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MIRPUR UNIVERSITY OF SCIENCE AND TECHNOLOGY (MUST), MIRPUR

DEPARTMENT OF SOFTWARE ENGINEERING

Computer Networks

Lecture [8]: TCP/IP PROTOCOL SUITE

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(Lecturer)

Topics discussed in Today's Lectures

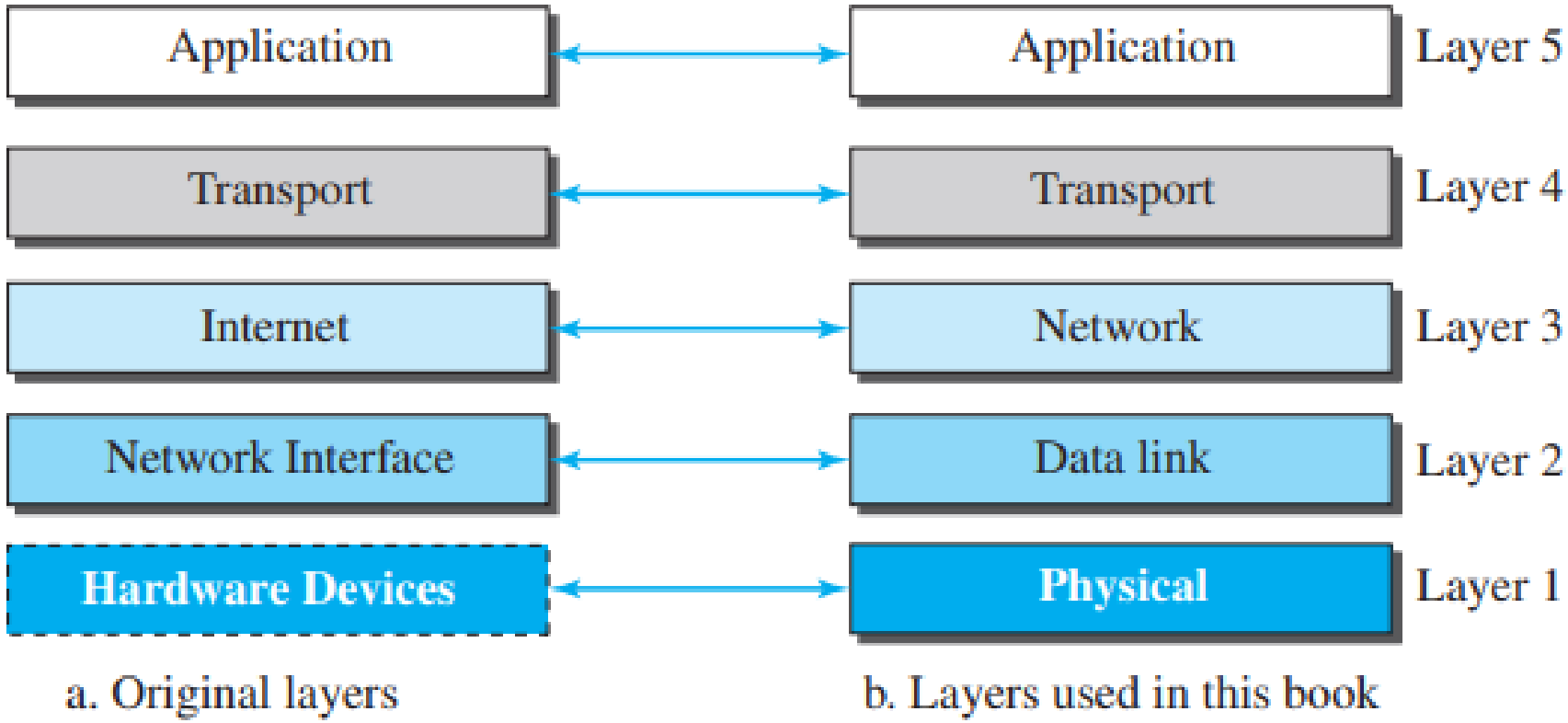
- TCP/IP PROTOCOL SUITE
- Layered Architecture
- Layers in the TCP/IP Protocol Suite

TCP/IP

- TCP/IP (Transmission Control Protocol/Internet Protocol)
- TCP/IP is a protocol suite (a set of protocols organized in different layers) used in the Internet today
- It is a hierarchical protocol, each upper level protocol is supported by the services provided by one or more lower level protocols
- Today, TCP/IP is thought of as a five-layer model (old was 4 layer model)
- Figure 2.4 shows both configurations

TCP/IP

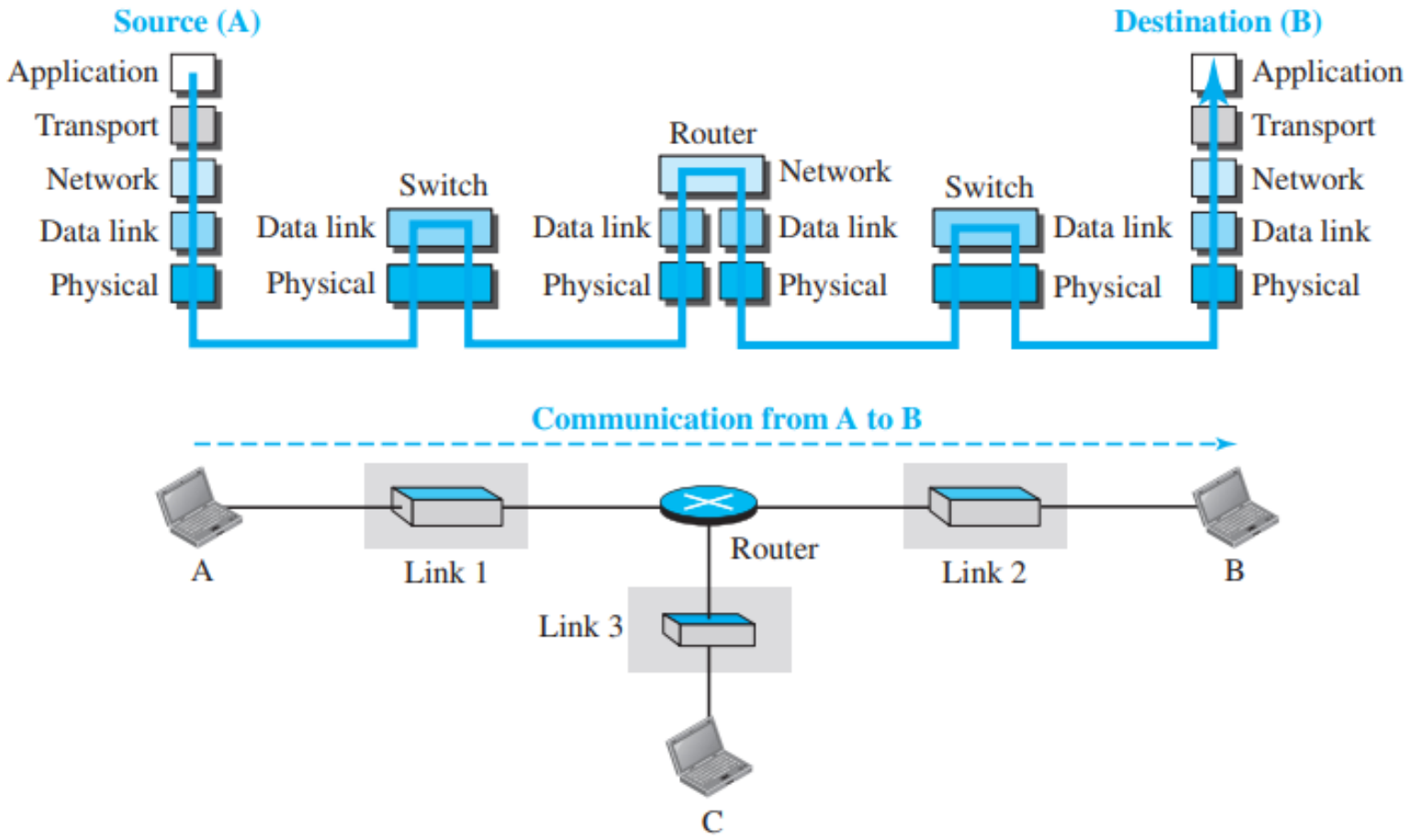
Figure 2.4 *Layers in the TCP/IP protocol suite*



Layered Architecture

- Layers in the TCP/IP protocol suite are involved in comm. b/w 2 hosts
- Assume we are using the suite in a small internet made up of 3 LANs (links), each with a link-layer switch
- Assume that the links are connected by one router, as shown in Figure 2.5.

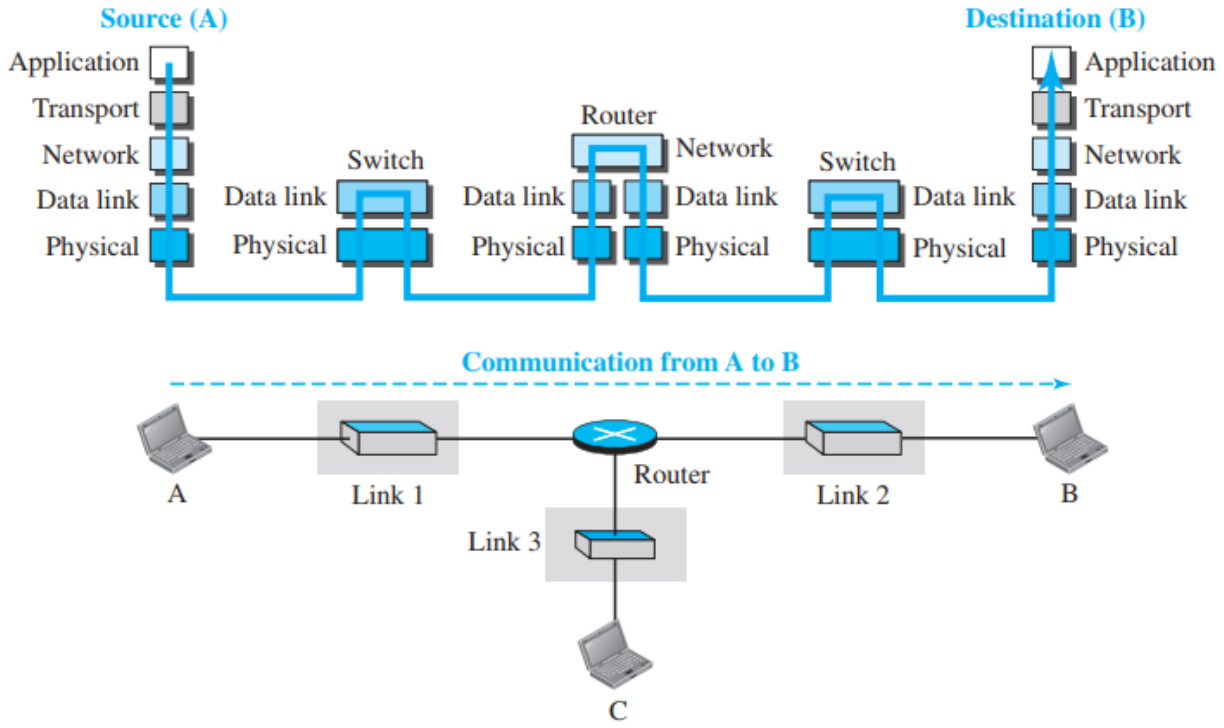
Figure 2.5 *Communication through an internet*



Layered Architecture

- Assume that computer A comm with B
- We have 5 communicating devices in this communication:
  i. Source host (computer A)
  ii. Link-layer switch in link 1
  iii. Router
  iv. Link-layer switch in link 2
  v. Destination host (computer B)
- Two hosts are involved in all five layers
- Source host creates a message in the application layer & send it down the layers so that it is physically sent to the destination host
- Destination host needs to receive the comm. at physical layer & then deliver it through other layers to the application layer

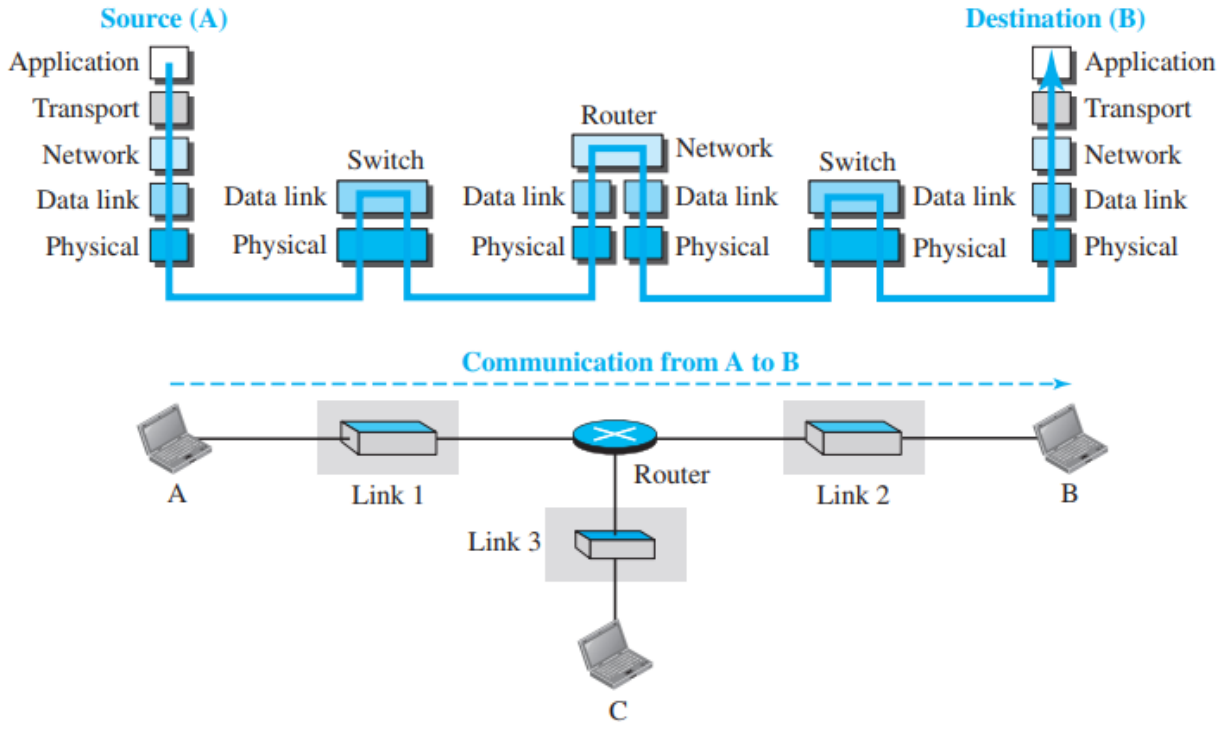
Figure 2.5 *Communication through an internet*



Layered Architecture

- Router is involved in only 3 layers
- Although a router is always involved in one network layer, it is involved in ***n*** combinations of data link and physical layers in which ***n*** is the number of links the router is connected to
- The reason is that *each link may use its own data-link* or *physical protocol*
- For example, in the figure, the router is involved in three links, but the message sent from source A to destination B is involved in two links.

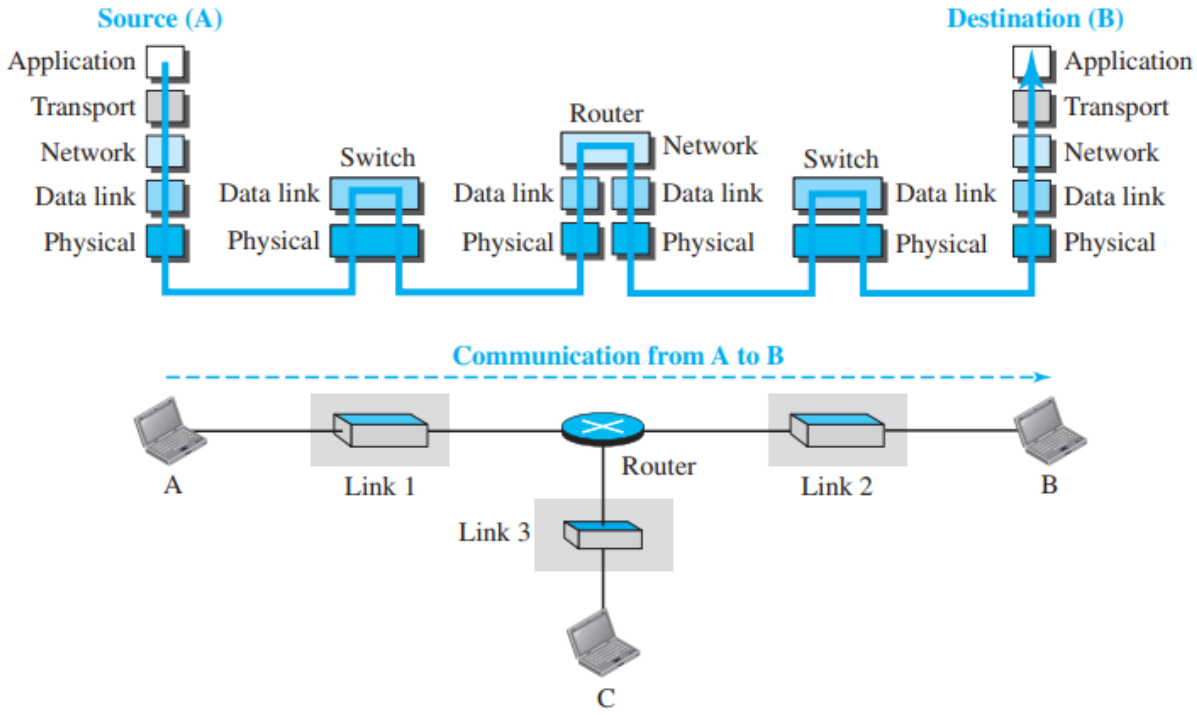
Figure 2.5 *Communication through an internet*



Layered Architecture

- Each link may be using **different protocols;**
- Router needs to receive a packet from link 1 based on one pair of protocols and deliver it to link 2 based on another pair of protocols
- A link-layer **switch** is involved only in two layers, data-link and physical
- Each switch has two different connections, the connections are in the same link, which uses only one set of protocols
- This means that switch is involved only in one data-link and one physical layer

Figure 2.5 *Communication through an internet*

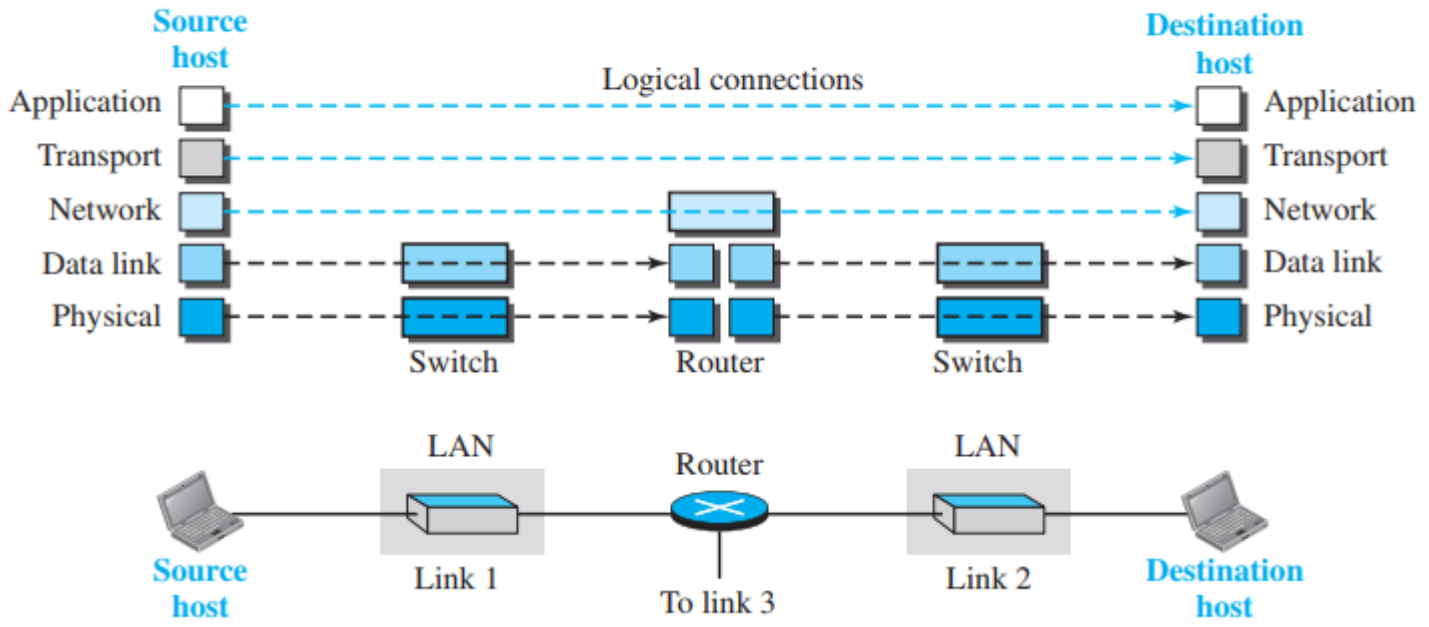


Layers in the TCP/IP Protocol Suite

- To better understand the duties of each layer, we need to think about the logical connections b/n layers

- As the figure shows, the duty of the application, transport, and network layers is end-to-end
- Duty of the data-link and physical layers is hop-to-hop, in which a hop is a host or router
- So, domain of duty of the top three layers is the internet, and domain of duty of the two lower layers is the link

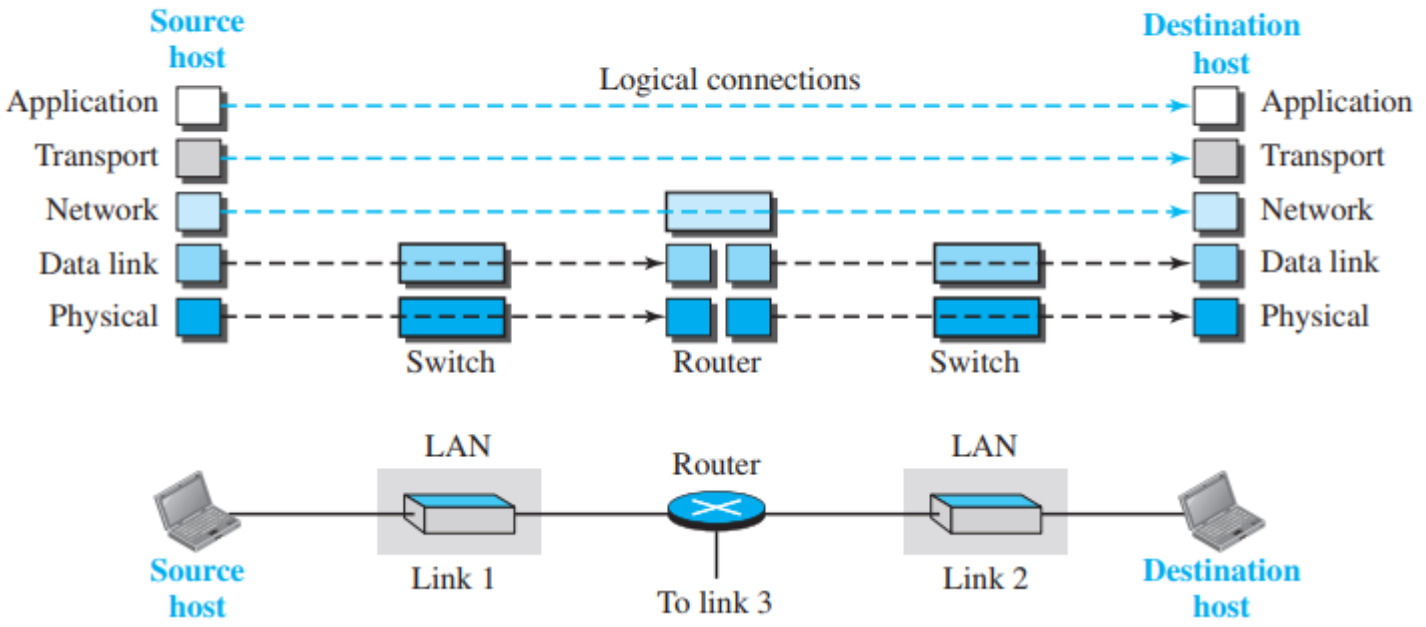
Figure 2.6 *Logical connections between layers of the TCP/IP protocol suite*



Layers in the TCP/IP Protocol Suite

- 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
- In the bottom two layers, the packet created by the host is changed only by the routers, not by the link-layer switches.
- Fig 2.7 shows the 2nd principle discussed previously for protocol layering.

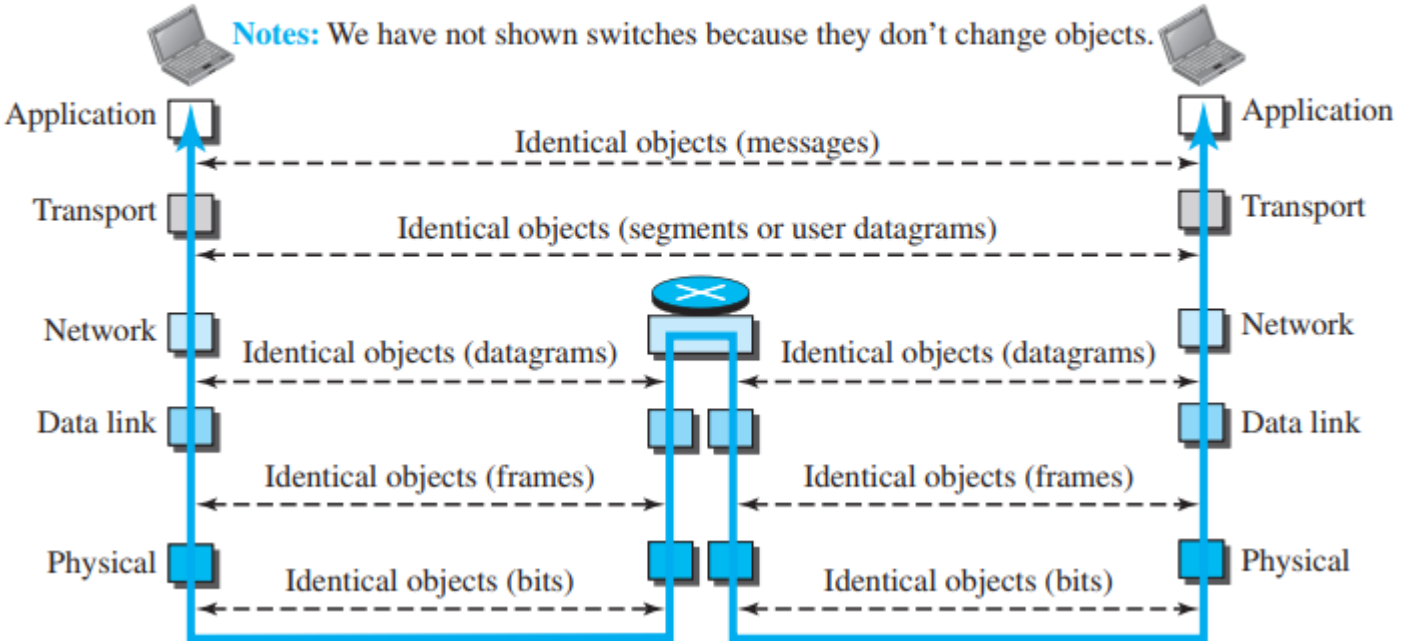
Figure 2.6 *Logical connections between layers of the TCP/IP protocol suite*



Layers in the TCP/IP Protocol Suite

- Although the logical connection at the network layer is between the two hosts
- Identical objects exist between two hops in this case because a router may fragment the packet at the network layer and send more packets than received
- Note that link between two hops does not change the object

Figure 2.7 *Identical objects in the TCP/IP protocol suite*



References

Chapter 2

Data Communication and Networking (5th Edition)
By Behrouz A. Forouzan

THANKS