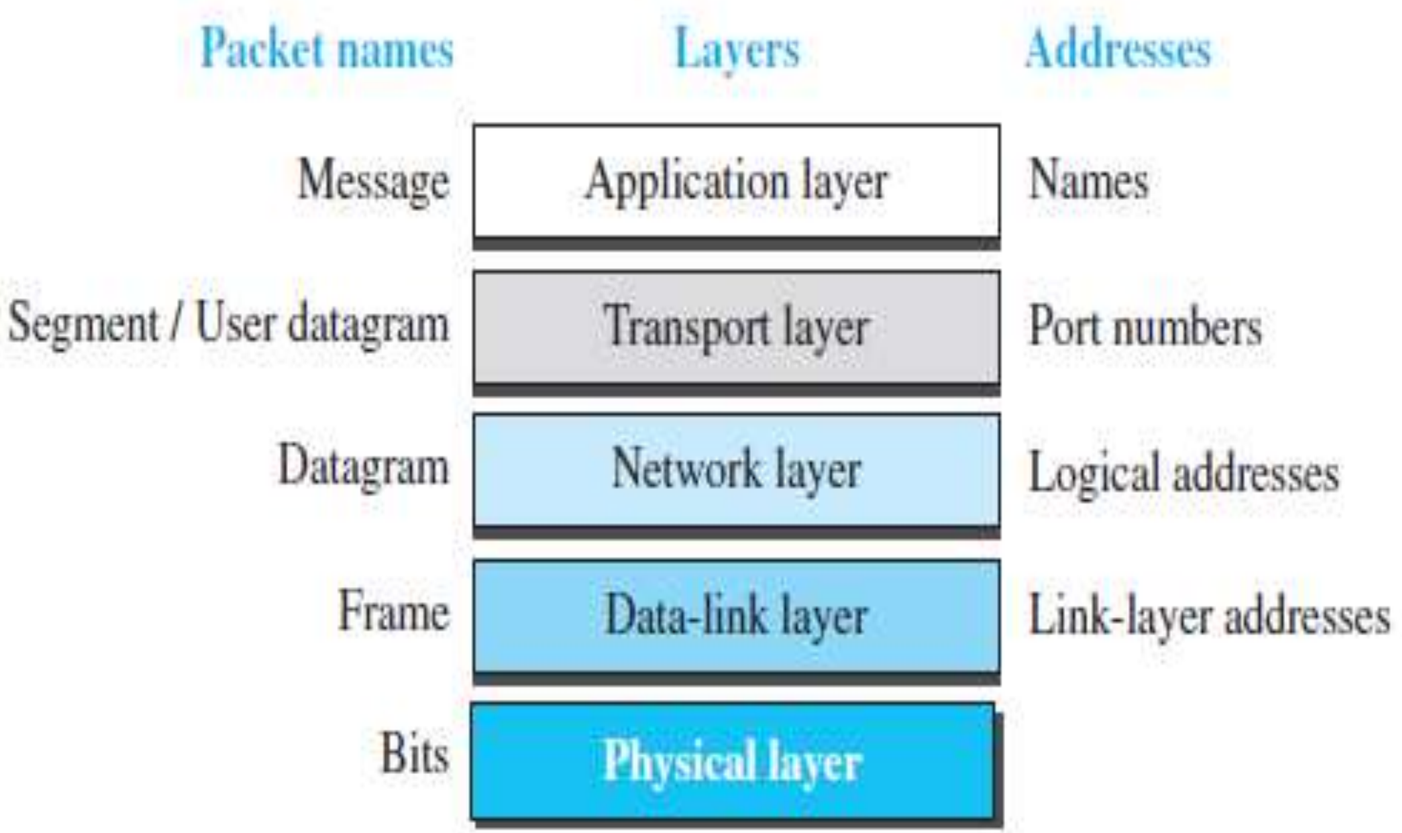


Figure 2.8 *Encapsulation/Decapsulation*

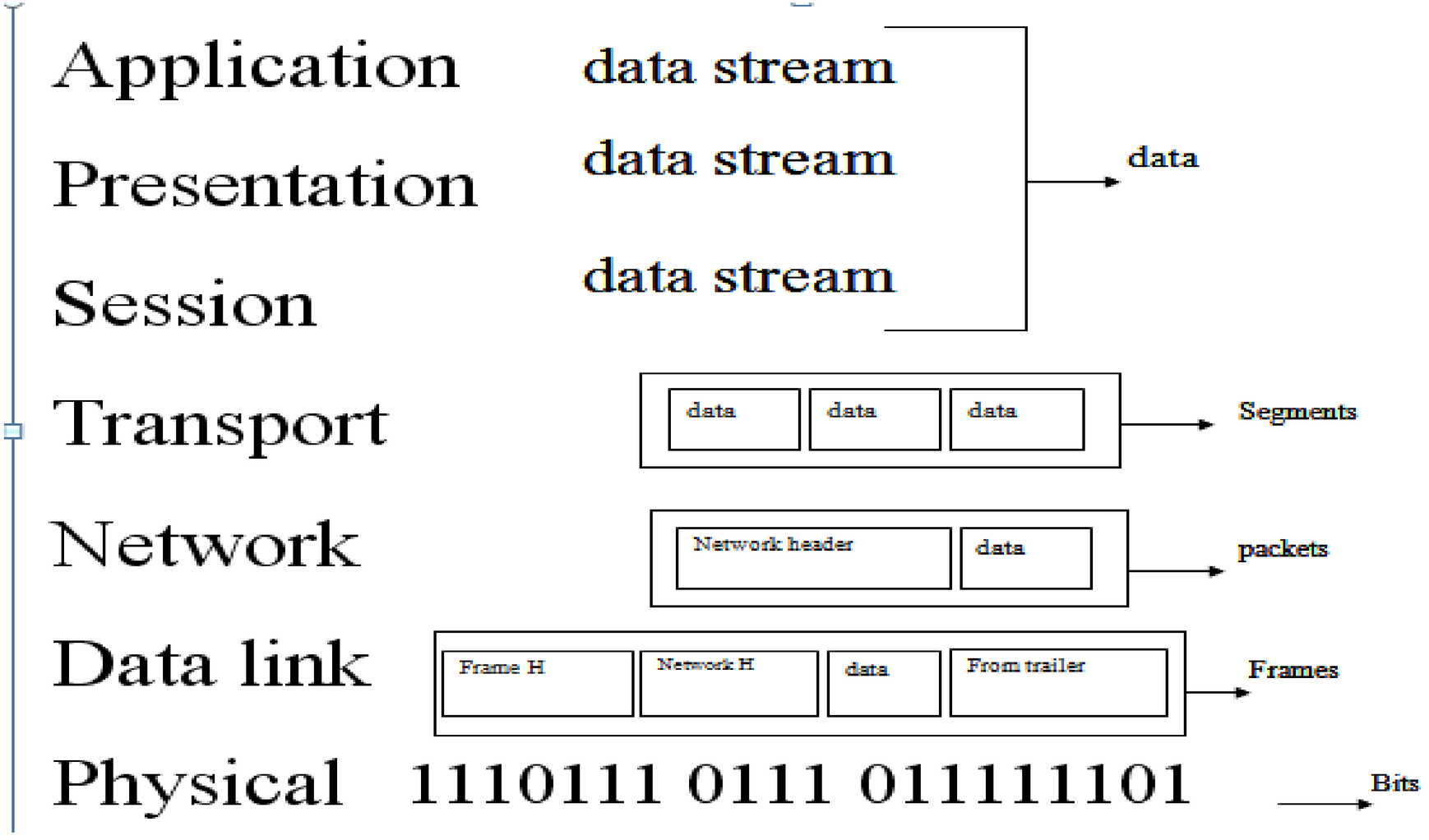


1. Transport layer header: It contains the identifiers of the source and destination application programs that want to communicate plus some more information that is needed for the end-to end delivery of the message, such as information needed for flow, error control, or congestion control. The result is the transport-layer packet, which is called the *segment* (in TCP) and the *user datagram (in UDP).*
2. *Network layer header:* The header contains the addresses of the source and destination hosts and some more information used for error checking of the header, fragmentation information, and so on. The result is the network-layer packet called a *datagram.*
3. Data link layer header contains the link-layer addresses of the host or the next hop (the router). The result is the link-layer packet, which is called a *frame*

Figure 2.9 *Addressing in the TCP/IP protocol suite*



OSI Model data stream



- Four levels of addresses are used in an internet following the TCP/IP protocols:

1. The physical address, also known as the link address, is the address of a node as defined by its LAN or WAN.
2. The IP address uniquely defines a host on the Internet.
3. The port address identifies a process on a host.
4. A specific address is a user-friendly address.

DEVICES :

1. **Hub**, a distributor that has a lot of ports which connected to computers.
2. **Switches**, like a hub but it transmit packets to it destination
3. **Bridge,** it is used to connect two similar LANs.
4. **Routers**, choose the best path to transmit the packet.
5. **Gateway**, it is use to connect two deferent LANs and connect different application protocols.
6. **Repeaters**, repeats signals that travels via long distance

Assessment

a).What is OSI Model?
b) List the OSI Model layers?
c) List the functions of OSI Model layers
d)What is TCP/IP model

Reference

TEXT BOOKS

Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.

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