

Chapter 2

Network Models

- ❑ Network Topologies
- ❑ Network Models
 - ❑ OSI 7-layer Model
 - ❑ TCP/IP Protocol Suite (4 or 5 layers)

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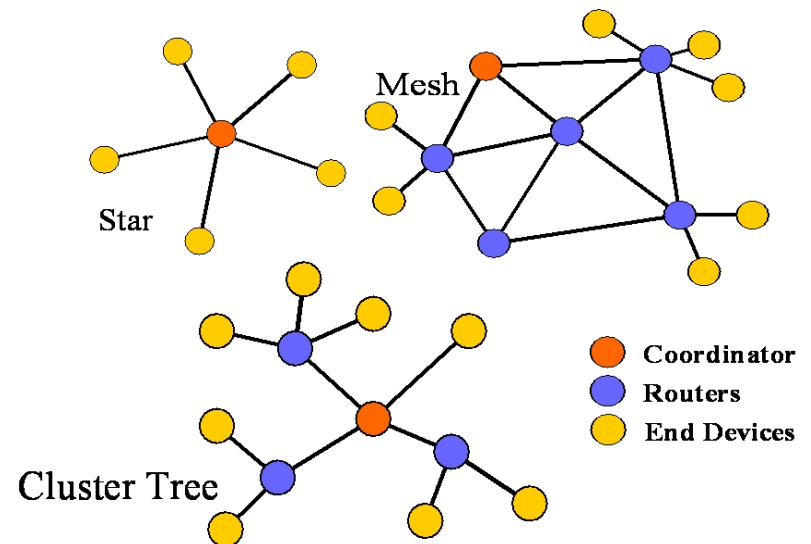
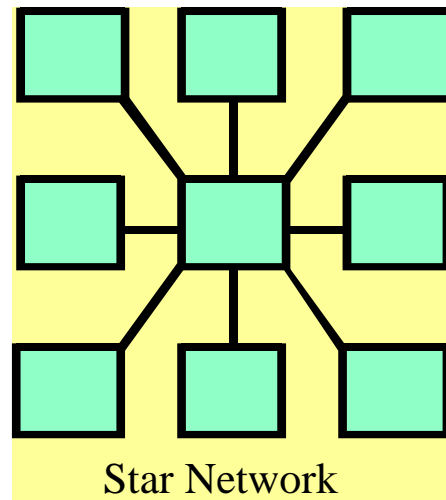
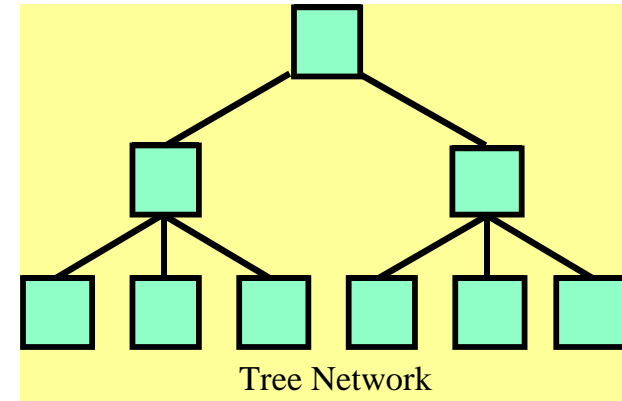
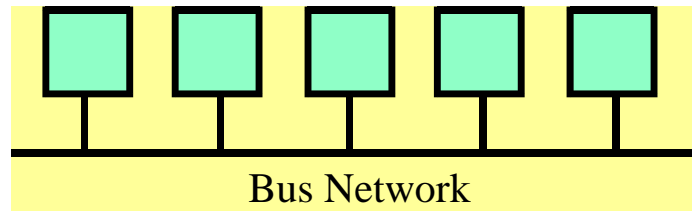
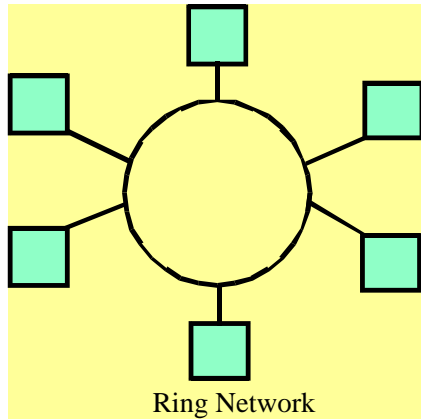
2.1 OSI Model

- **ISO= International Standard Organization (1947)**
(Worldwide Agreement on International Standards)
- **OSI=Open System Interconnection (1970's)**
It covers all aspects of network communications

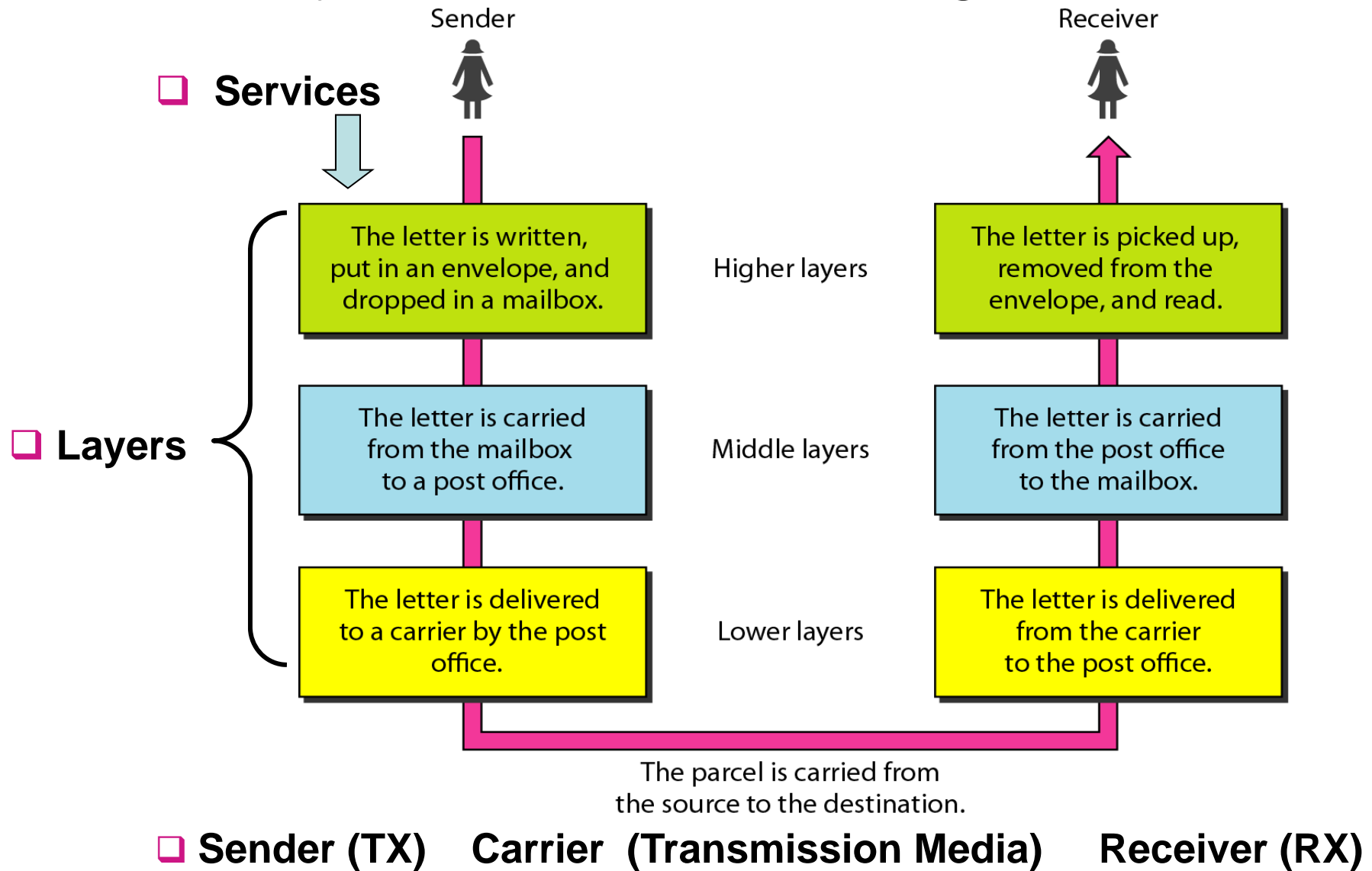
**ISO is the Organization.
OSI is the Model.**

- OSI is a set of internationally recognized standards for networking and for operating system involved in networking functions.

Network Topologies?



Layered Tasks in sending letter



OSI Model

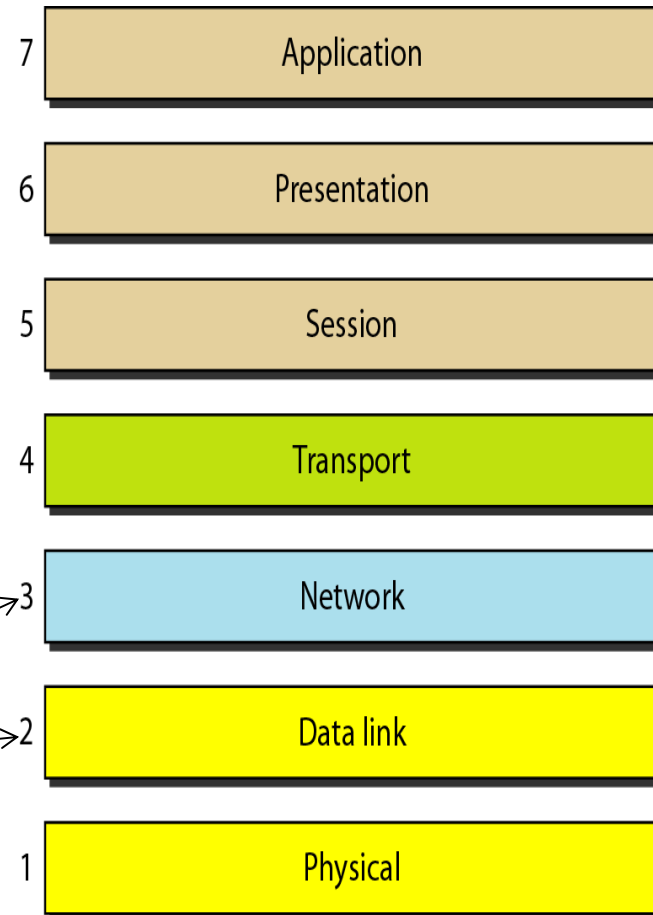
Seven layers of the OSI Model

The OSI model is composed of:

- ❖ Physical (Layer-1)
- ❖ Data link (Layer-2)
- ❖ Network (Layer-3)
- ❖ Transport (Layer-4)
- ❖ Session (Layer-5)
- ❖ Presentation (Layer-6)
- ❖ Application (Layer-7)

Layer.

- ❑ Each layer uses the services of the layer immediately below it.
- ❑ Interfaces between Layers define what information and services a layer must provide for the layer above it.



OSI Layers

OSI Model			
	Data unit	Layer	Function
Upper Layers Host Layers	Data	7. Application	Network process to application
		6. Presentation	Data Representation, Encryption and Decryption
		5. Session	Interhost Communication
	Segments	4. Transport	End-to-end connections and Reliability, Flow Control
Lower Layers Media Layers	Packet	3. Network	Path determination and logical addressing
	Frame	2. Data Link	Physical addressing
	Bit	1. Physical	Media, Signal and Binary Transmission

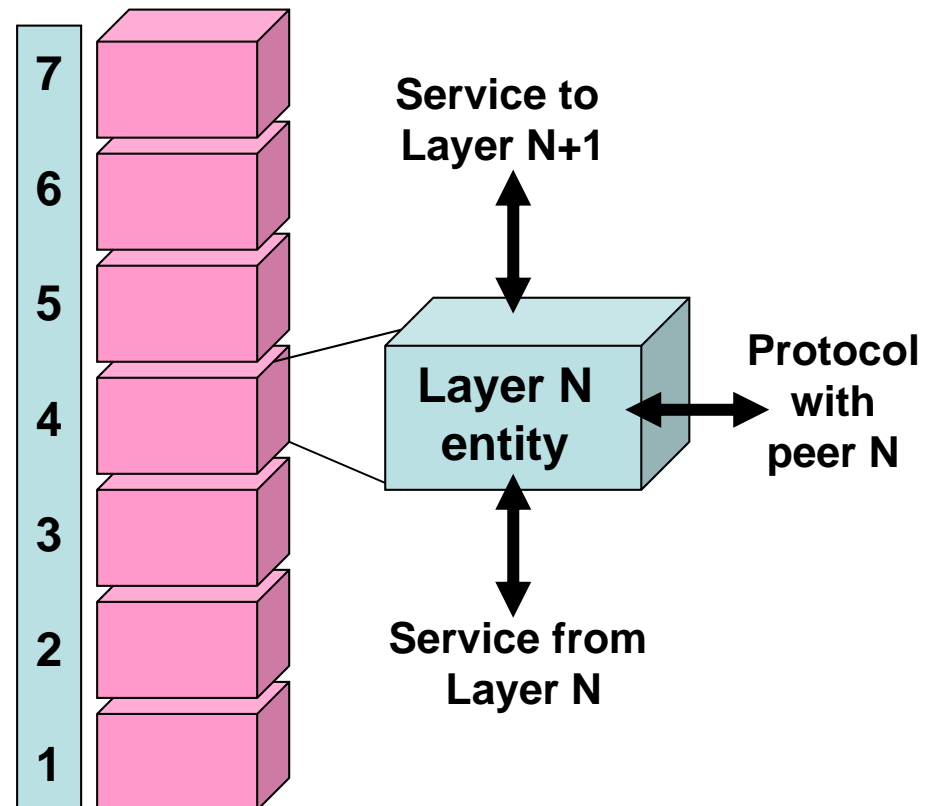
Peer-to-Peer Process

Layer N on **System A** communicates with the corresponding **layer N** on another **System B**. The exchange of information between **peer layers** depends on **protocols**.

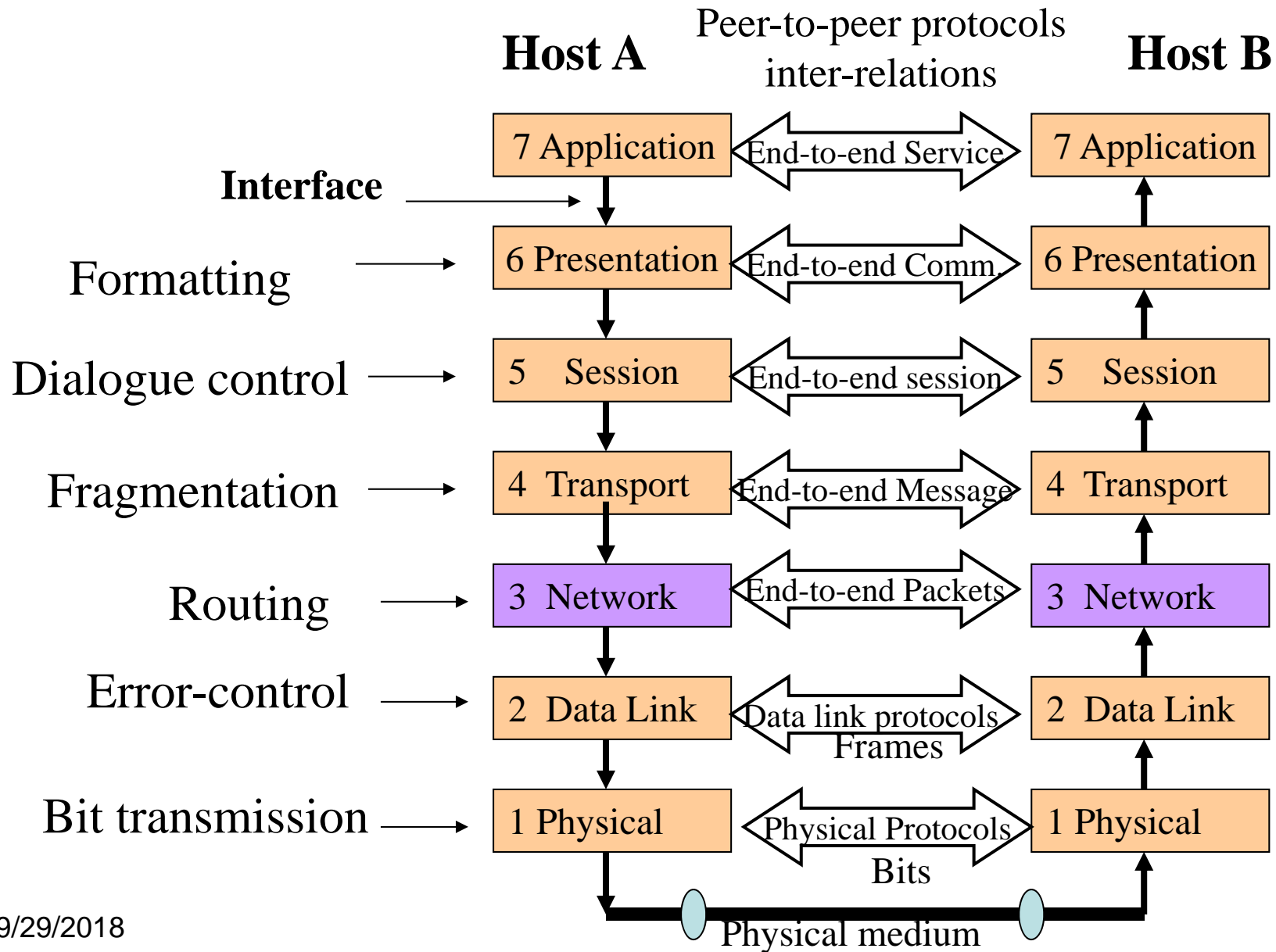
Protocol: is a set of rules to govern the format and control of information that is transmitted through a network or is stored in a database.

Information= voice, text, video, image.

In OSI Model: the information is passed from one layer to the next layer until reaches Layer N.

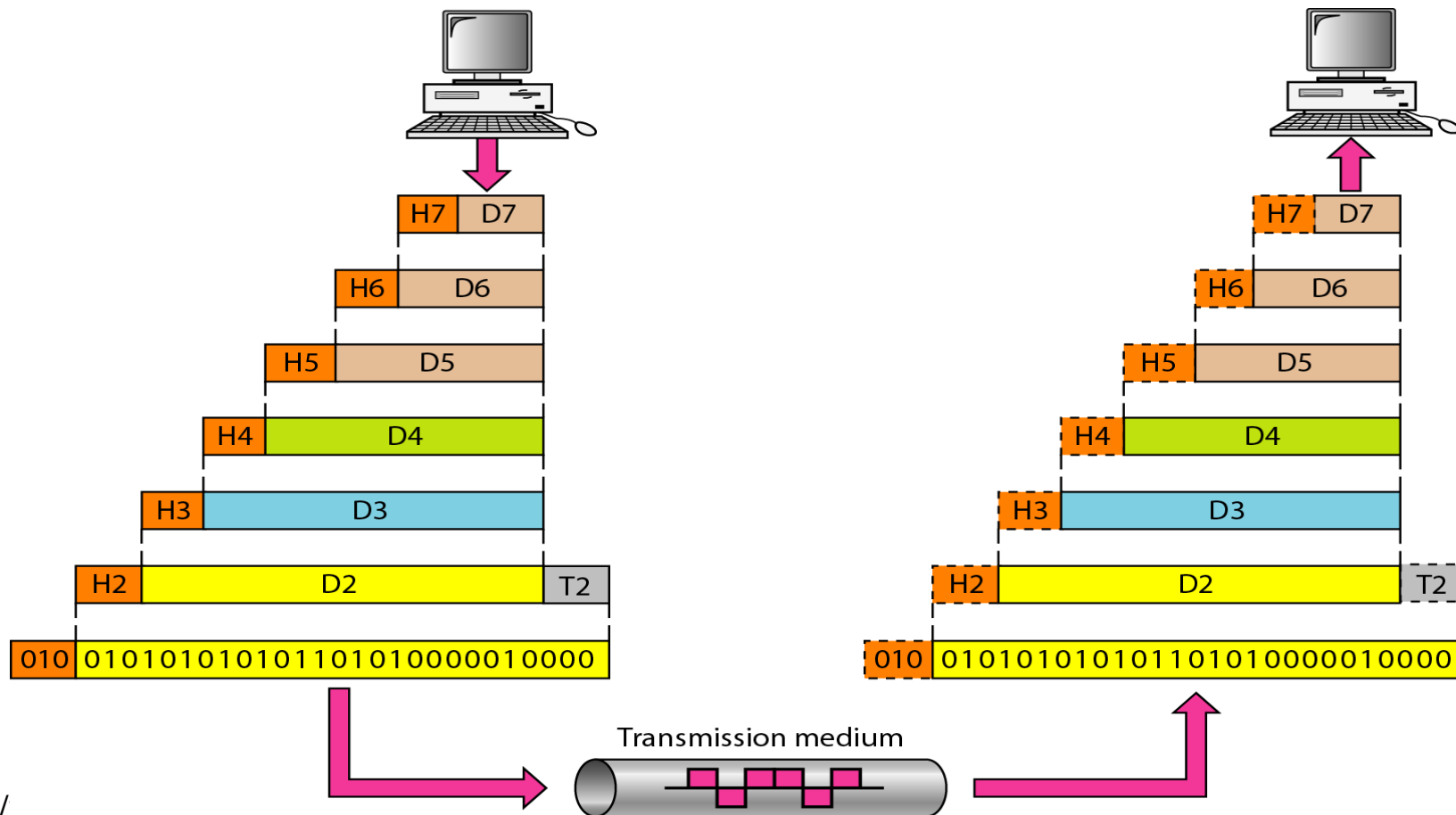


Peer-to-Peer System:



Peer-to-peer Processes (cont'd)

- ❑ The data portion of a packet at level N-1 carries the whole packet from level N. – The concept is called encapsulation.



Summary of Layers

OSI Layer Name	Functional Description	Examples
Application	Interface between network and application software	HTTP, e-mail
Presentation	How data is presented Special processing, such as encryption, Compression	JPEG, ASCII, EBCDIC, MPEG,
Session	Establish, manage and terminate sessions	SQL
Transport	Reliable or unreliable delivery	TCP, UDP
Network	Logical addressing Move packets from source to destination	IPv4, IPv6
Data link	Combination of bits into bytes, and bytes into frames, Error detection and error recovery	802.3/802.2, FR, ATM, WiFi 802.11
Physical	Moving of bits between devices Specification of voltage, wire speed, and cable pinouts	RS-232, Modem, Hub, Repeater

TCP/IP Model

- ❑ The **Internet Protocol Suite** (commonly known as **TCP/IP**)
- ❑ It is the set of communications protocols used for the Internet and other similar networks.
- ❑ It is named from **two** of the most important protocols in it:
 - **Transmission Control Protocol (TCP)** and
 - **Internet Protocol (IP)**.

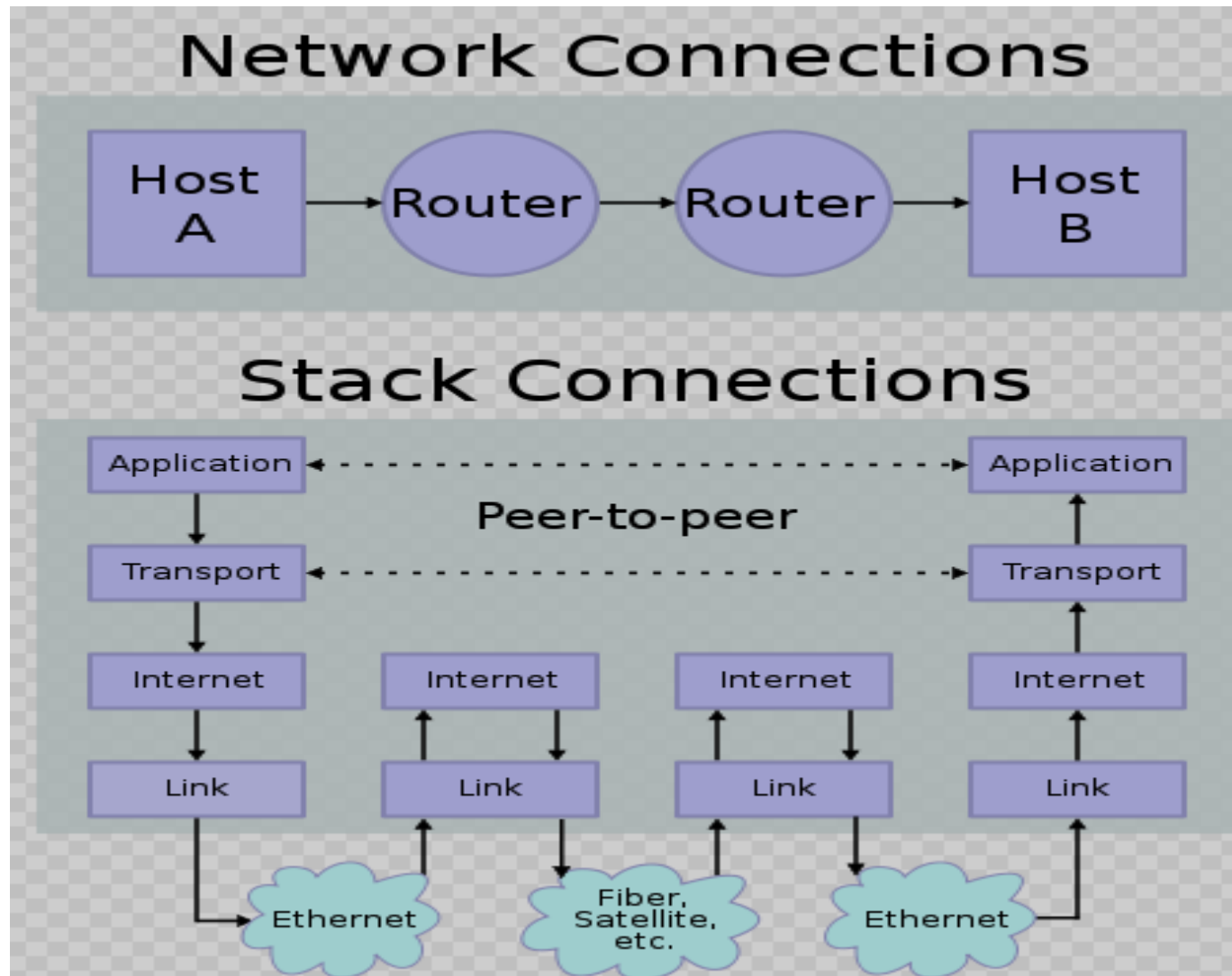
TCP/IP Layers

OSI	TCP/IP
Application Layer	Application Layer FTP, SMTP, POP3, DNS, HTTP, ...
Presentation Layer	
Session Layer	
Transport Layer	Transport Layer TCP , UDP , ...
Network Layer	Internet Layer IPv4/IPv6 , ICMP, ARP, RARP, ..
Data Link Layer	Link Layer FDDI, Ethernet, ISDN, X.25,...
Physical Layer	

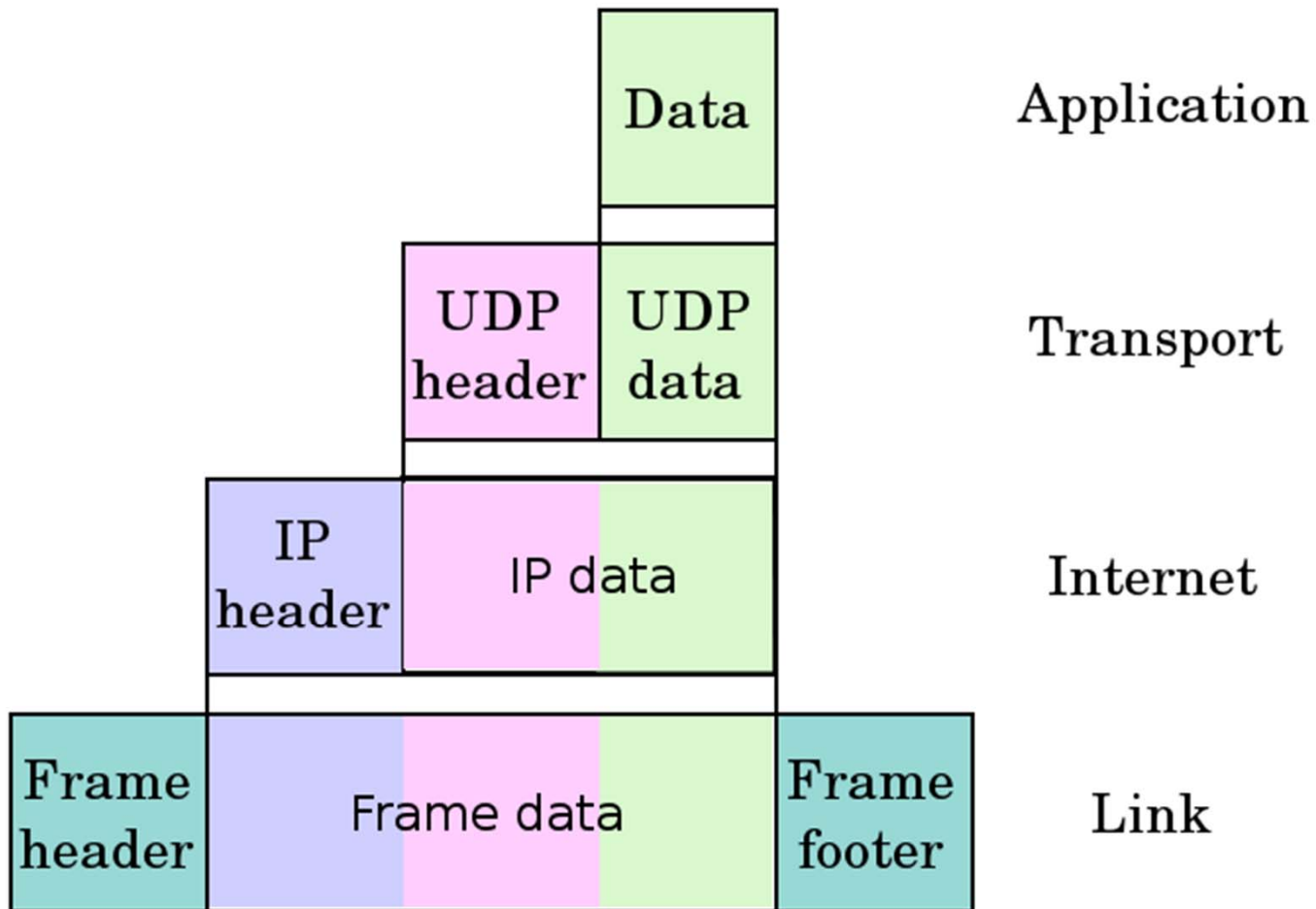
Some TCP/IP Protocols

TCP	Transmission Control Protocol
UDP	User Datagram Protocol
SCTP	Streaming Control Transmission Protocol
IP	Internet Protocol
ICMP	Internet Control Message Protocol
IGMP	Internet Group Message Protocol
ARP	Address Resolution Protocol
RARP	Reverse Address Resolution Protocol
FTP	File Transfer Protocol
HTTP	Hyper Text Transfer Protocol
SMTP	Simple Mail Transfer Protocol (E-mail)

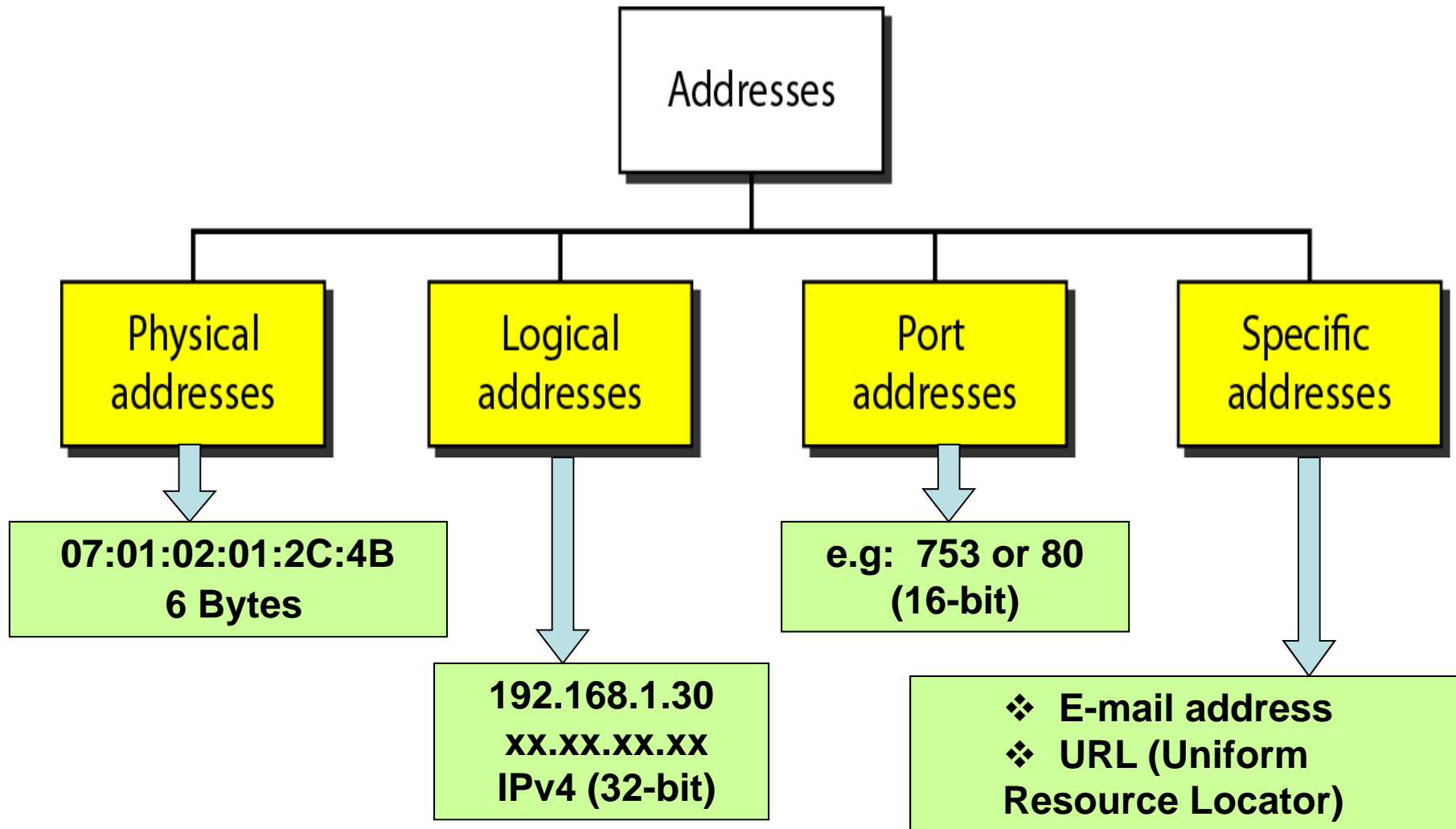
TCP/IP Stack



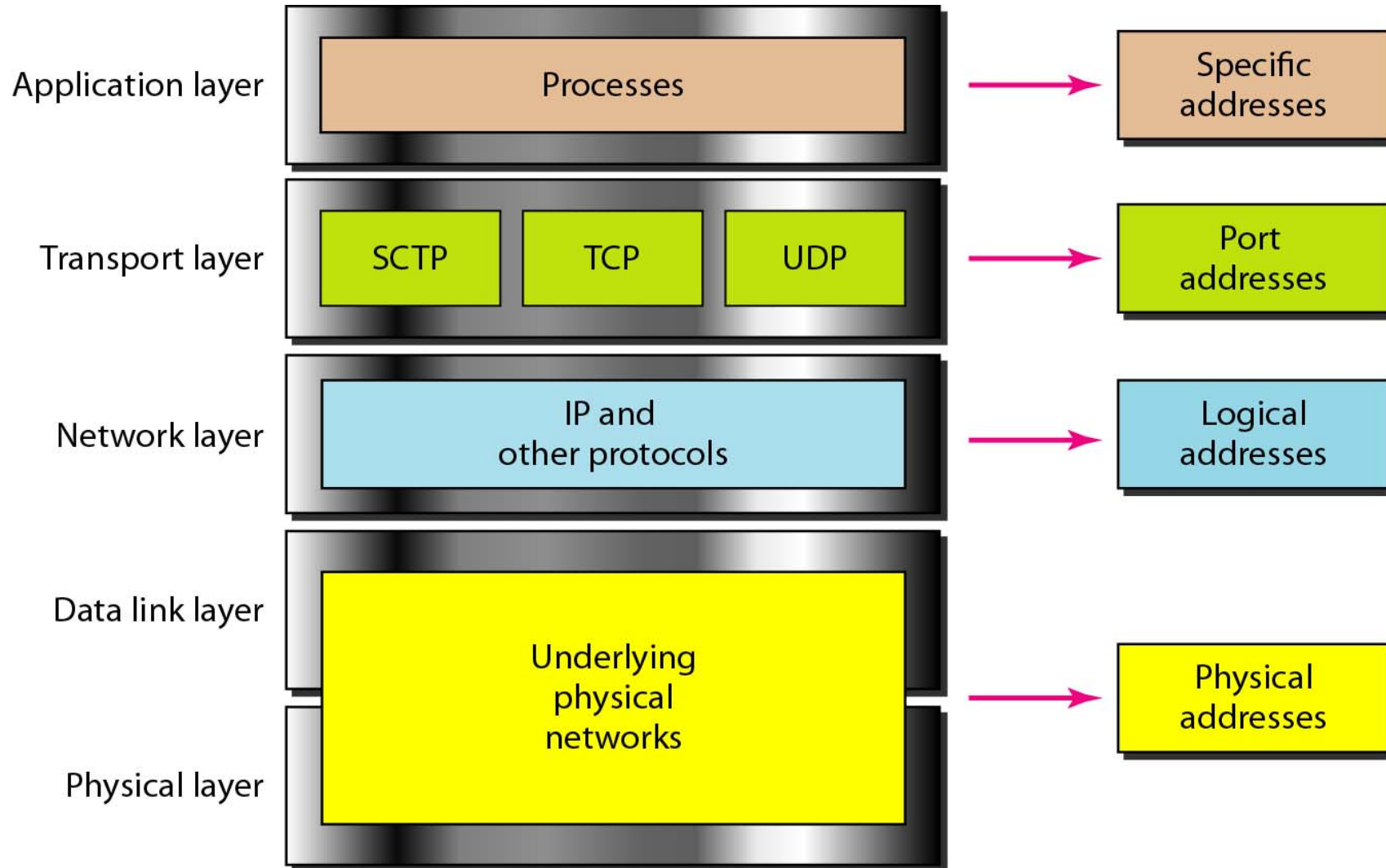
TCP/IP Encapsulation



Addressing in TCP/IP



Addressing in TCP/IP



- **Internet Services**

- E-mail - Chatting and Instant Messaging - Newsgroups
- File Transfer Protocol (FTP)
- **World Wide Web (WWW)**
- VoIP - IPTV Applications

The World Wide Web

- **HTML (Hypertext Markup Language):**
 - Formats documents for display on Web
- **Hypertext Transfer Protocol (HTTP):**
 - Communications standard used for transferring Web pages
- **Uniform Resource Locators (URLs):**
 - Addresses of Web pages e.g.
<http://www.yahoo.com/content/features/082602.html>
- **Web Servers**
 - Software for locating and managing Web pages
- **Search engines e.g. Yahoo, Google**