

---

# COMPUTER NETWORKS

## - Chapter1.2: Architecture

王昊翔

WANG Haoxiang

hxwang@scut.edu.cn

School of Computer Science & Engineering

国家双语教学试点项目 广东省精品课

# Contents

---

- How to design
- Layered Model
  - OSI
  - TCP/IP of Internet
- Standardization

# Design Issues for the Networks

---

- Addressing
- Error control
- flow control
- routing
- multiplexing and de-multiplexing

# Network Architecture

---

- Layered Network Model
- What is the Protocol
- What is the Service, Service Primitives
- Relationship of Services and Protocols

Software、Soften and Programmable

# Layered Network Model (OSI)



- Reduces complexity
- Standardizes interfaces
- Facilitates modular engineering
- Ensures interoperable technology
- Accelerates evolution
- Simplifies teaching and learning

**Support varieties**

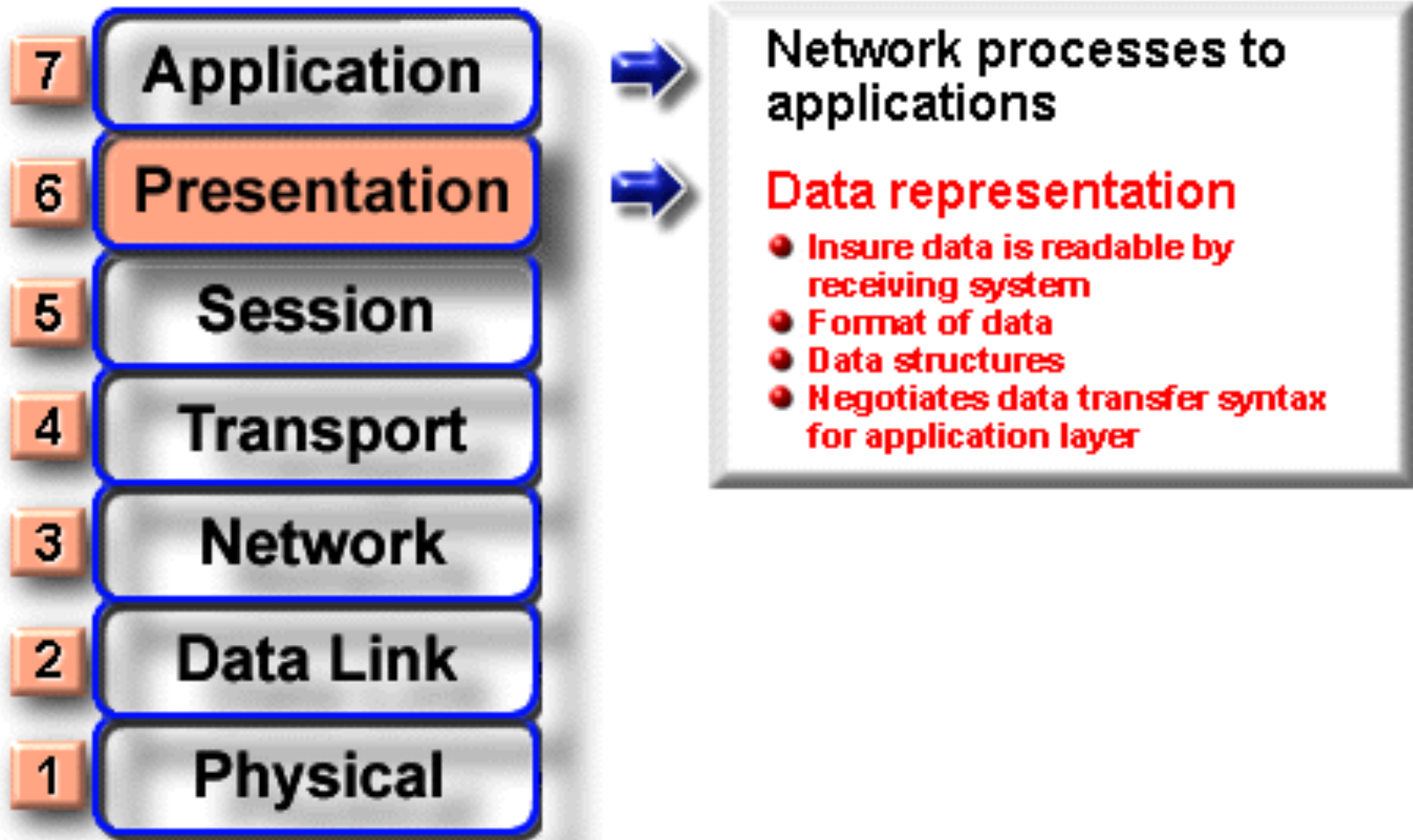
# OSI Model Application Layer



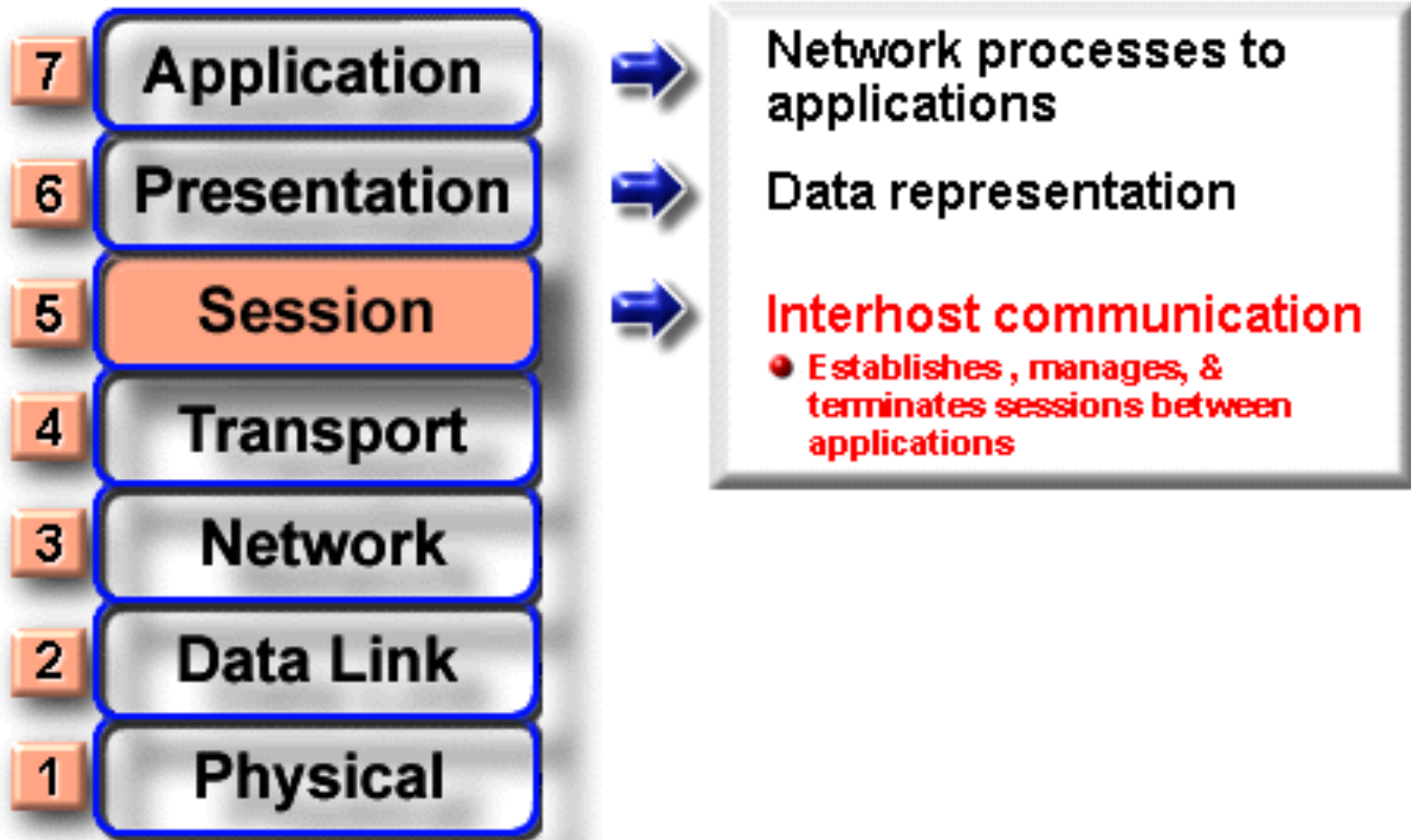
## Network processes to applications

- Provides network services to application processes (such as electronic mail, file transfer, and terminal emulation)

# OSI Model Presentation Layer

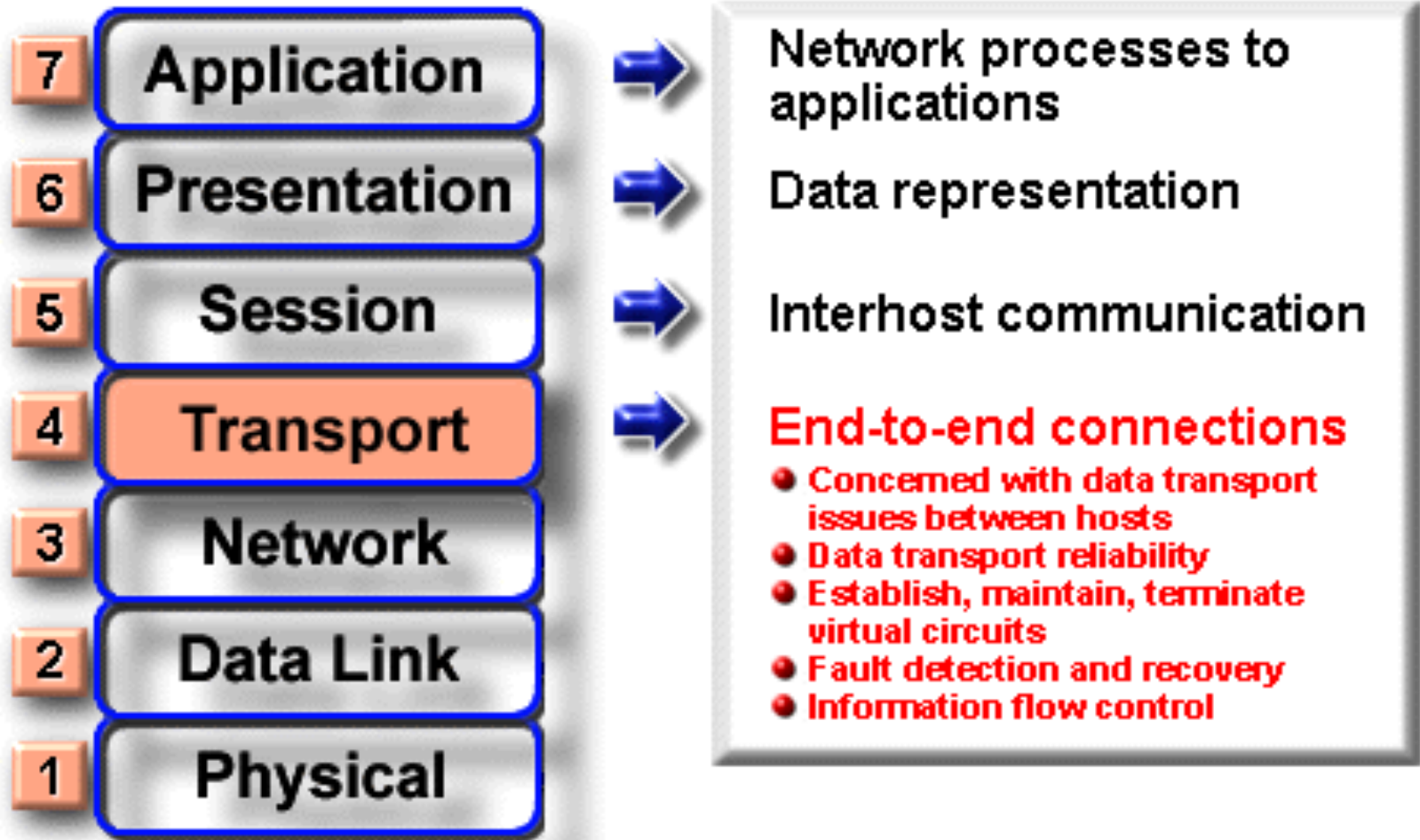


# OSI Model Session Layer

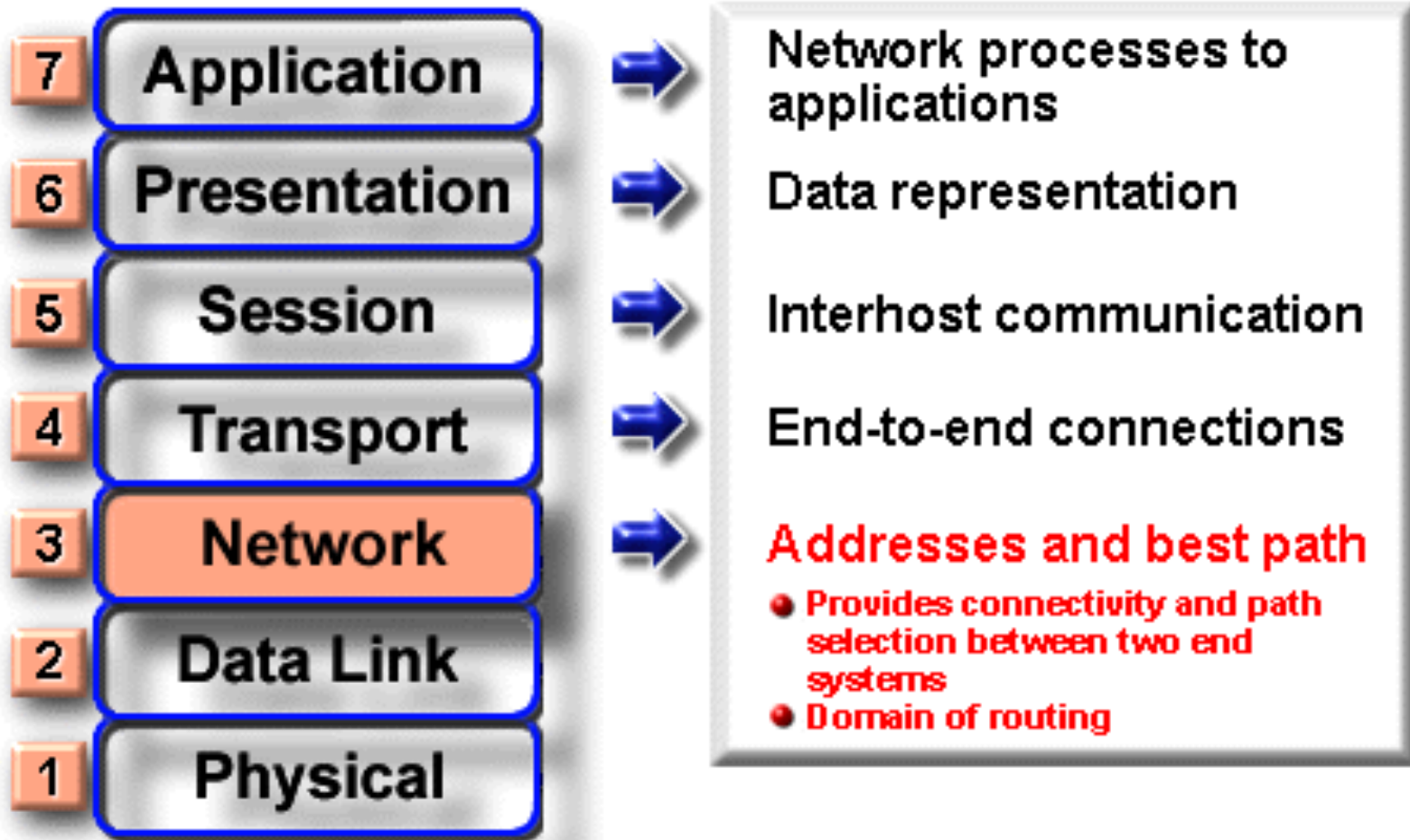




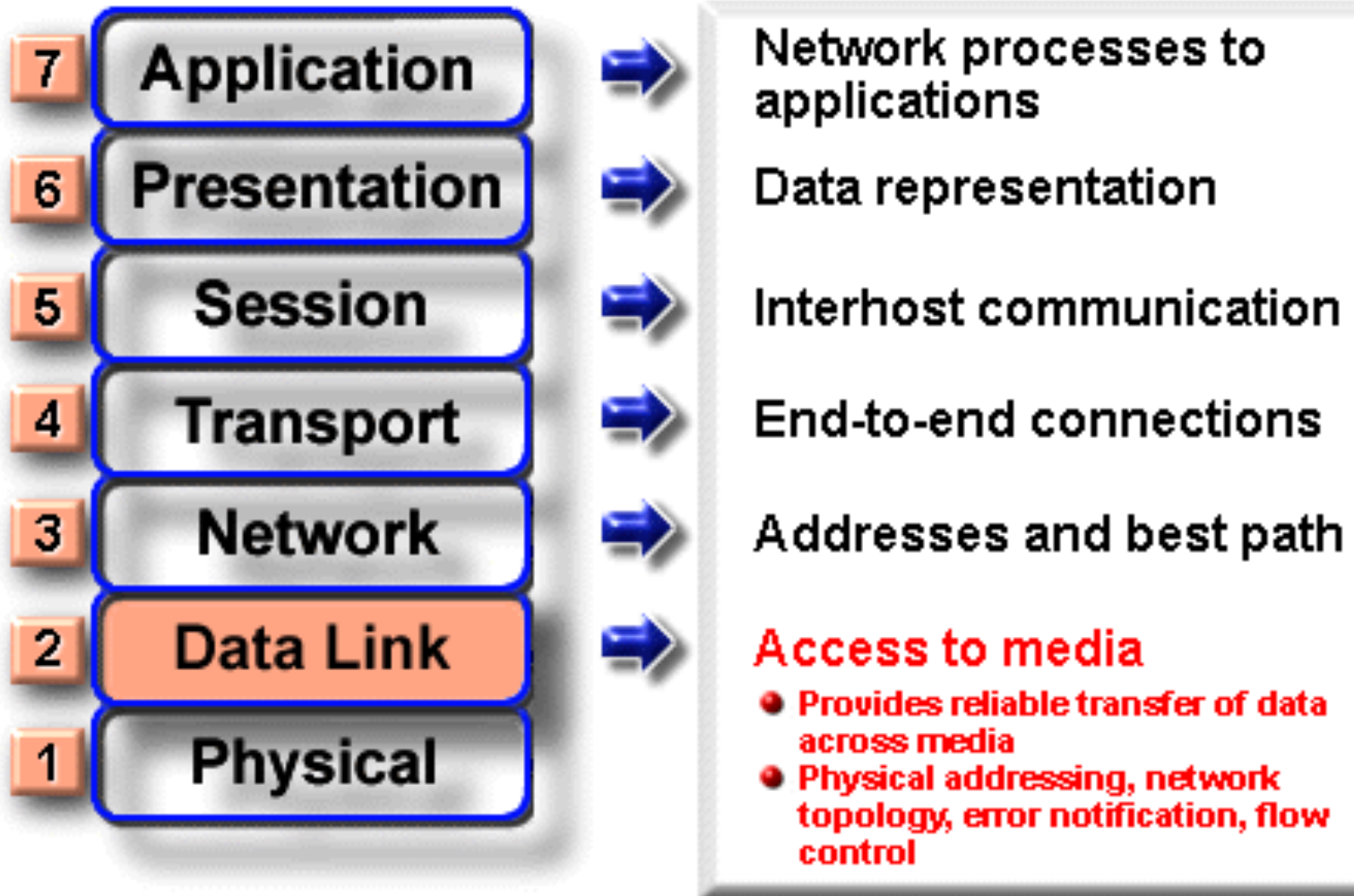
# OSI Model Transport Layer



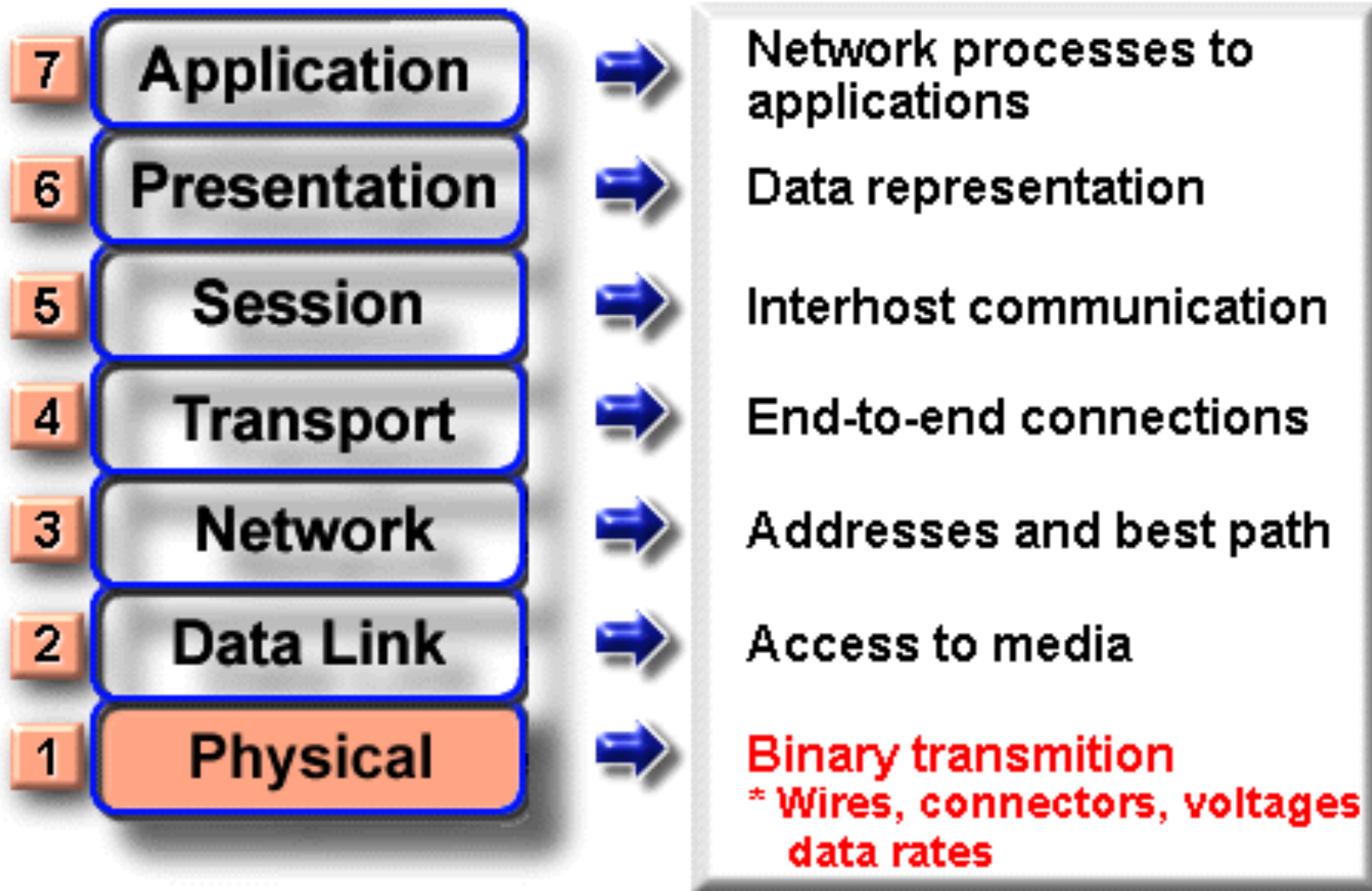
# OSI Model Network Layer



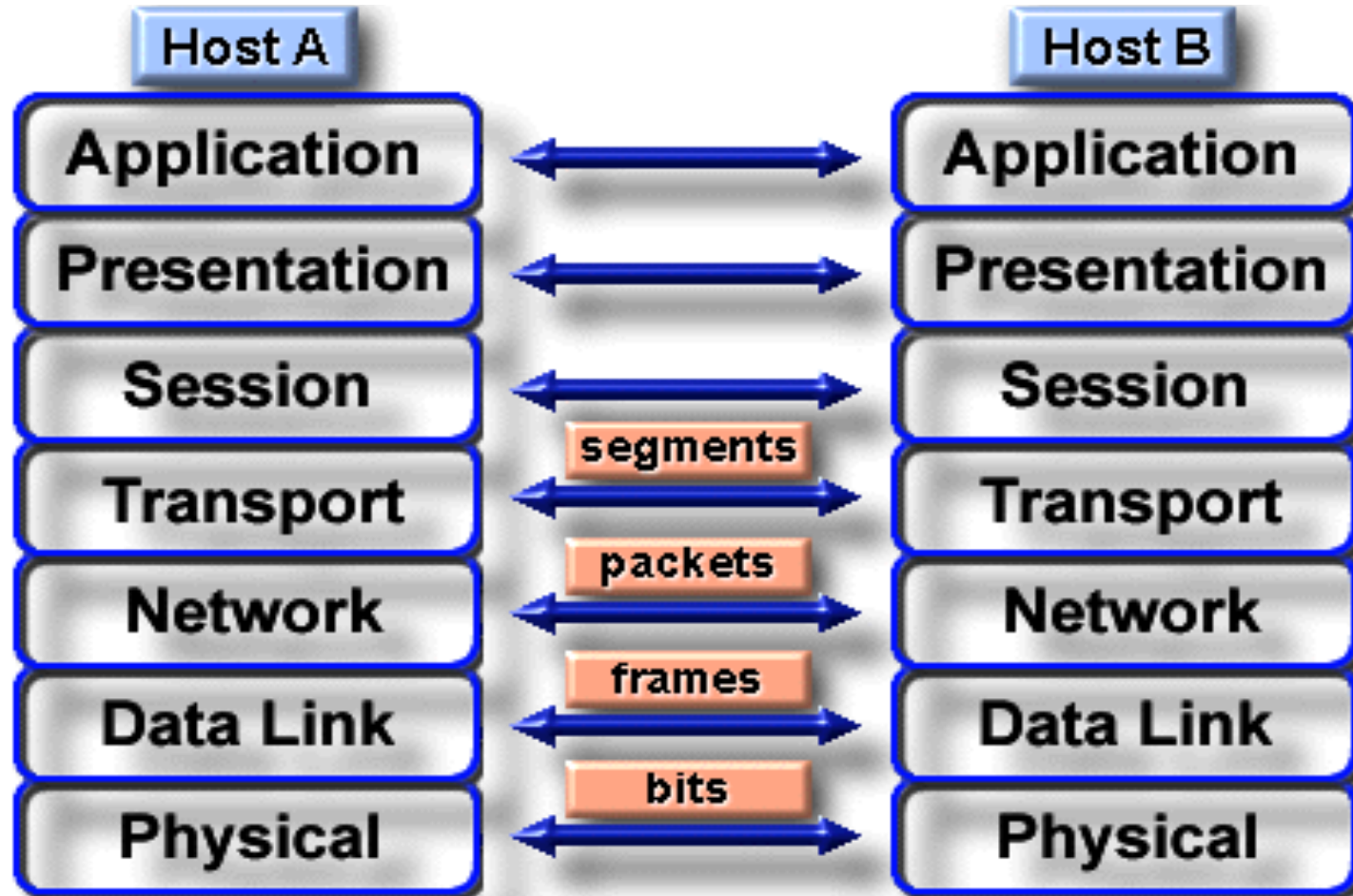
# OSI Model Data Link Layer



# OSI Model Physical Layer



# Peer-to-Peer Communications



**Protocol is the most important !**

# Service Primitives

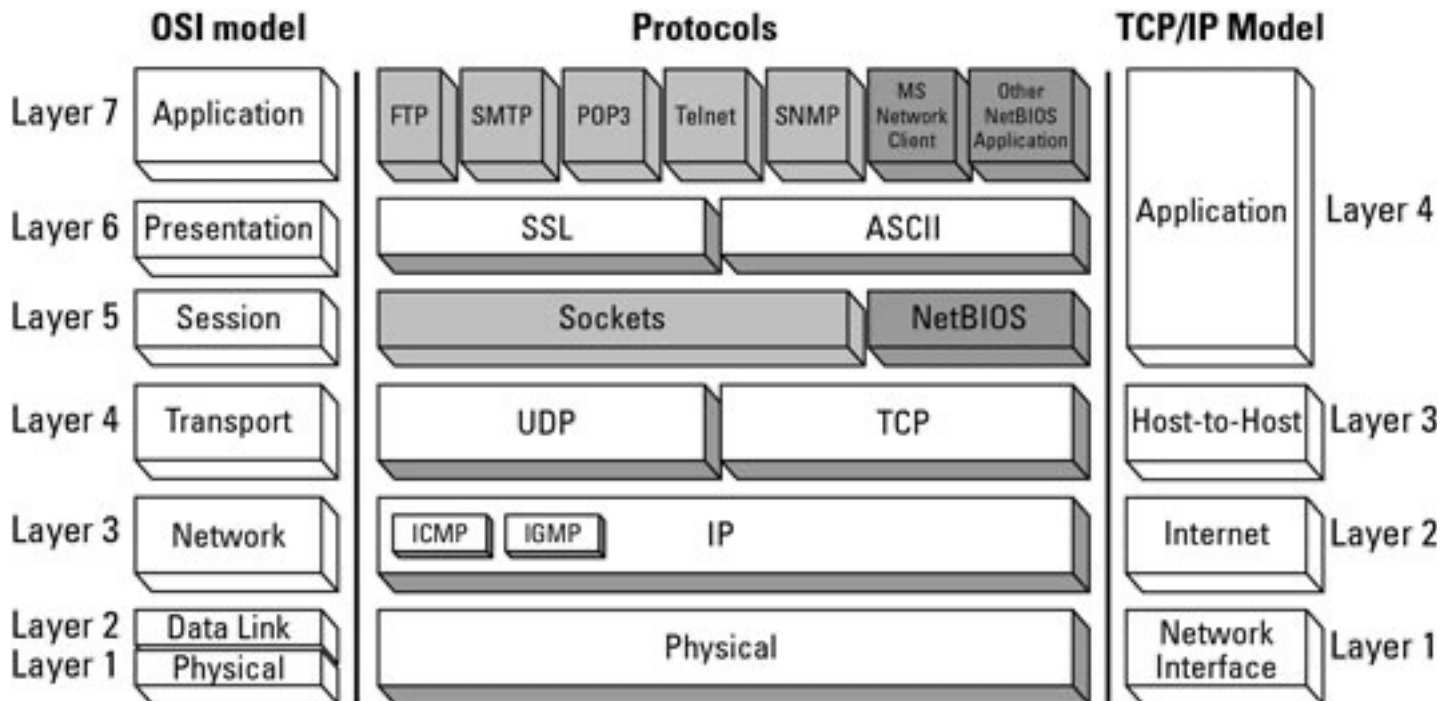
---

Primitive	Meaning
LISTEN	Block waiting for an incoming connection
CONNECT	Establish a connection with a waiting peer
RECEIVE	Block waiting for an incoming message
SEND	Send a message to the peer
DISCONNECT	Terminate a connection



# Discussion (3)

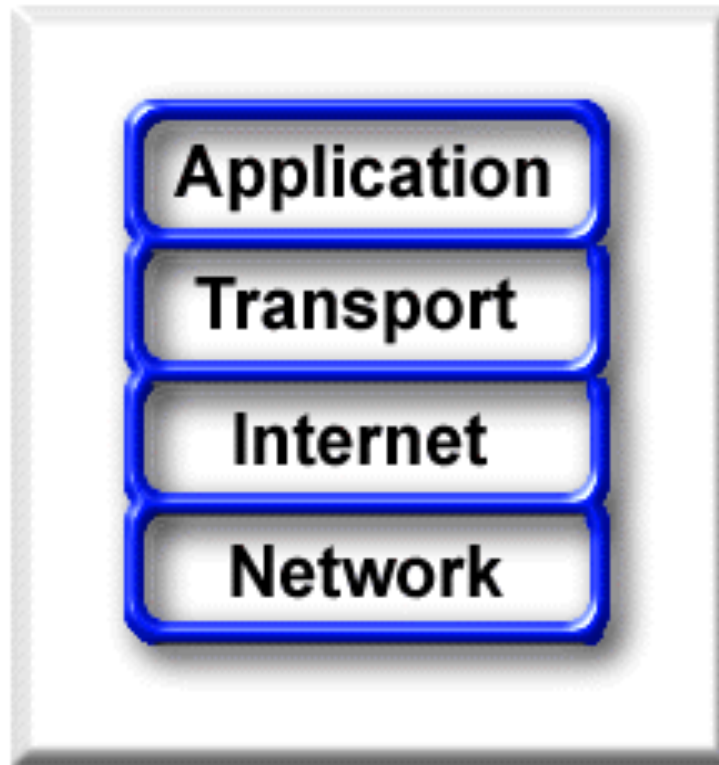
- OSI v.s. TCP/IP?



# OSI: XNS, Novell-IPX, MS-NetBEUI

---

## The TCP/IP Model



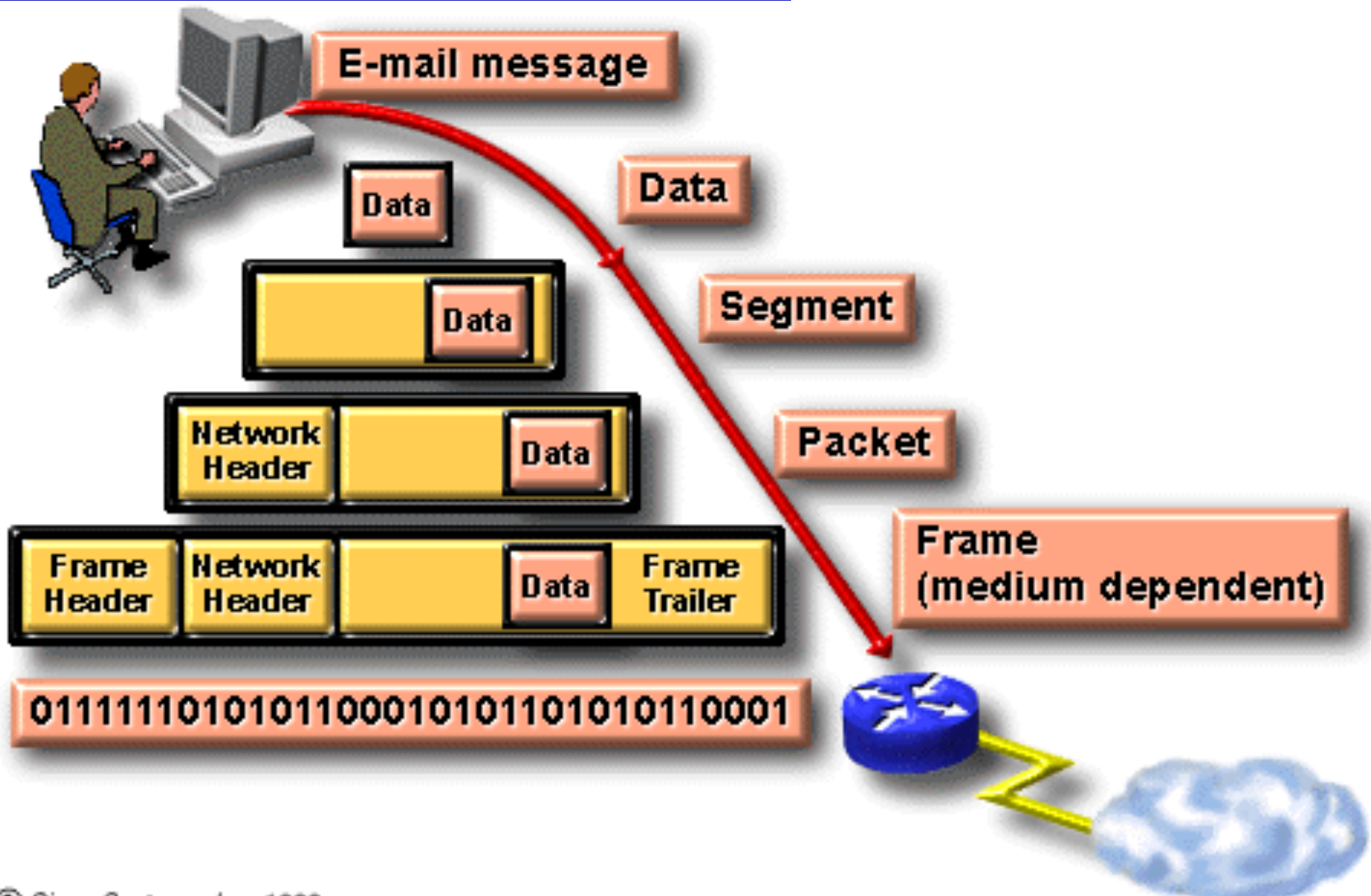
network itf  
itf layer

## Physical + DataLink Layers :Ethernet

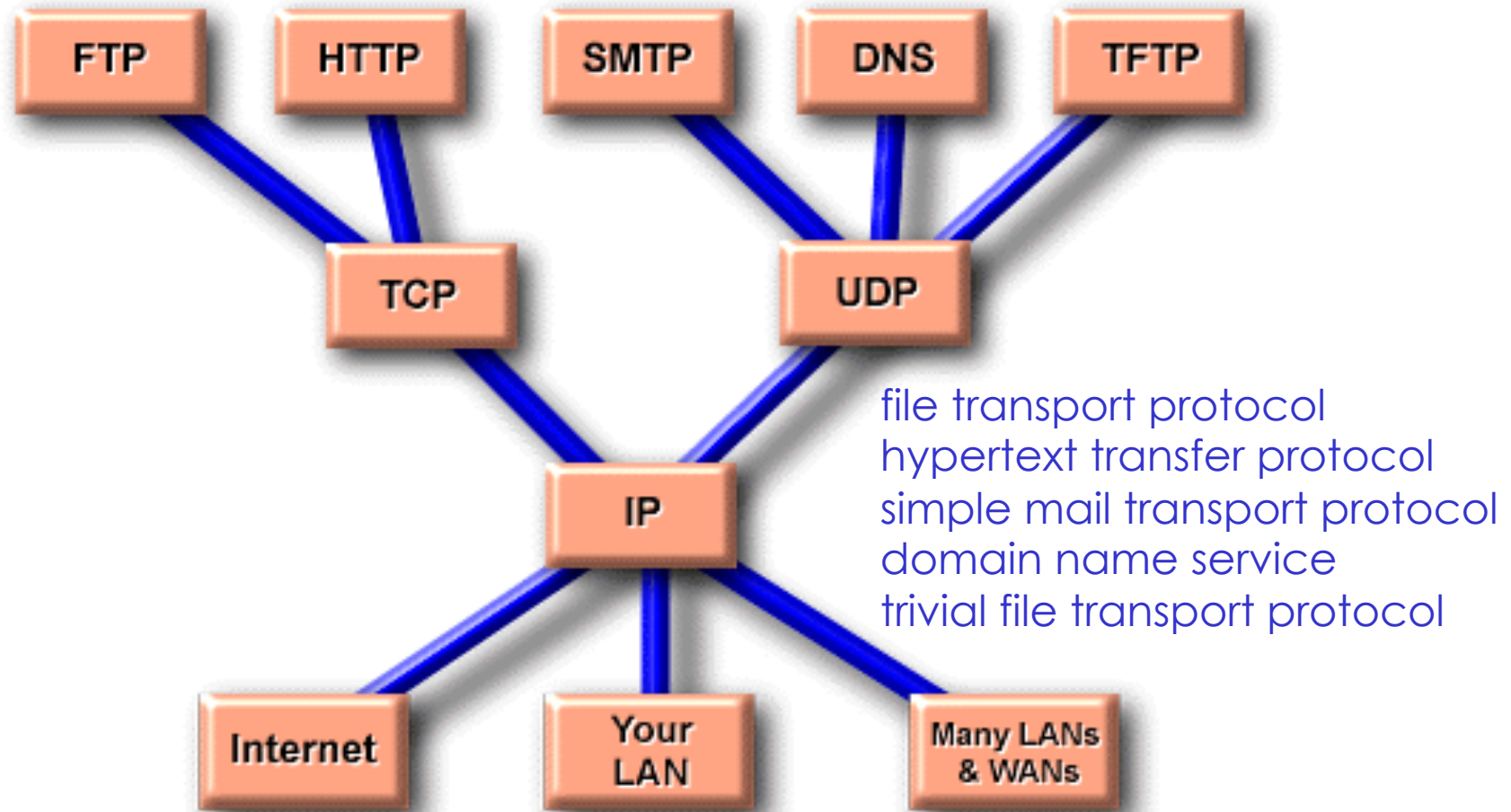


[illegible]

# Information Encapsulation Exp.

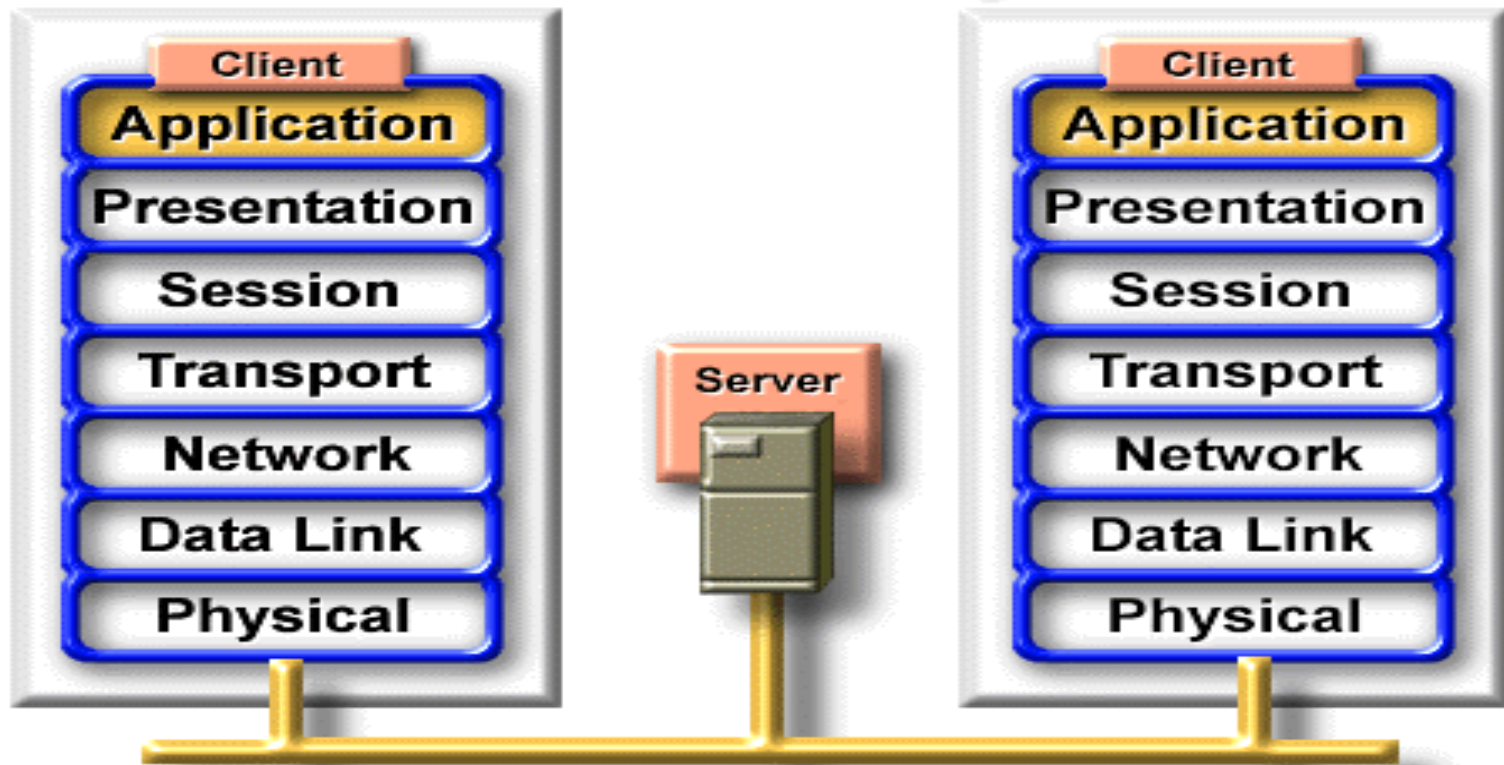


# Protocol Graph: TCP/IP



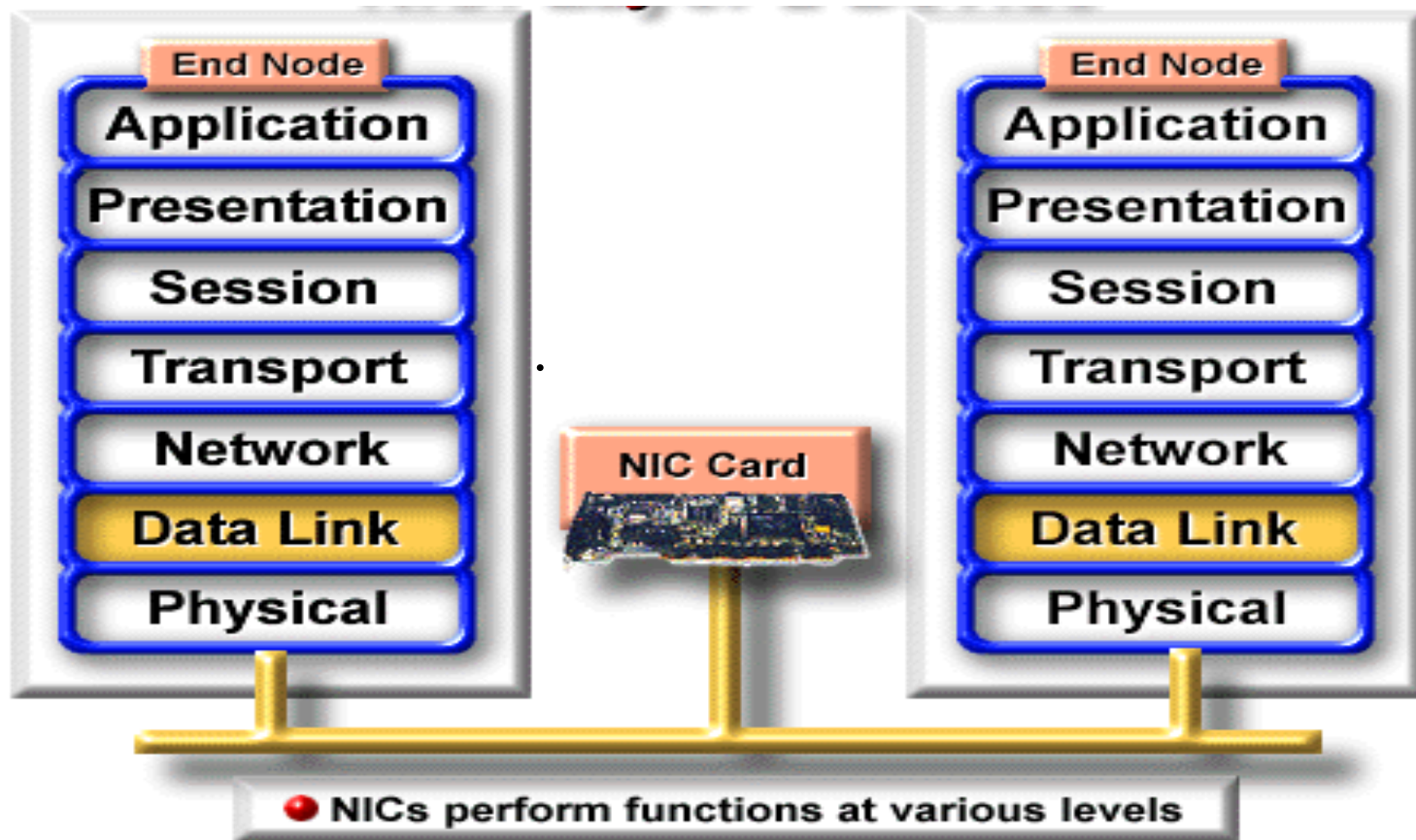
You can add more and more applications

# Example: Client/Server



They operate at all 7 layers of the OSI model. They perform the entire process of encapsulation and decapsulation to do their job of sending e-mails, printing reports, scanning pictures, or accessing database.

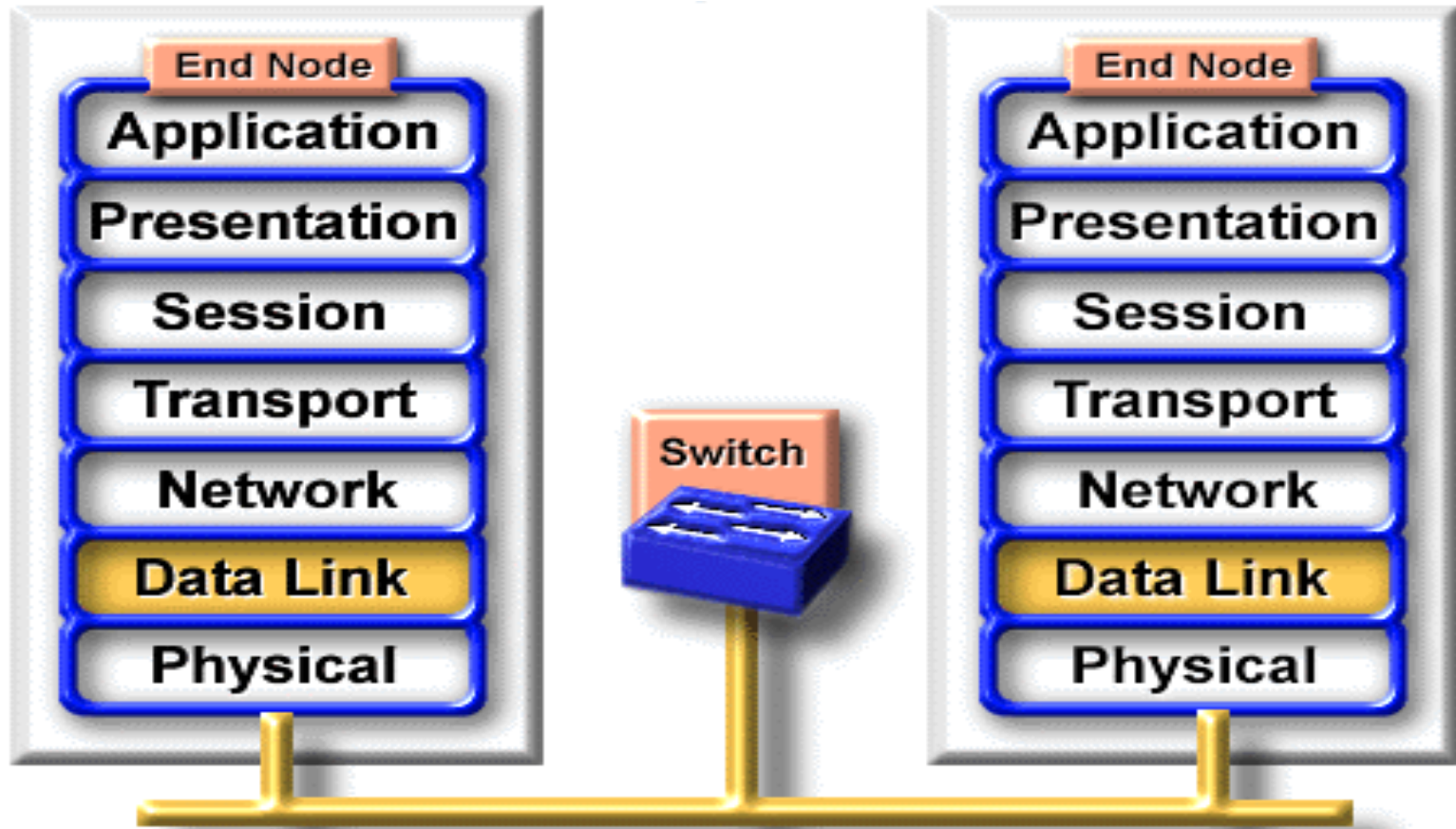
# Example: NIC



A network interface card (NIC card or NIC) is a small printed circuit board that fits into the expansion slot of a bus on a computer's motherboard or peripheral device network adapter.

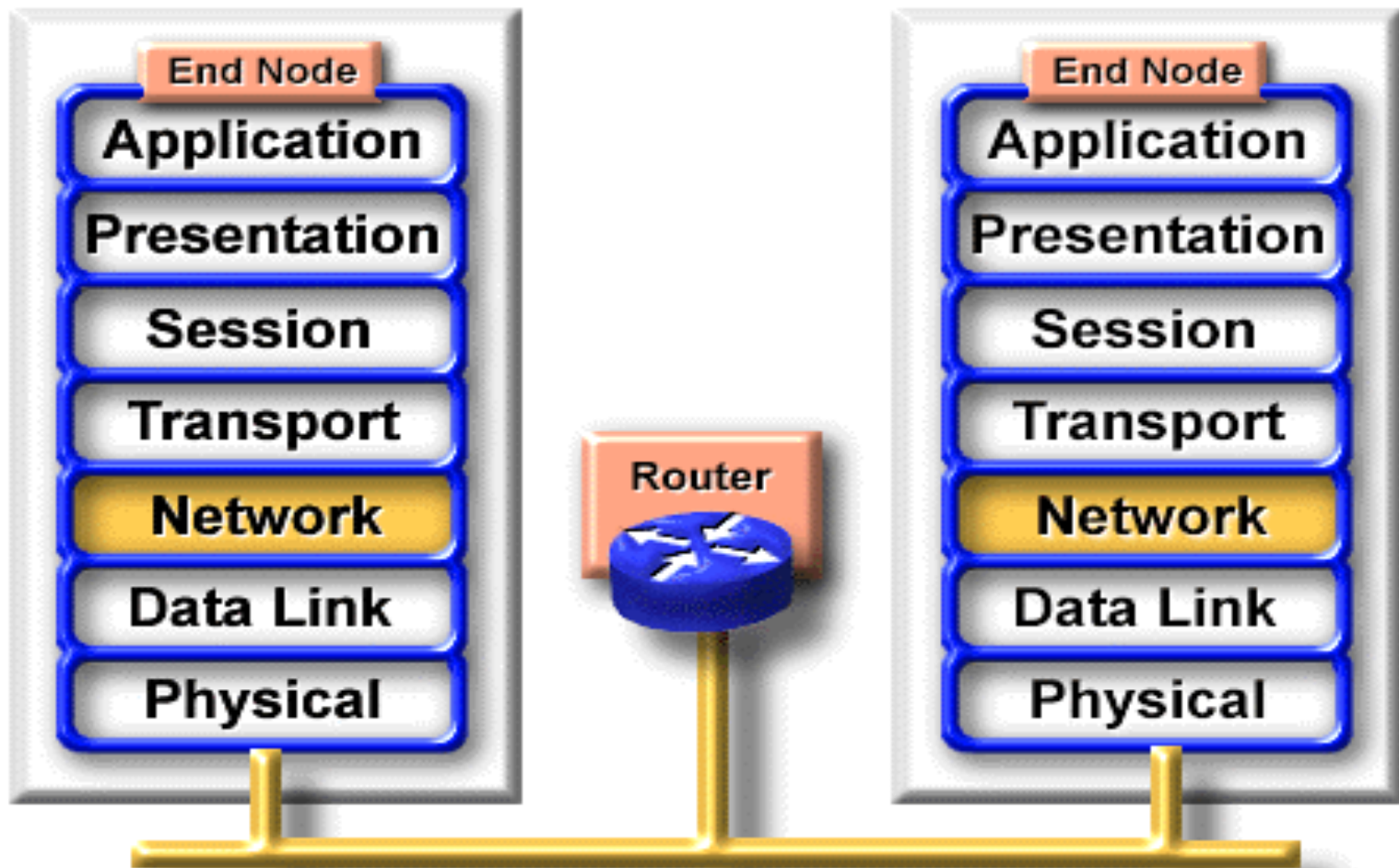


# Example: Switch



It switches packets from incoming ports (interfaces) to outgoing ports, while providing each port with full bandwidth

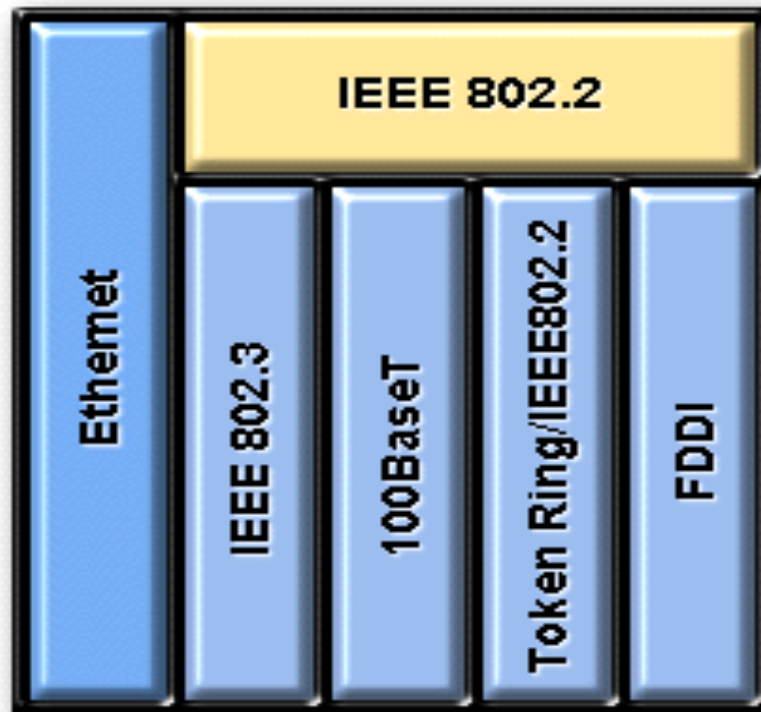
# Example: Router



The symbol for a router is suggestive of its two primary purposes path selection, and switching of router routes, and packets.

# TCP/IP protocols' friend

## LAN Specification





# The IEEE 802 working groups

Number	Topic
802.1	Overview and architecture of LANs
802.2 ↓	Logical link control
802.3 *	Ethernet
802.4 ↓	Token bus (was briefly used in manufacturing plants)
802.5	Token ring (IBM's entry into the LAN world)
802.6 ↓	Dual queue dual bus (early metropolitan area network)
802.7 ↓	Technical advisory group on broadband technologies
802.8 †	Technical advisory group on fiber optic technologies
802.9 ↓	Isochronous LANs (for real-time applications)
802.10 ↓	Virtual LANs and security
802.11 *	Wireless LANs
802.12 ↓	Demand priority (Hewlett-Packard's AnyLAN)
802.13	Unlucky number. Nobody wanted it
802.14 ↓	Cable modems (defunct: an industry consortium got there first)
802.15 *	Personal area networks (Bluetooth)
802.16 *	Broadband wireless
802.17	Resilient packet ring

# Network Standardization

---

- ITU (International Telecommunication Union)
- ISO (International Standards Organization )
- ANSI (American National Standards Institute)
- NIST (National Institute of Standards and Technology)
- IEEE (Institute of Electrical and Electronics Engineers)
- RFCs (Request For Comments).
- IRTF (Internet Research Task Force)

# Presentation 1

---

- For a good talk
  - Organization: Structure, acknowledge or refs.
  - Presentation: Visually; orally; body language...
  - Timing: ~20mins(15-25 min?)
  - Q&A

# Many thanks:

---

Cisco Academy.

Your task:

Yuketang &

Layered Structure ? &

Compare TCP/IP and OSI ?