22AIE204 Introduction to Computer Networks

Encapsulation
TCP/IP model

How two devices communicate over internet?

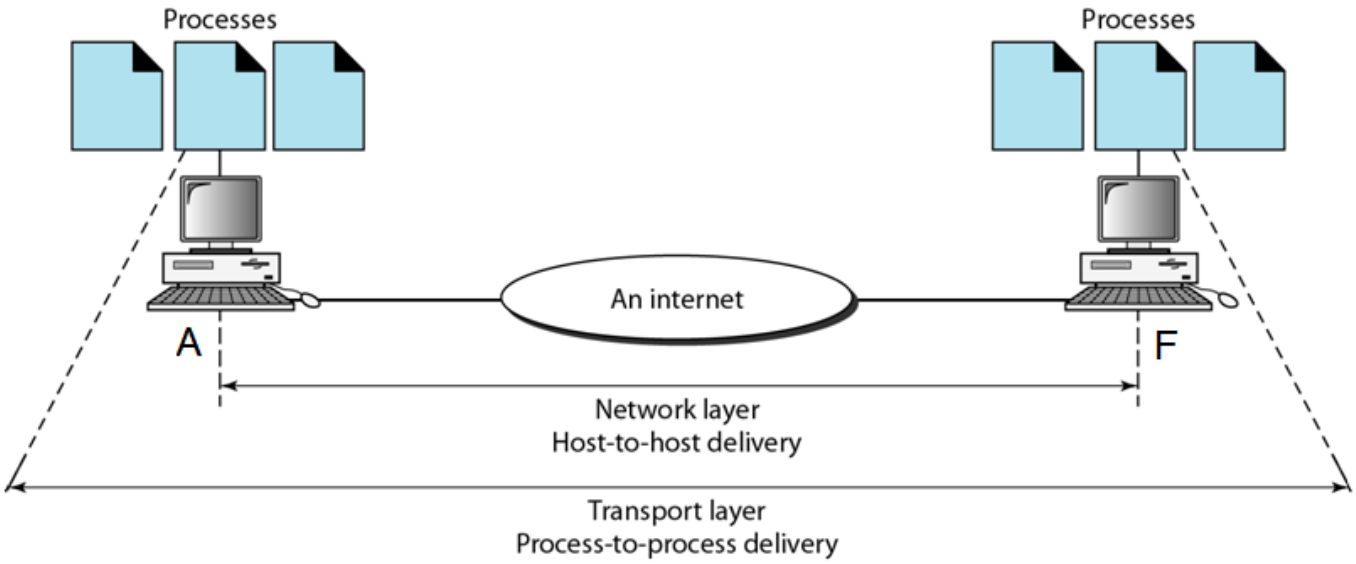


Figure: Reliable process-to-process delivery ofa message

- applications running in device A and F interact with each other
- process corresponds to a given application currently active in a device

Source: Data Communications and Networking, Forouzan

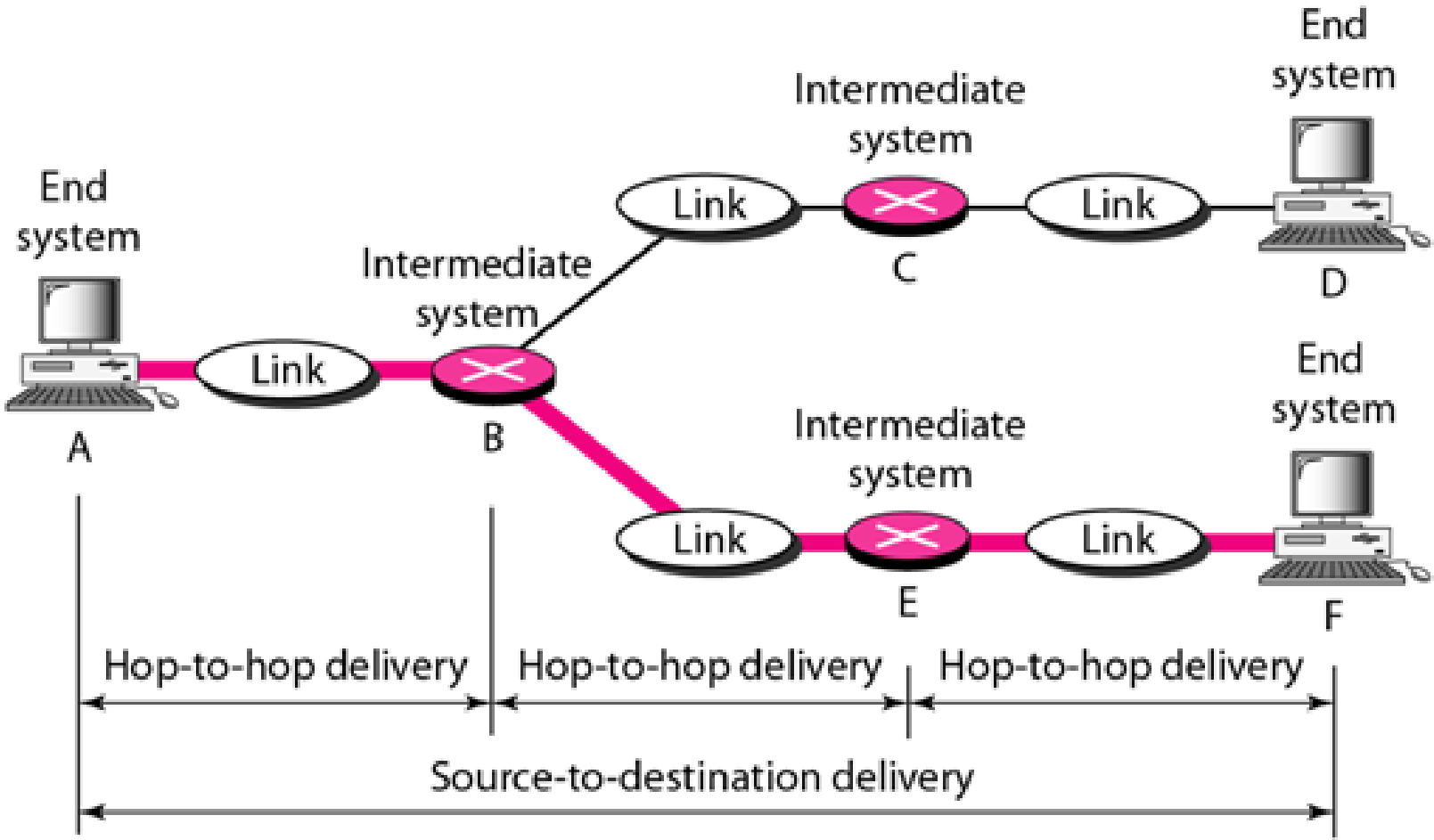
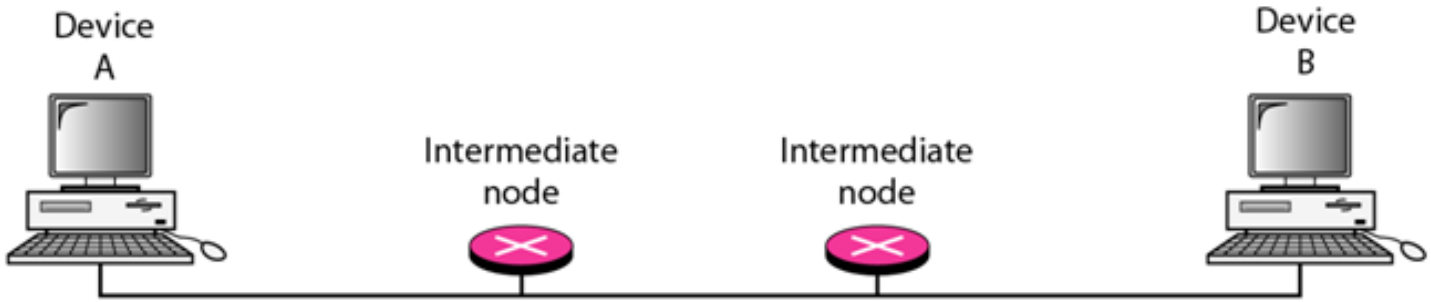


Figure: Source-to-destination delivery of data at network layer

Source: Data Communications and Networking, Forouzan

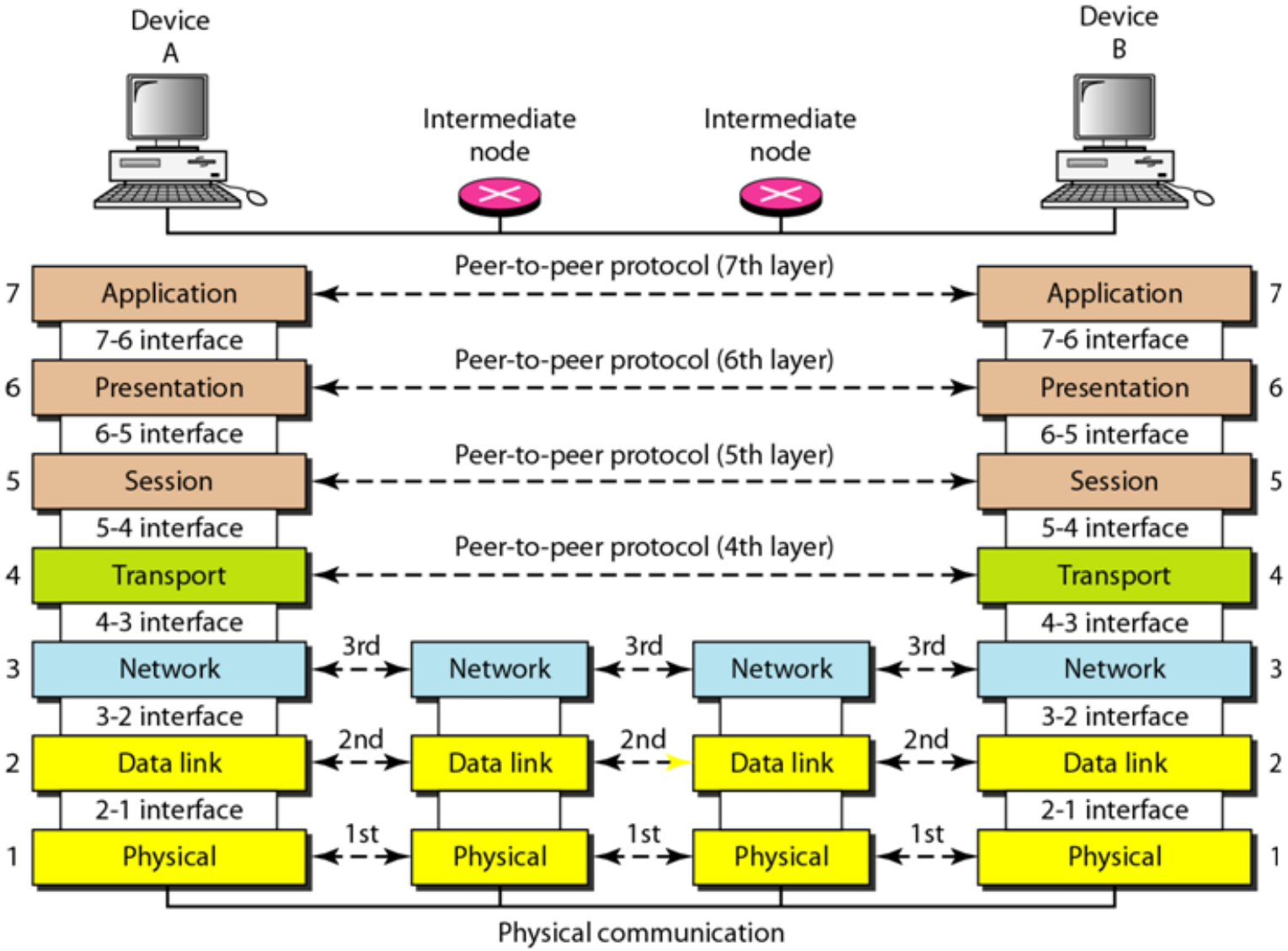
How the data is sent from device A to B along the two intermediate nodes?



- data packet is sent from device A to B
- intermediate nodes/devices will forward the data received to the next node along the path
  - here device A will send the data to first intermediate node which forwards it to the second intermediate node and so on

Source: Data Communications and Networking, Forouzan

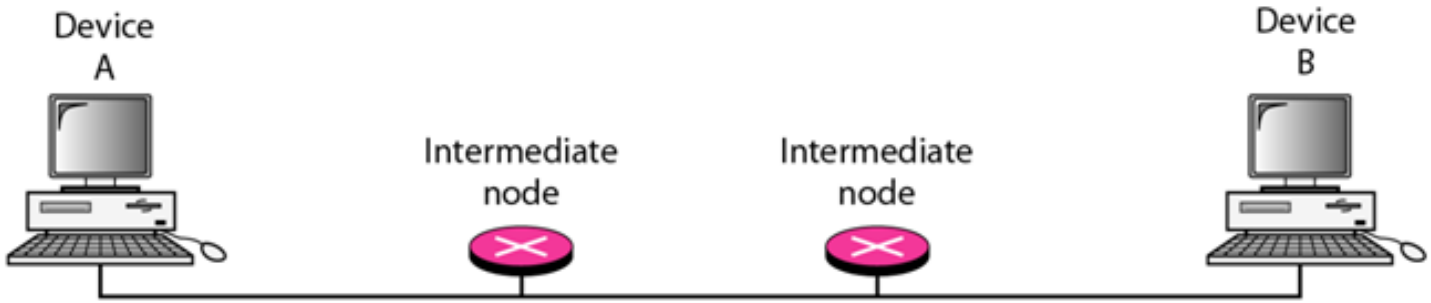
The interaction between layers in the OSI model



Source: Data Communications and Networking, Forouzan

The interaction between layers in the OSI model

How the data is sent from device A to B along the two intermediate nodes?



- same layers communicate with each other
- data is passed down the layer at sender and the reverse operation at the receiver
- data is forwarded by the network devices along the path from sender to receiver

Source: Data Communications and Networking, Forouzan

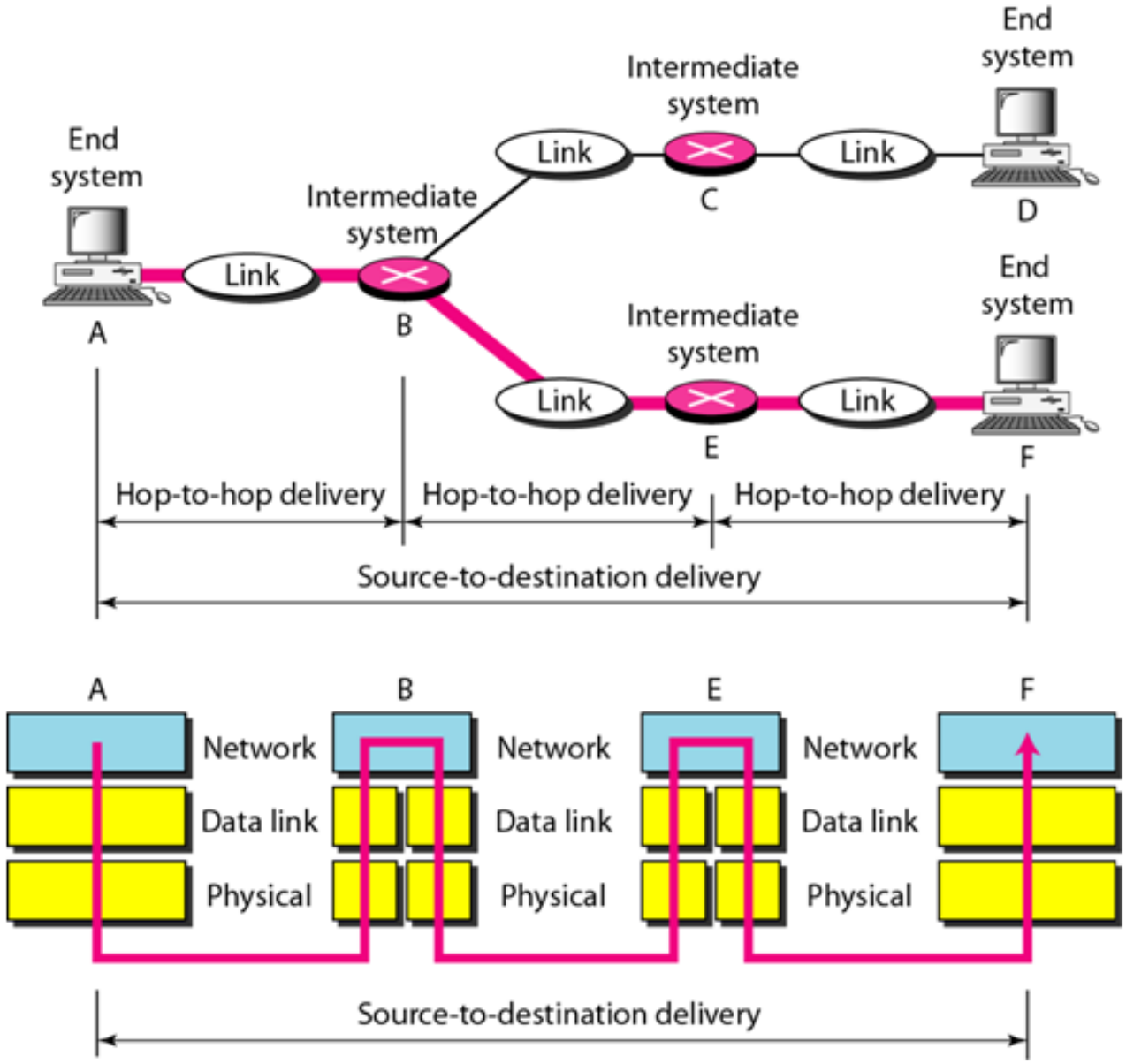


Figure: Source-to-destination delivery of data at network layer

Source: Data Communications and Networking, Forouzan

The interaction between layers in the OSI model

How the data is passed from device A to B along the two intermediate nodes?

- data is passed down from higher to lower layers in device A
- data is transmitted to the first intermediate node at the physical layer
- data received at the first intermediate node is passed to the layers above
- process repeats till it reaches application layer at device B

Source: Data Communications and Networking, Forouzan

Data transfer between the layers in a device

Encapsulation:

- Each layer in the sending device adds its own information as a header to the message it receives from the layer just above it before passing to the layer just below it.
  - same layers between the communicating nodes interact using based on the header
  - information required to forward the data to next node will be stored in the header
- At receiver, data is passed to the layer above after removing the header - de-encapsulation.

Source: Data Communications and Networking, Forouzan

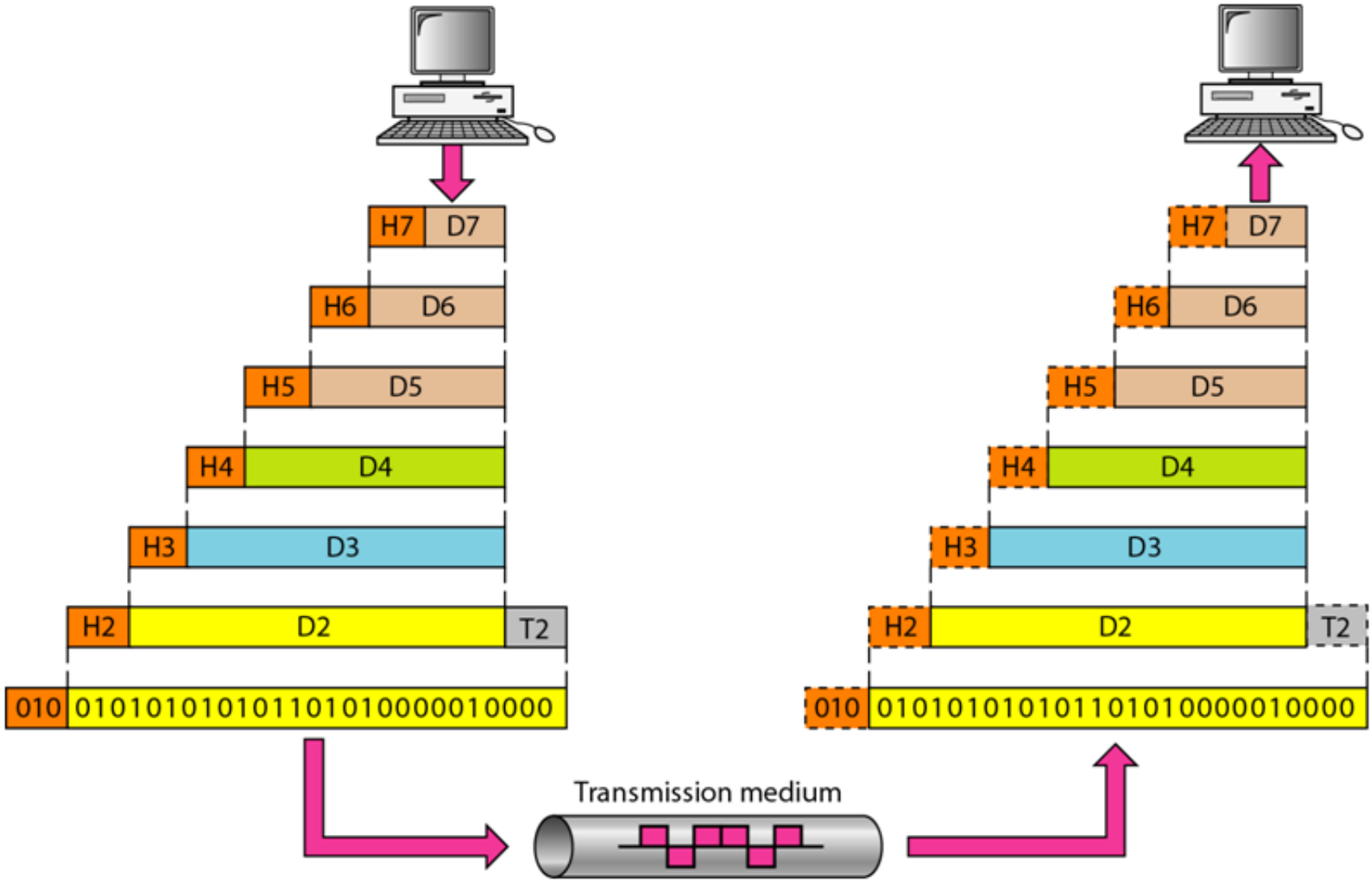


Figure: An exchange using the OSI model

The Internet (TCP/IP) Protocol Suite

- It stands for Transmission Control Protocol/ Internet Protocol.
- TCP/IP was developed to solve the problem of inter networking
- Internet based applications and the communication between the end devices connected to the internet are based on this model
- Protocols define how the communication takes place at each layer and how to interface between the adjacent layers.

Source: Data Communications and Networking, Forouzan

The Internet (TCP/IP) Protocol Suite

- TCP/IP protocol suite is made of five layers:
  - application layer
  - transport layer
  - network layer
  - data link layer and
  - physical layer

Source: Data Communications and Networking, Forouzan

The Internets 5-Layer Model

- Application: used by application program
- Transport: establishes end-to-end connections
- Network*: data transfer between the end-to-end systems, addressing and routing
- Data Link*: deals with message delineation, error control & network access
- Physical*: defines how information will be transmitted through the network

*same as corresponding layer in OSI model

Source: Data Communications and Networking, Forouzan

TCP/IP model

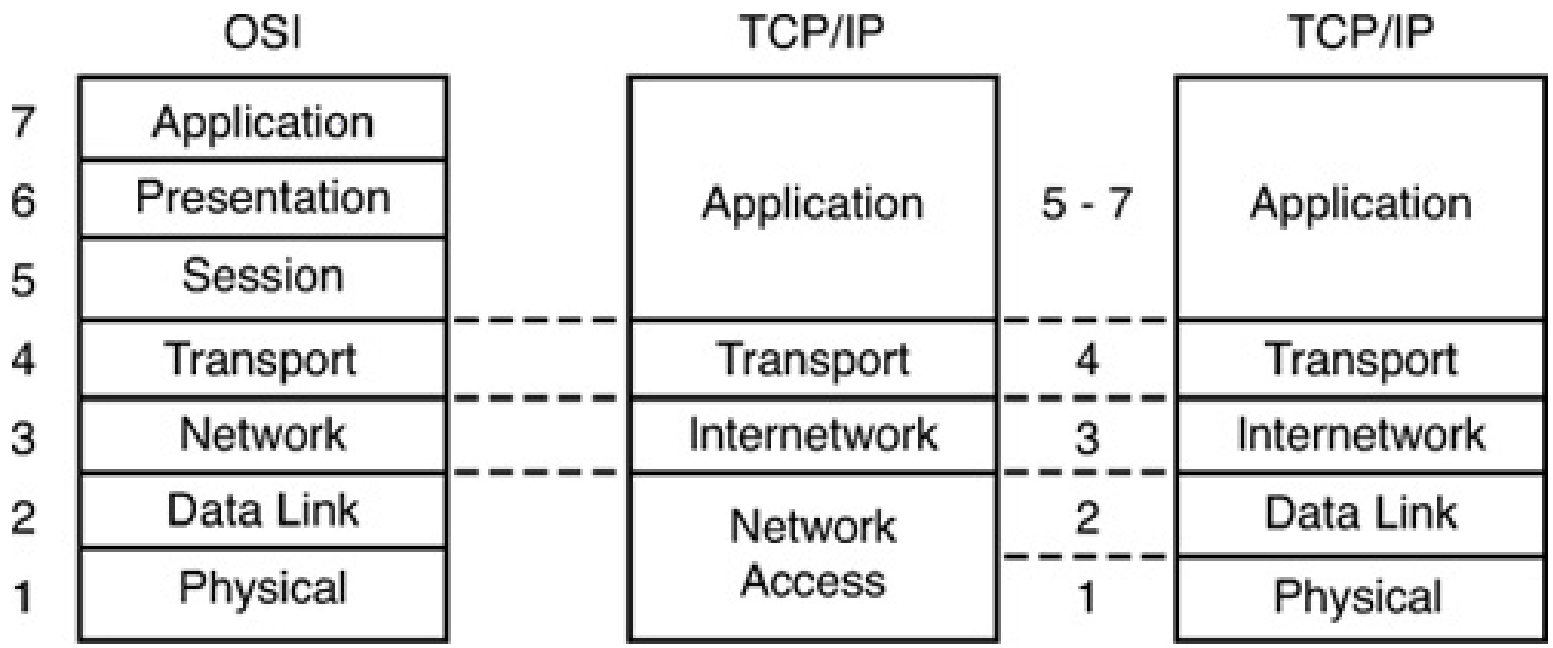


Figure: Comparision of layers in OSI and TCP/IP model

Encapsulation in TCP/IP model

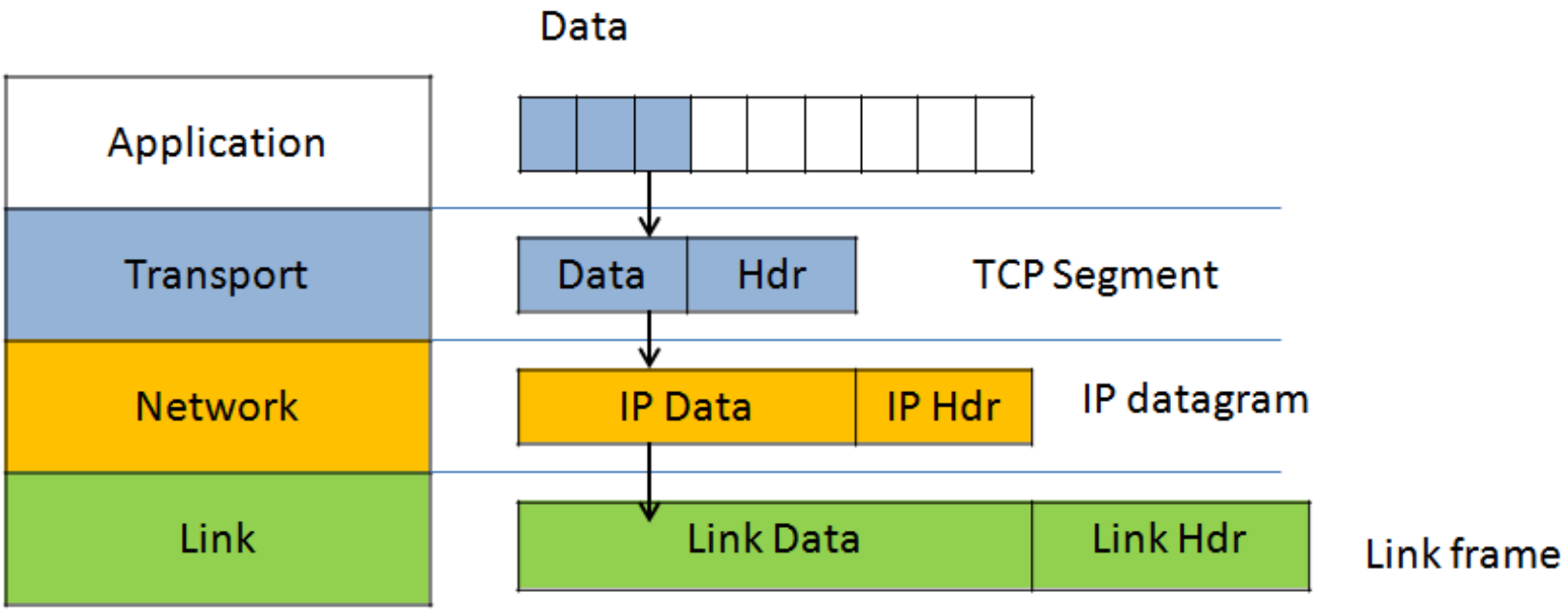


Figure: Encapsulation

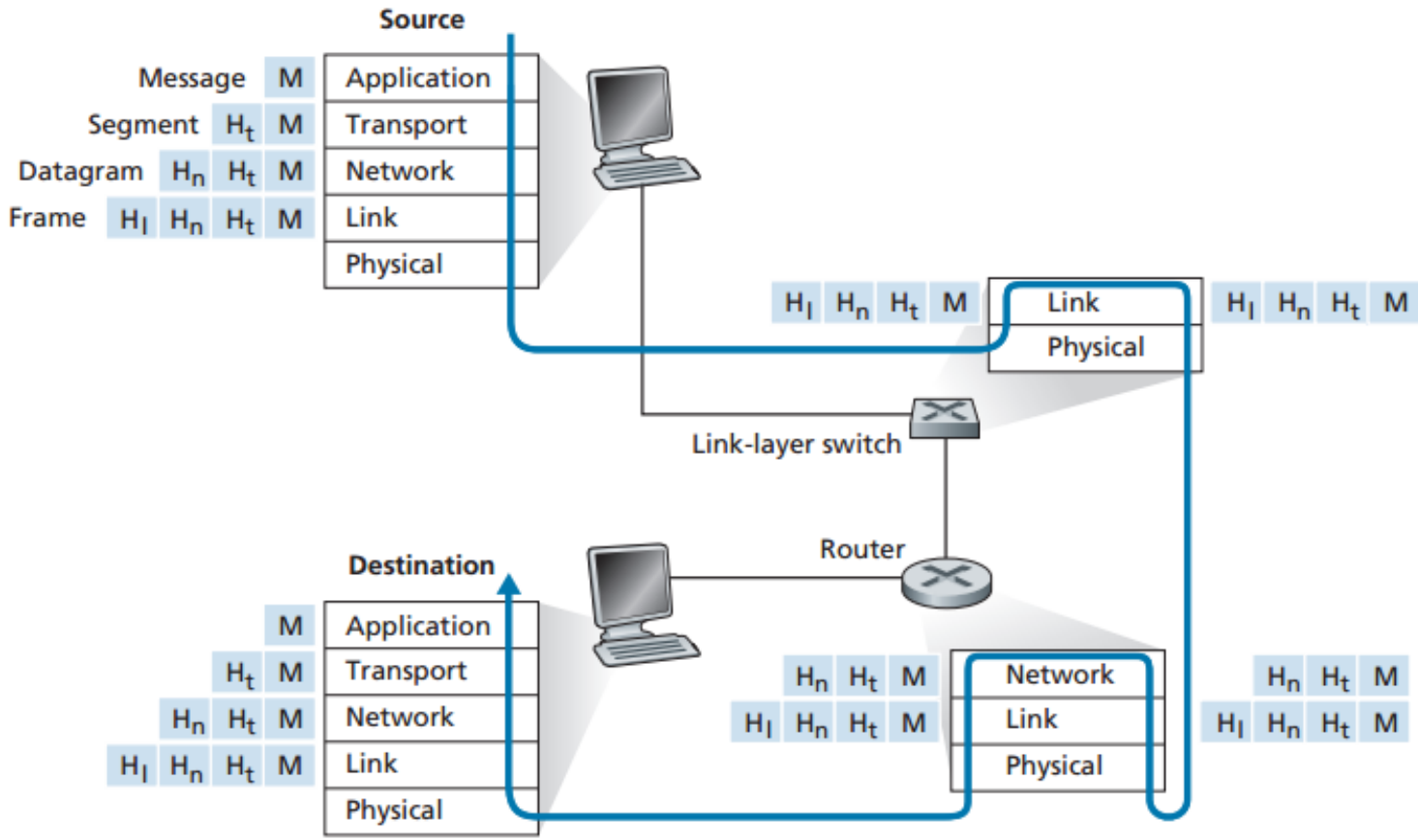


Figure: Data transfer between the applications running in different end systems

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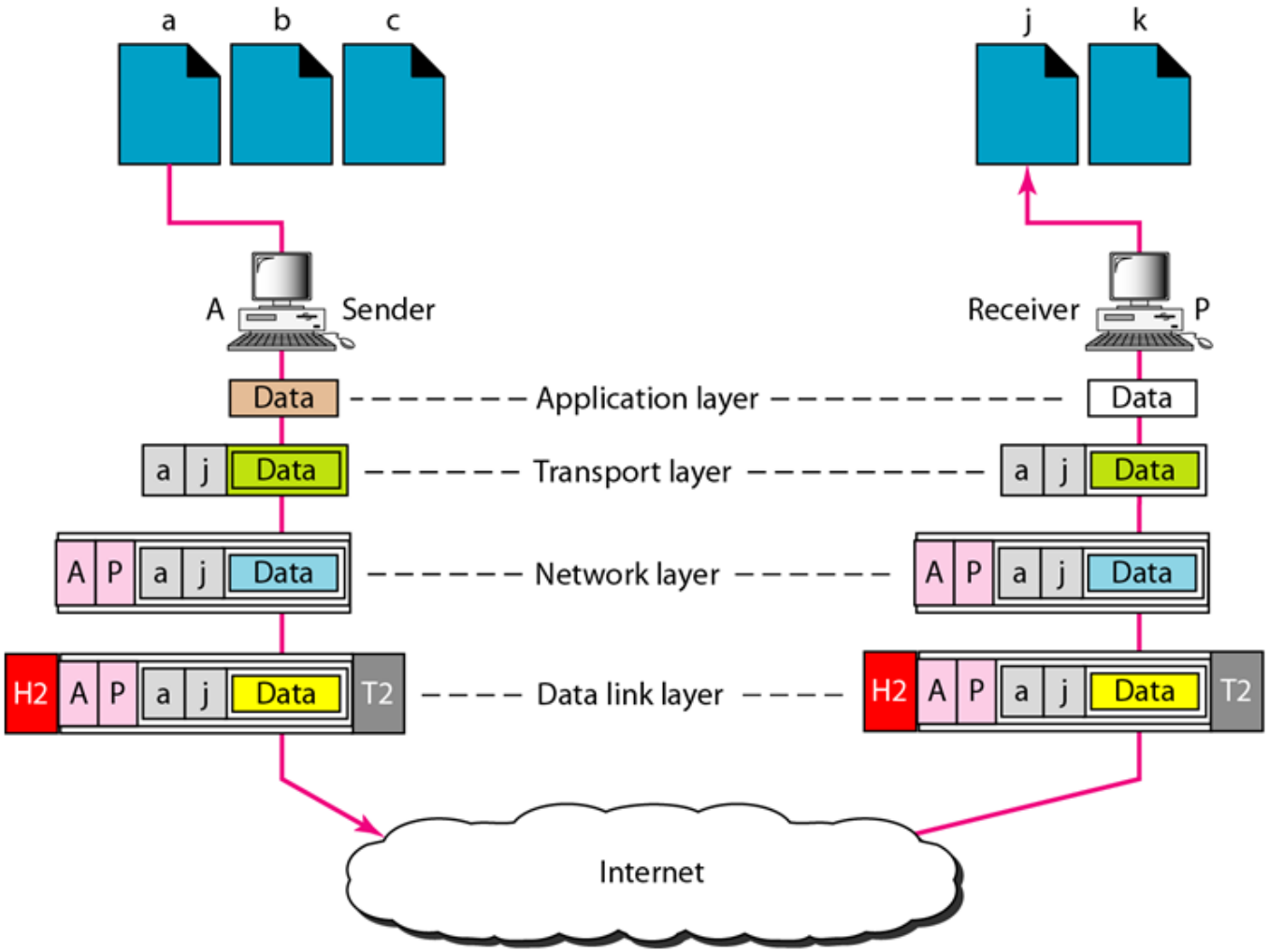
Kurose, James, and Keith Ross. "Computer networks: A top-down approach featuring the internet." (2010).



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Questions?