2020 NAAAEA Annual Conference Program

"Network OSI Models " Conceptual Definition with Use Cases

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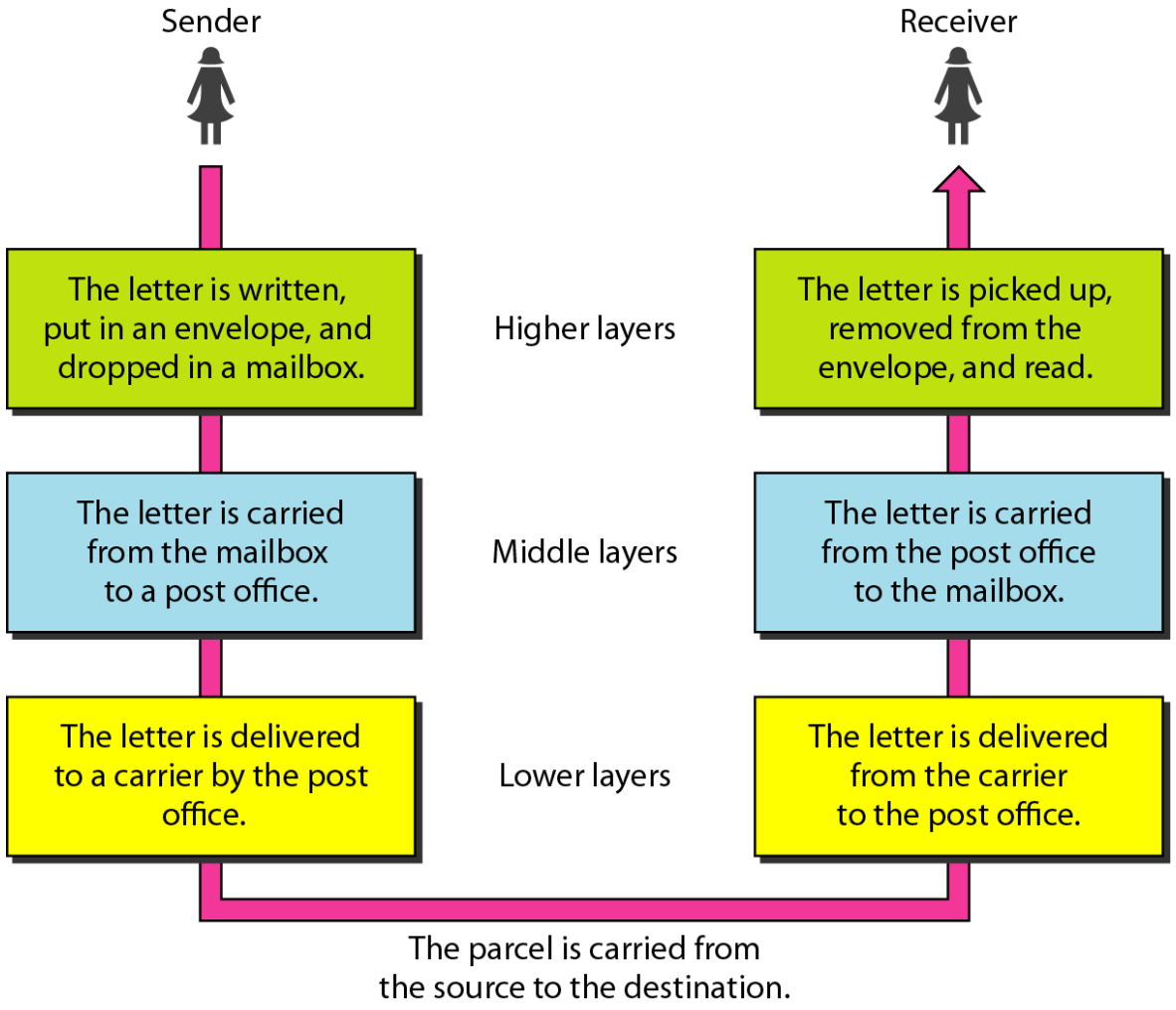
Houston Chapter

LAYERED TASKS

- We use the concept of layers in our daily life. As an example, let us consider two friends who communicate through postal mail. The process of sending a letter to a friend would be complex if there were no services available from the post office.

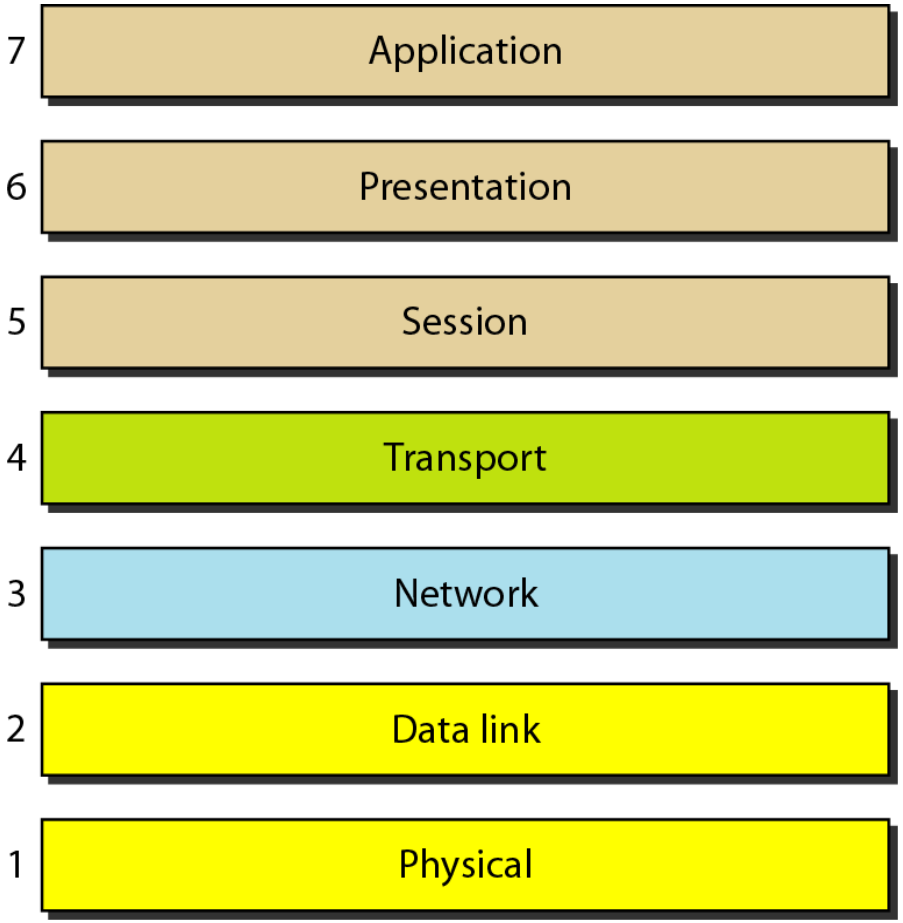
Layered Tasks, Example



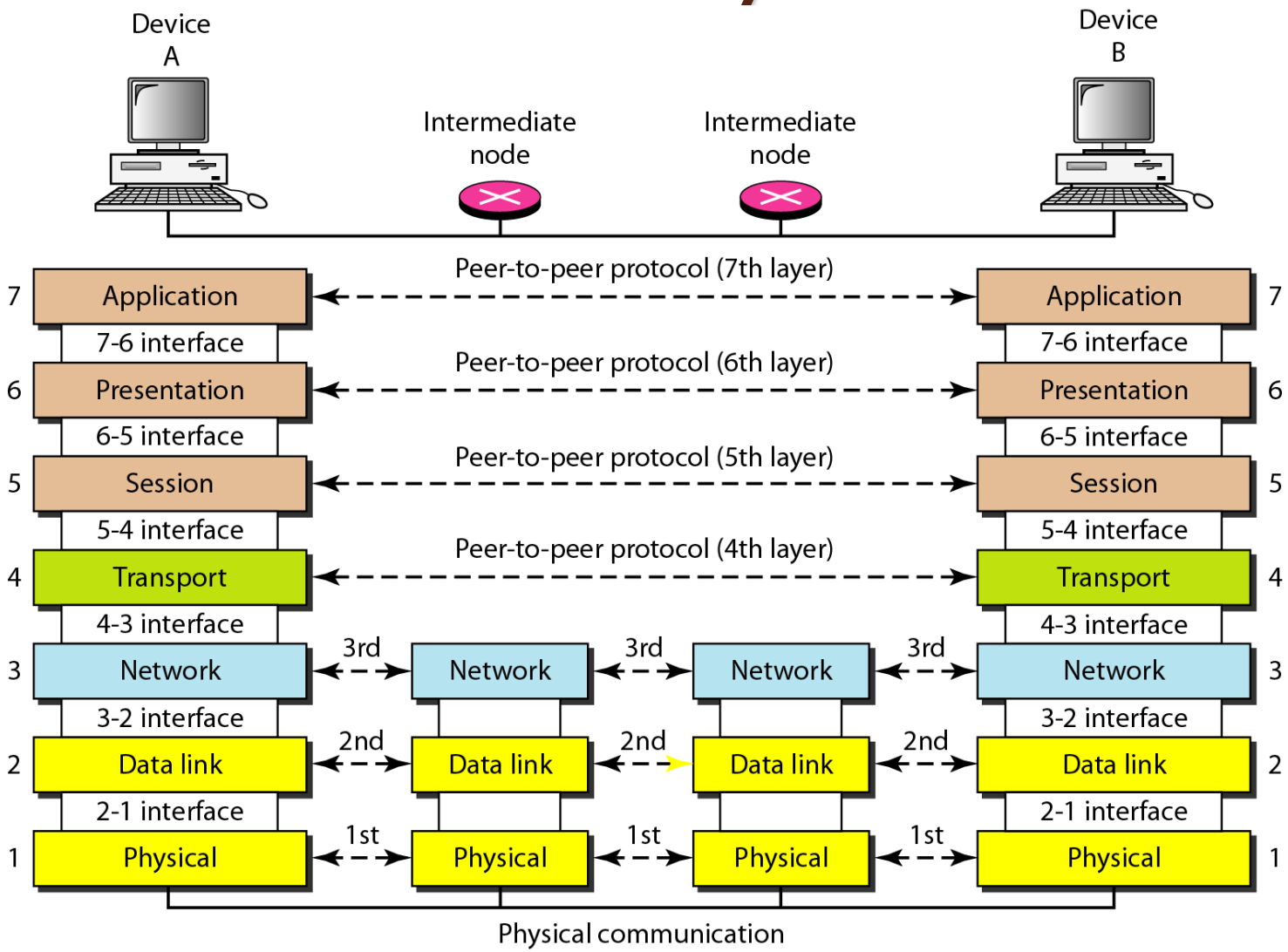
THE OSI MODEL

- Established in 1947, the International Standards Organization (ISO) is a multinational body dedicated to worldwide agreement on international standards. An ISO standard that covers all aspects of network communications is the Open Systems Interconnection (OSI) model. It was first introduced in the late 1970s.
- Note:
  - ISO is the organization.
  - OSI is the model.

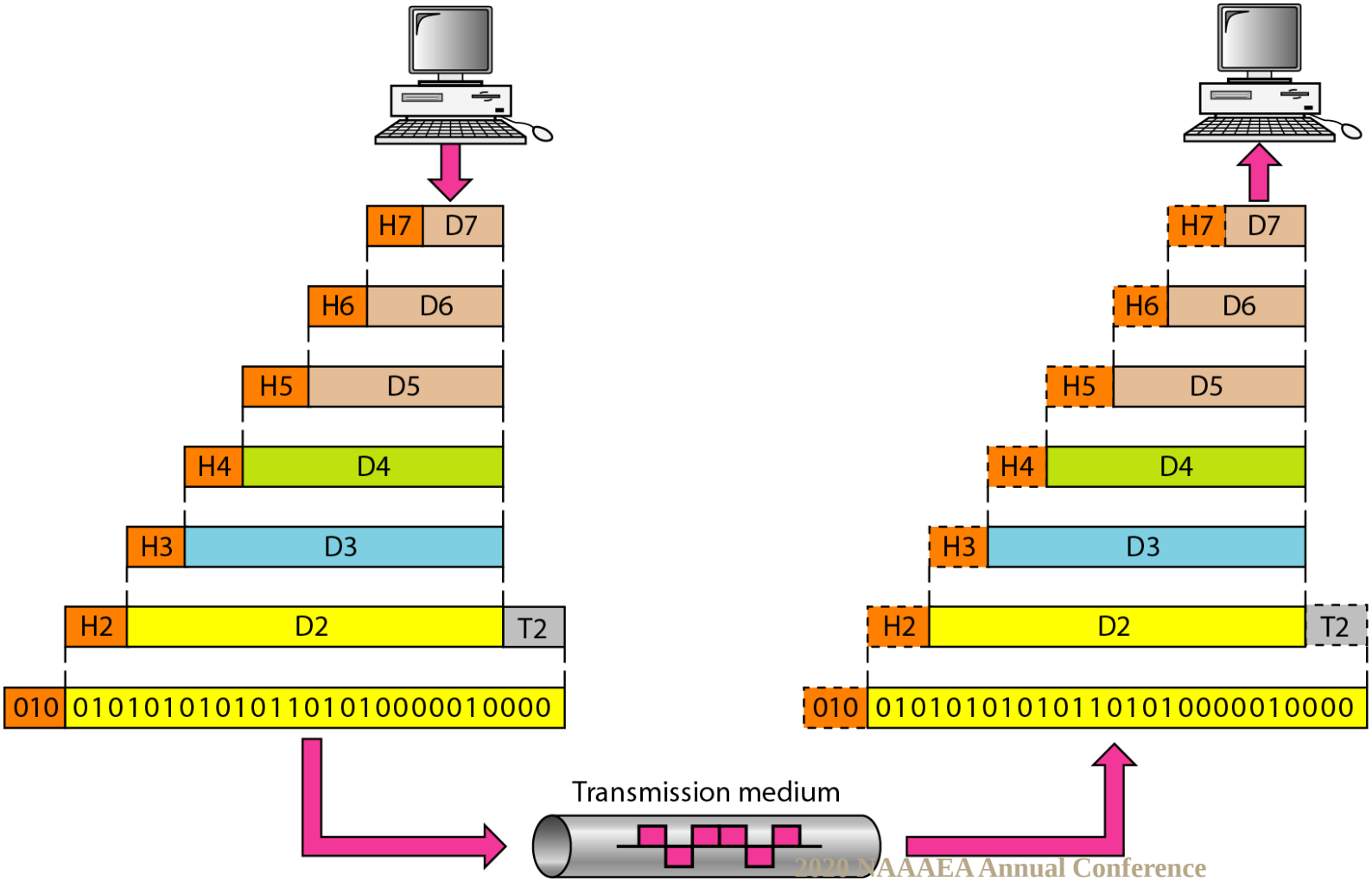
Seven layers of the OSI model



Interfaces b/w Layers



Exchange using the OSI Model



LAYERS IN THE OSI MODEL

- Physical Layer
- Data Link Layer
- Network Layer
- Transport Layer
- Session Layer
- Presentation Layer
- Application Layer

Physical Layer

- The physical layer is responsible for movements of individual bits from one hop (node) to the next.
  - Physical characteristics of interface and medium: pin assignment, connector, cables
  - Representation of bits: encoding
  - Data rate
  - Synchronization of bits
  - Line configuration: point-to-point, multipoint
  - Physical topology
  - Transmission mode: simplex, half-duplex, full-duplex

Data Link Layer

- The data link layer is responsible for moving frames from one hop (node) to the next.
  - Framing
  - Physical addressing
  - Flow control
  - Error control
  - Access control

Network Layer

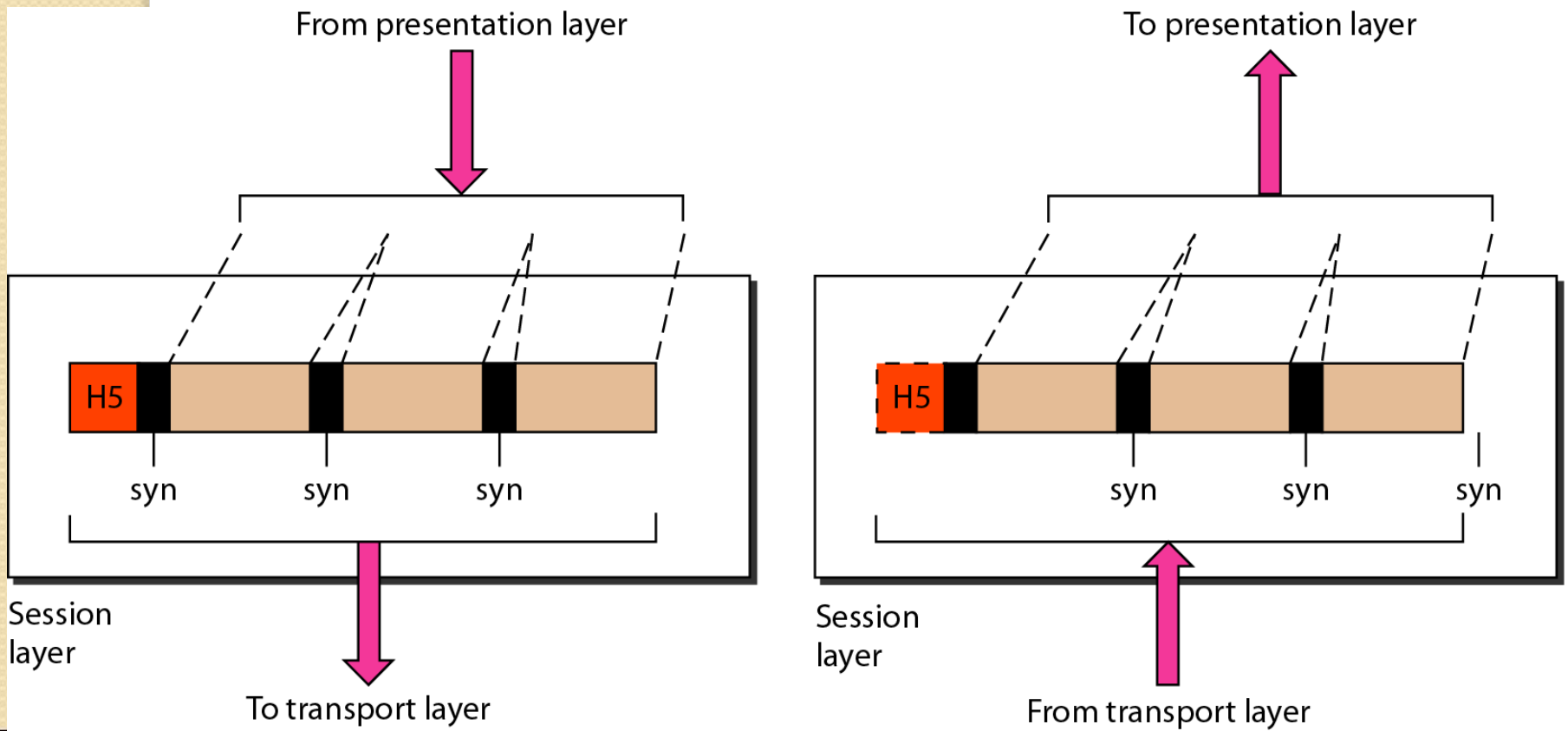
- The network layer is responsible for the delivery of individual packets from the source host to the destination host.
  - Logical addressing
  - Routing

Transport layer

- The transport layer is responsible for the delivery of a message from one process to another.
  - Service-point addressing
  - Segmentation and reassembly
  - Connection control
  - Flow control
  - Error control

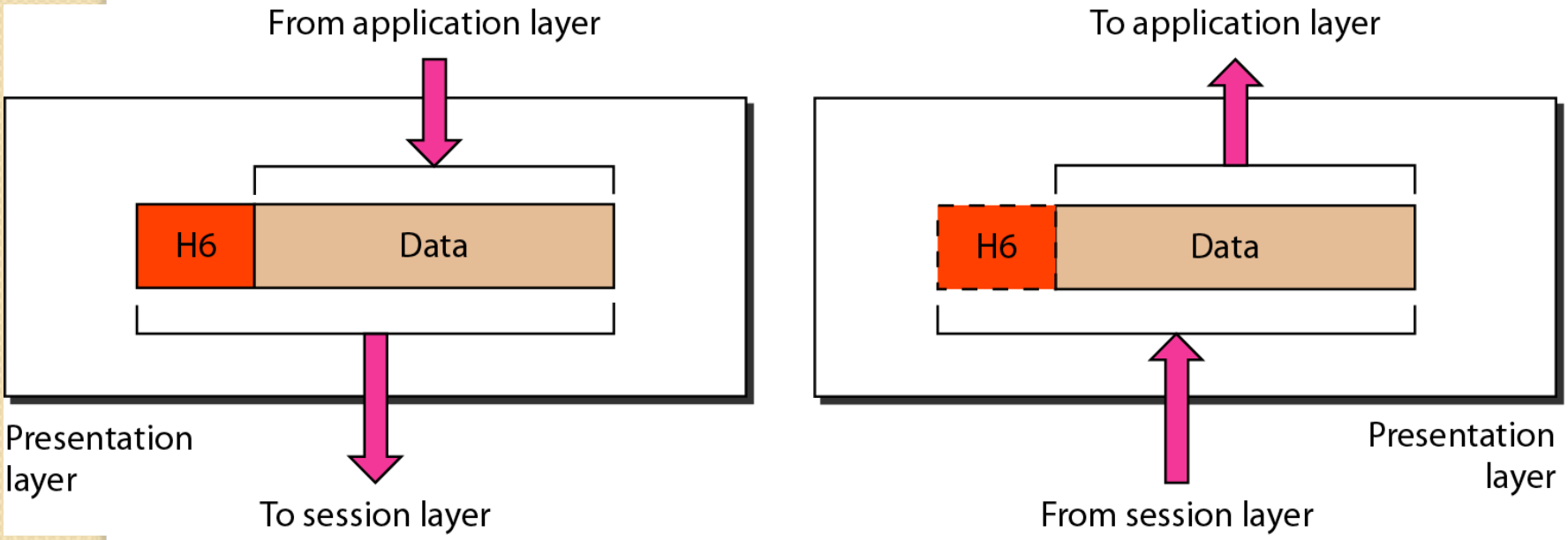
Session layer

- The session layer is responsible for dialog control and synchronization.



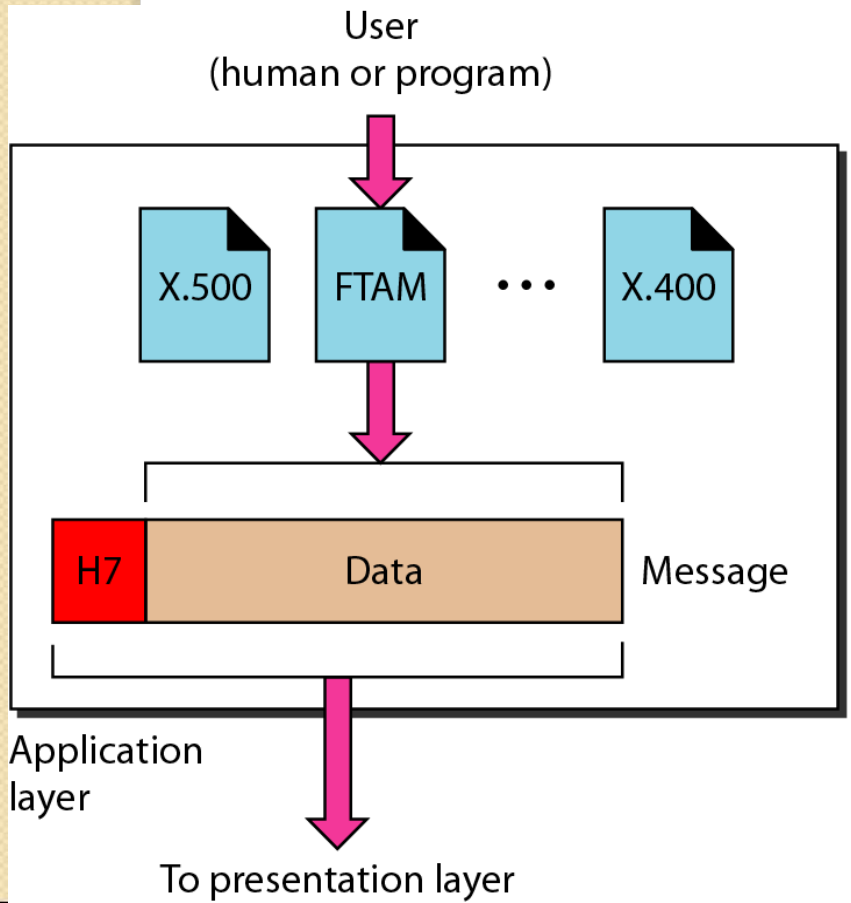
Presentation layer

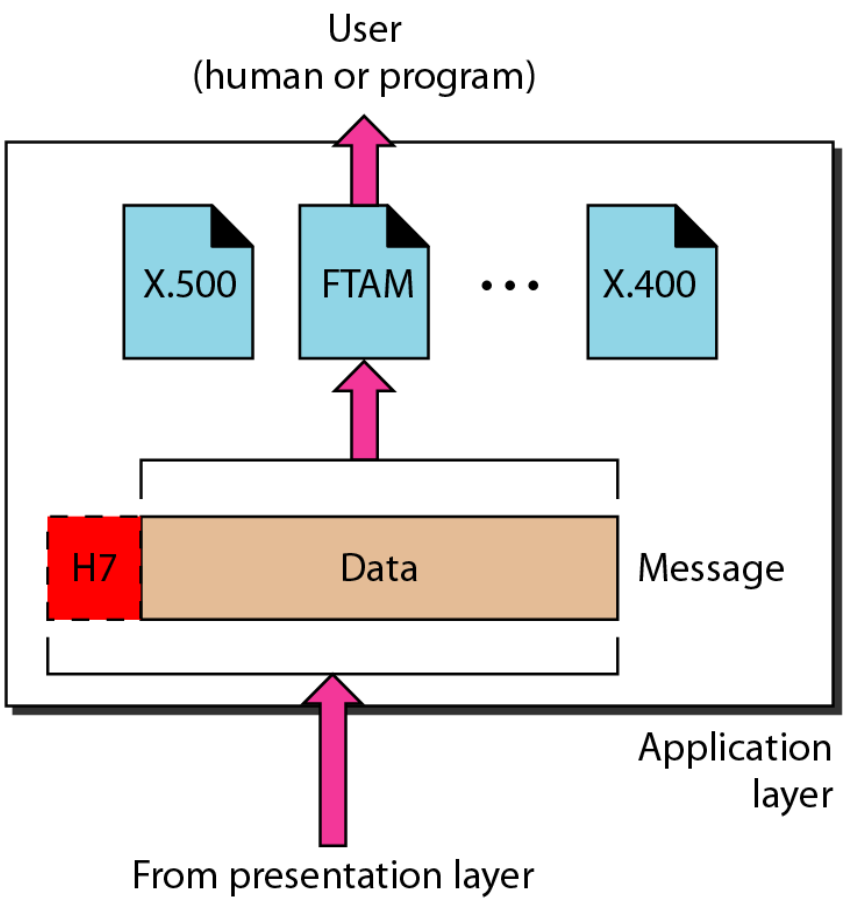
- The presentation layer is responsible for translation, compression, and encryption.



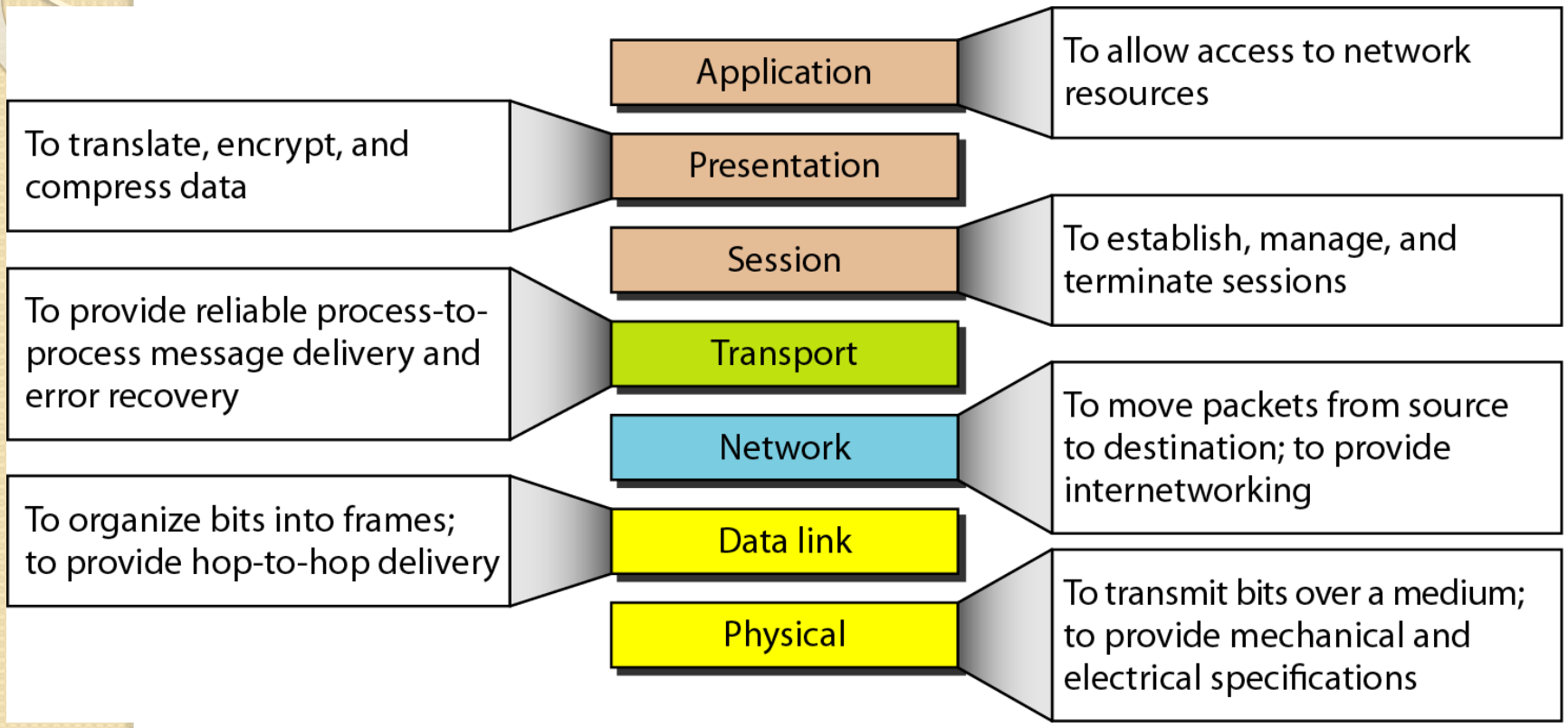
Application layer

- The application layer is responsible for providing services to the user.





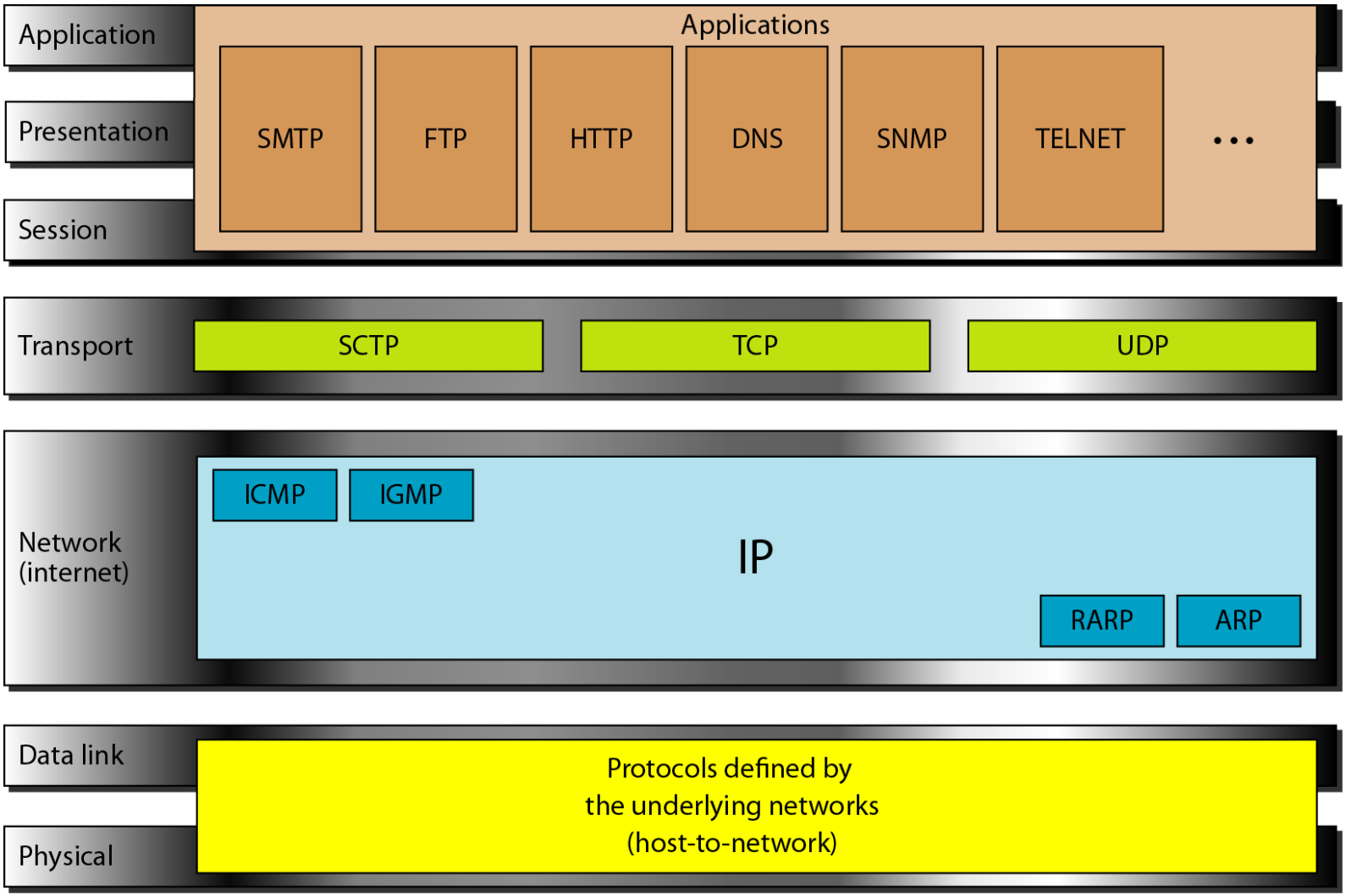
Summary of layers



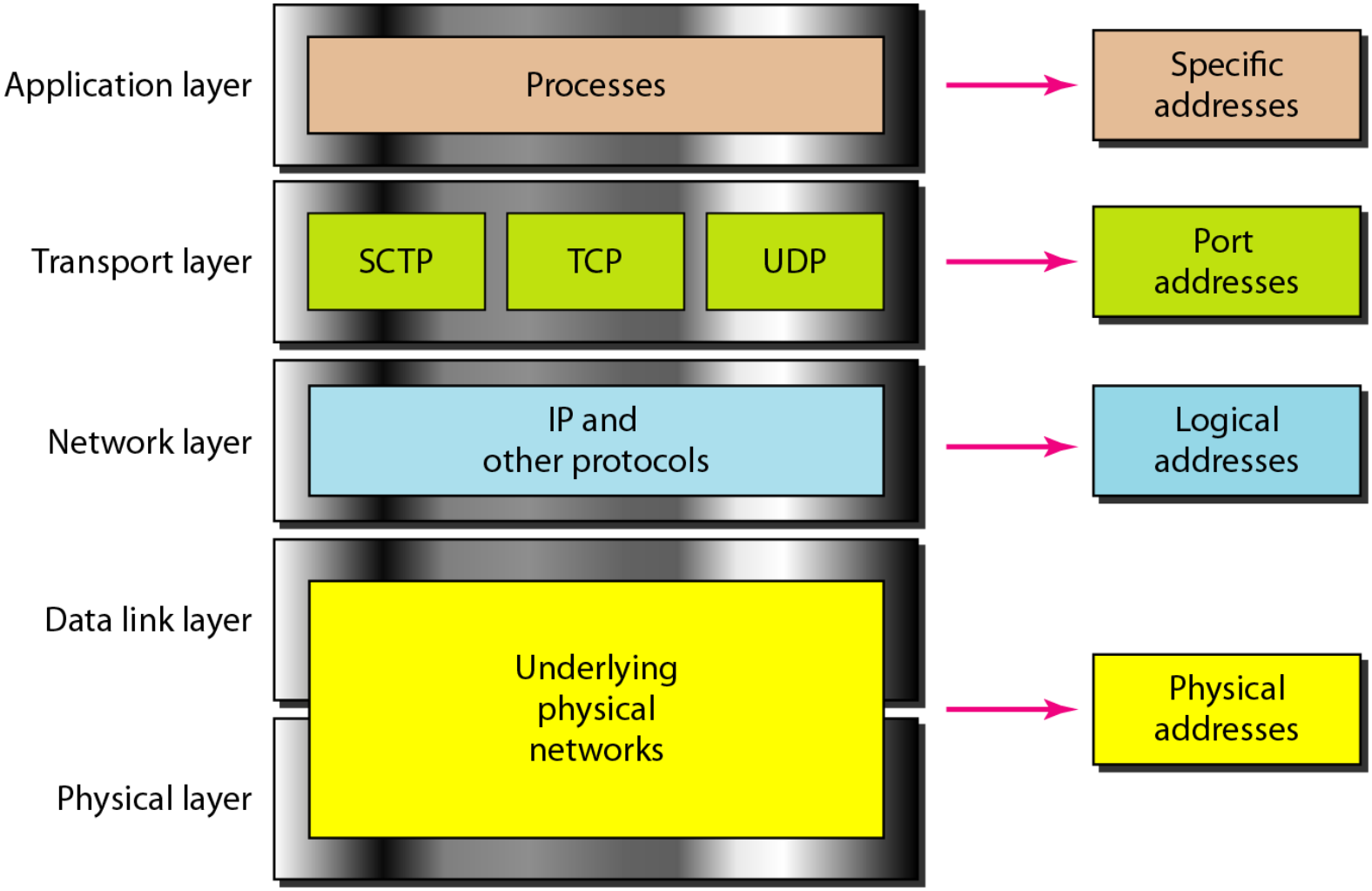
TCP/IP PROTOCOL SUITE

- The layers in the TCP/IP protocol suite do not exactly match those in the OSI model. The original TCP/IP protocol suite was defined as having four layers: host-to-network, internet, transport, and application. However, when TCP/IP is compared to OSI, we can say that the TCP/IP protocol suite is made of five layers: physical, data link, network, transport, and application.

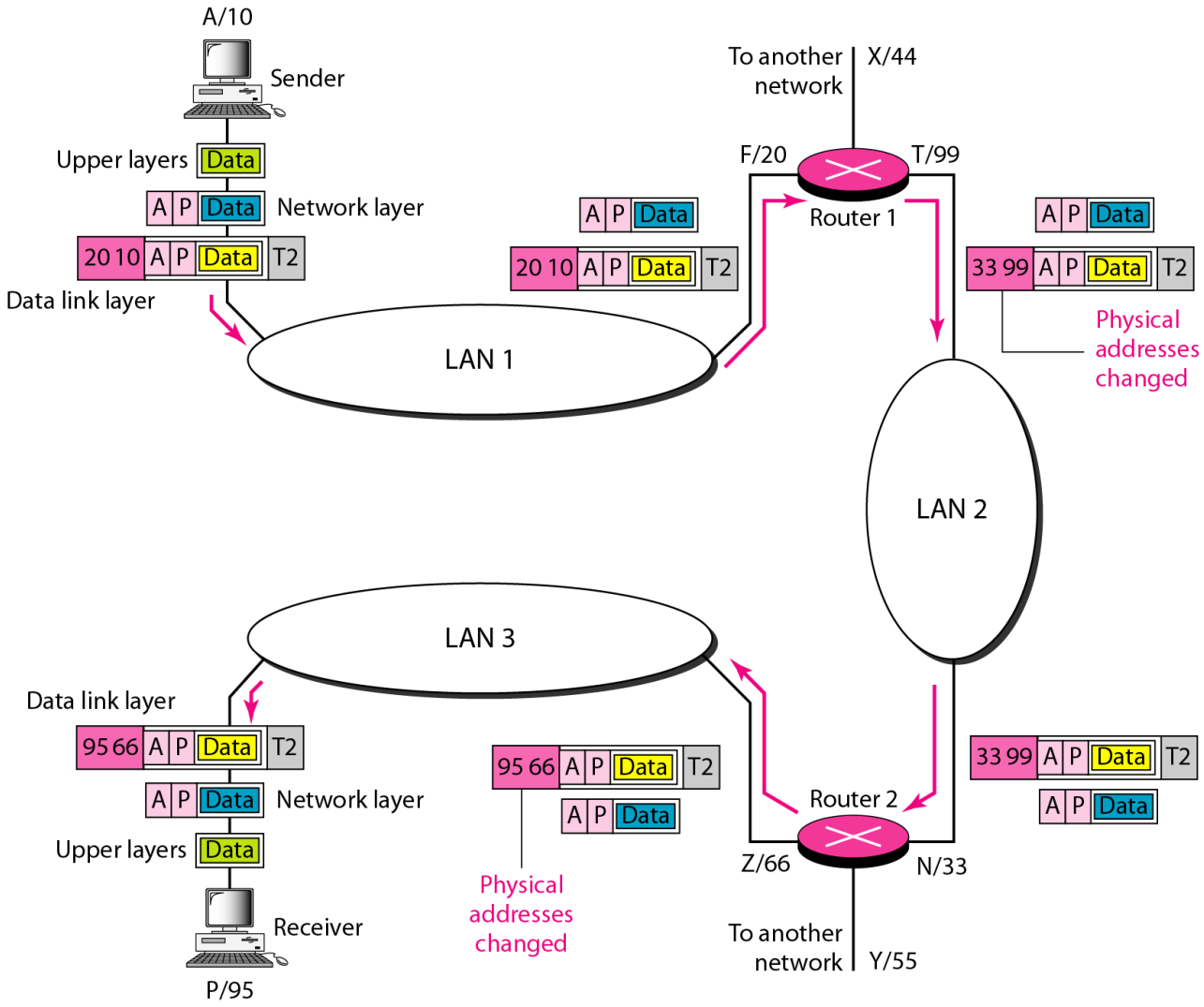
TCP/IP and OSI model



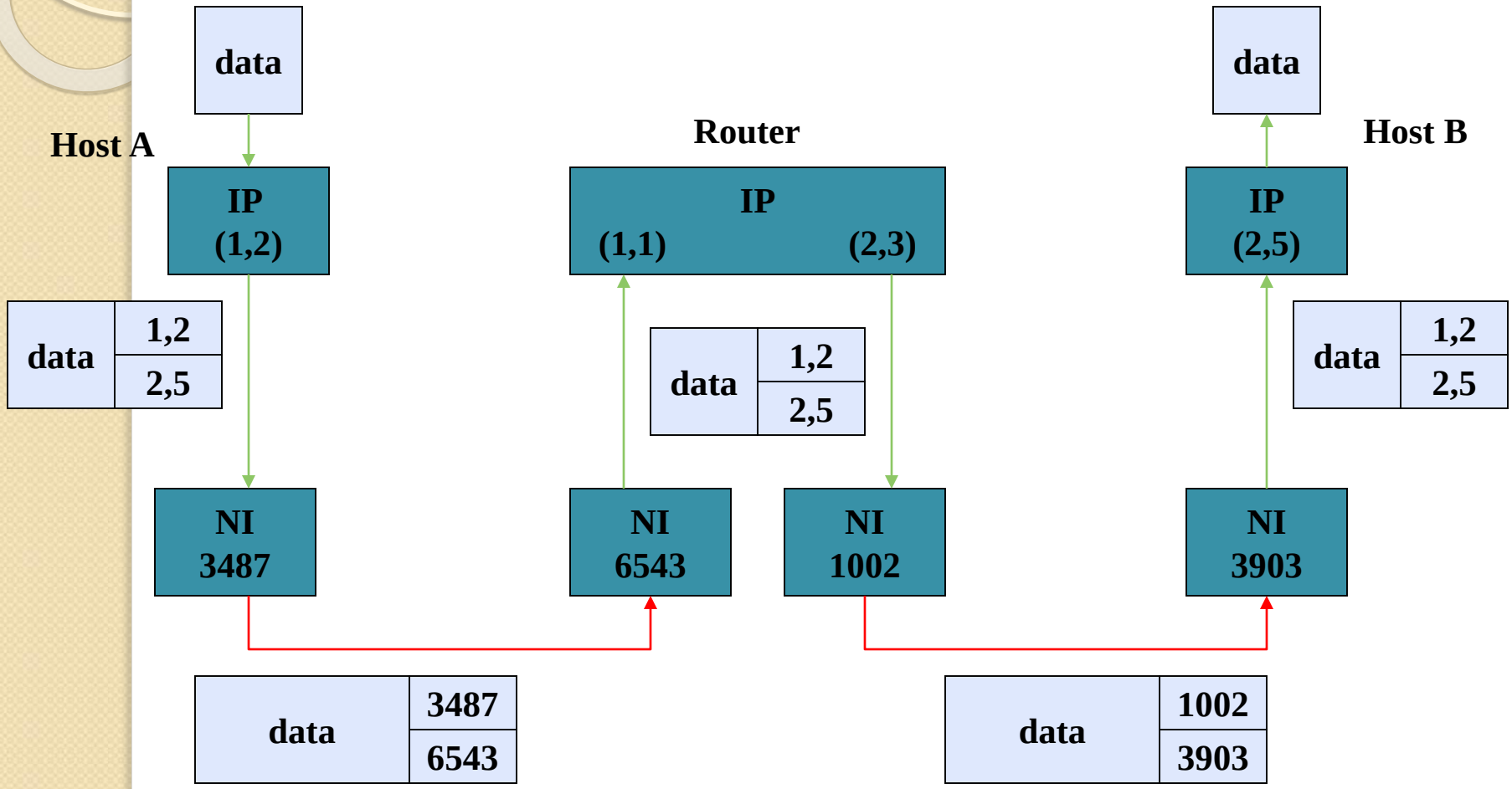
Relationship of layers and addresses in TCP/IP



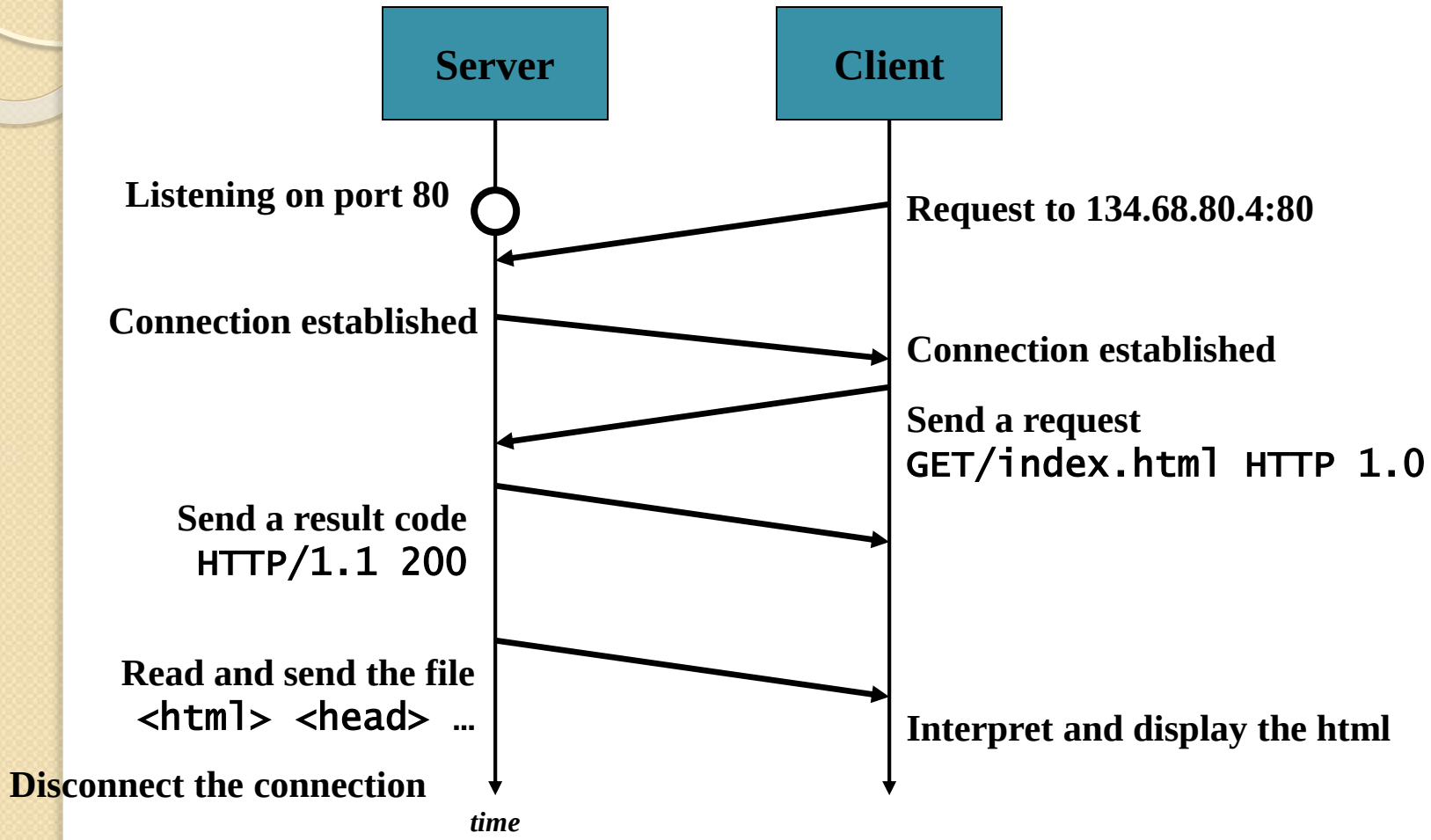
IP addresses



TCP/IP thru a Router



Example of Protocol, http (1)



TCP and Socket in Client/Server