COMPUTER NETWORKS

- Chapter 1.2: Architecture

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“国家双语教学试点项目”

Contents

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

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)

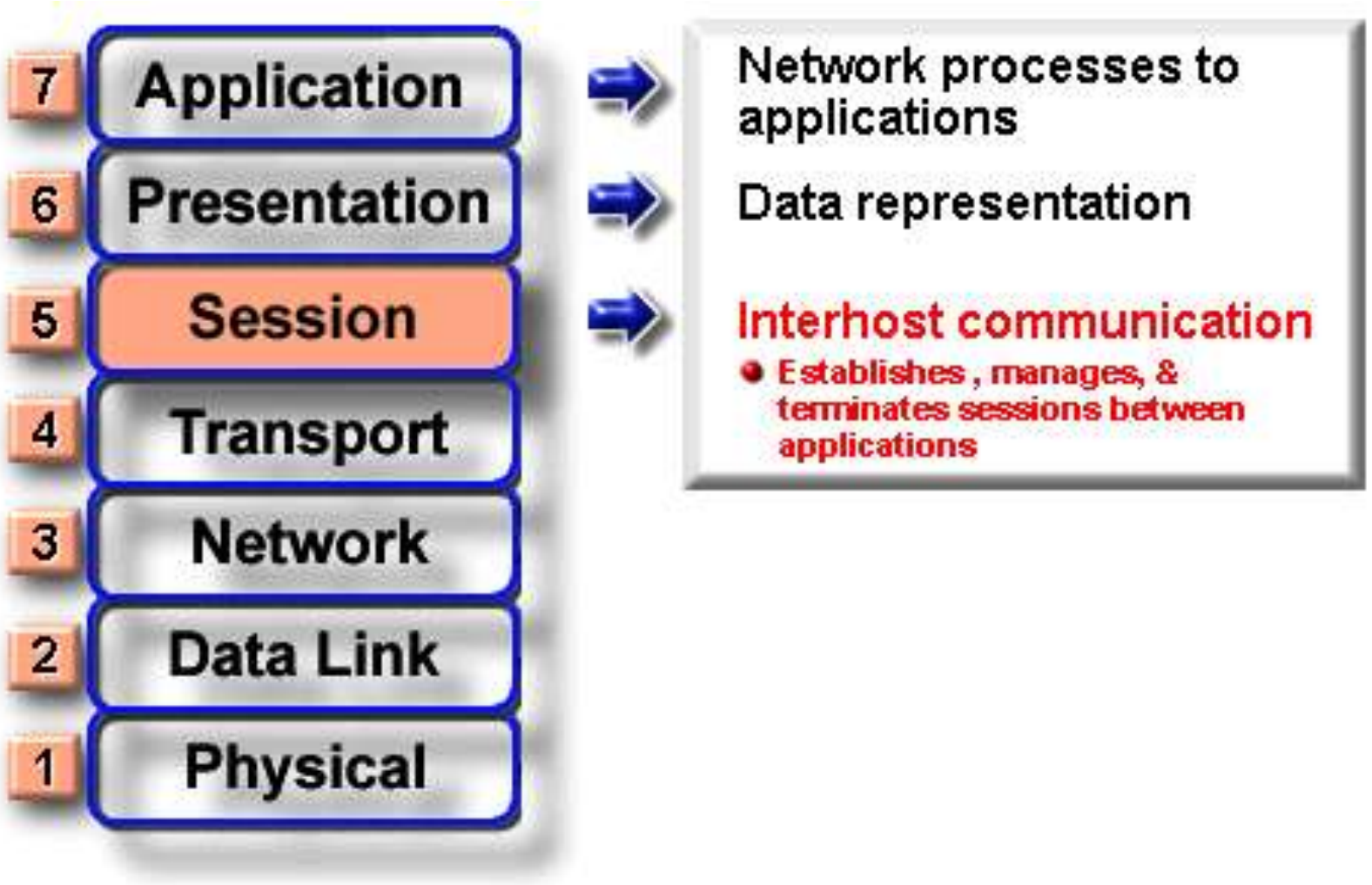
OSI Model Presentation Layer

Network processes to applications

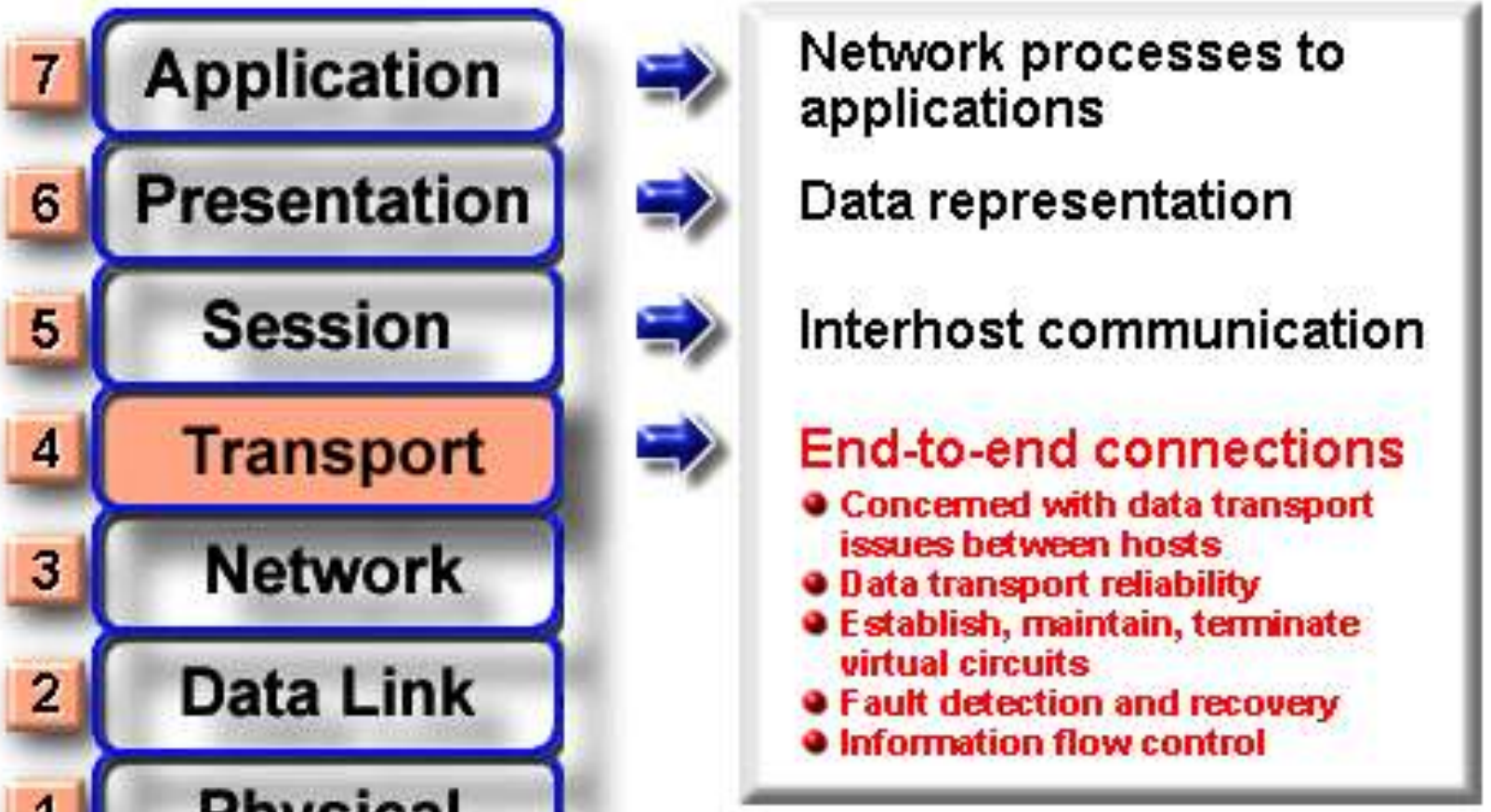
Data representation

- Insure data is readable by receiving system
- Format of data
- Data structures
- Negotiates data transfer syntax for application layer

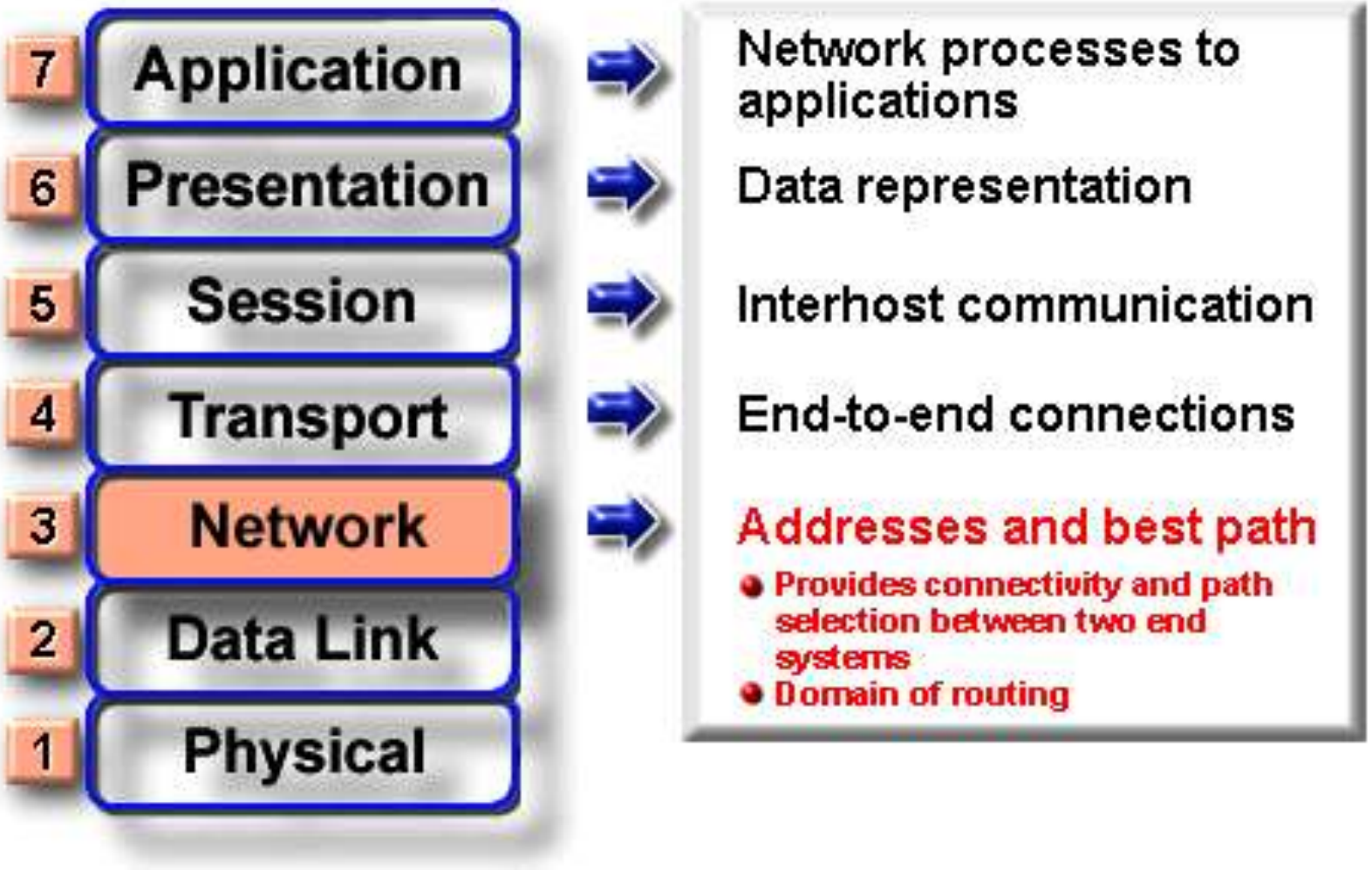
OSI Model Session Layer



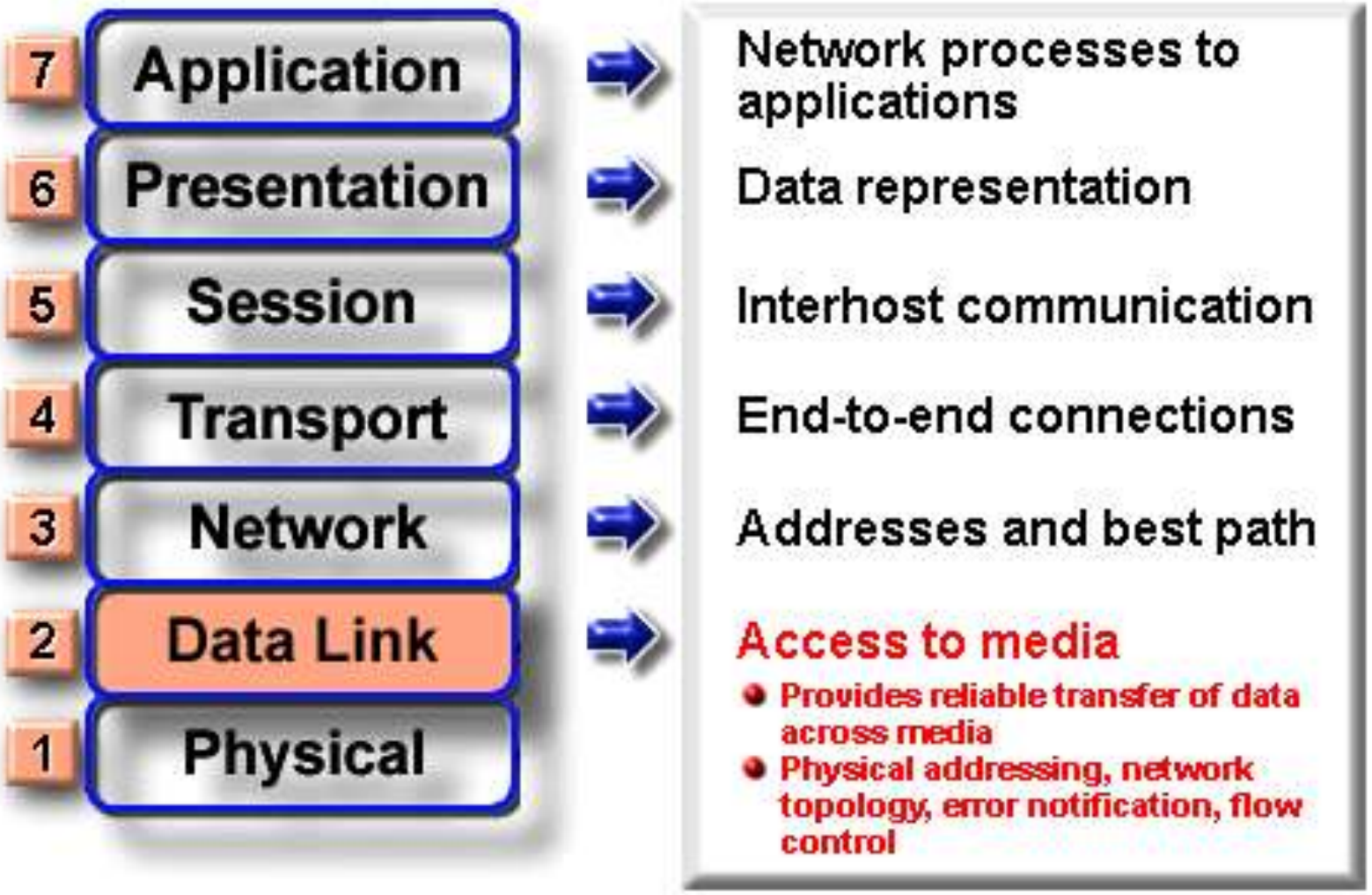
OSI Model Transport Layer



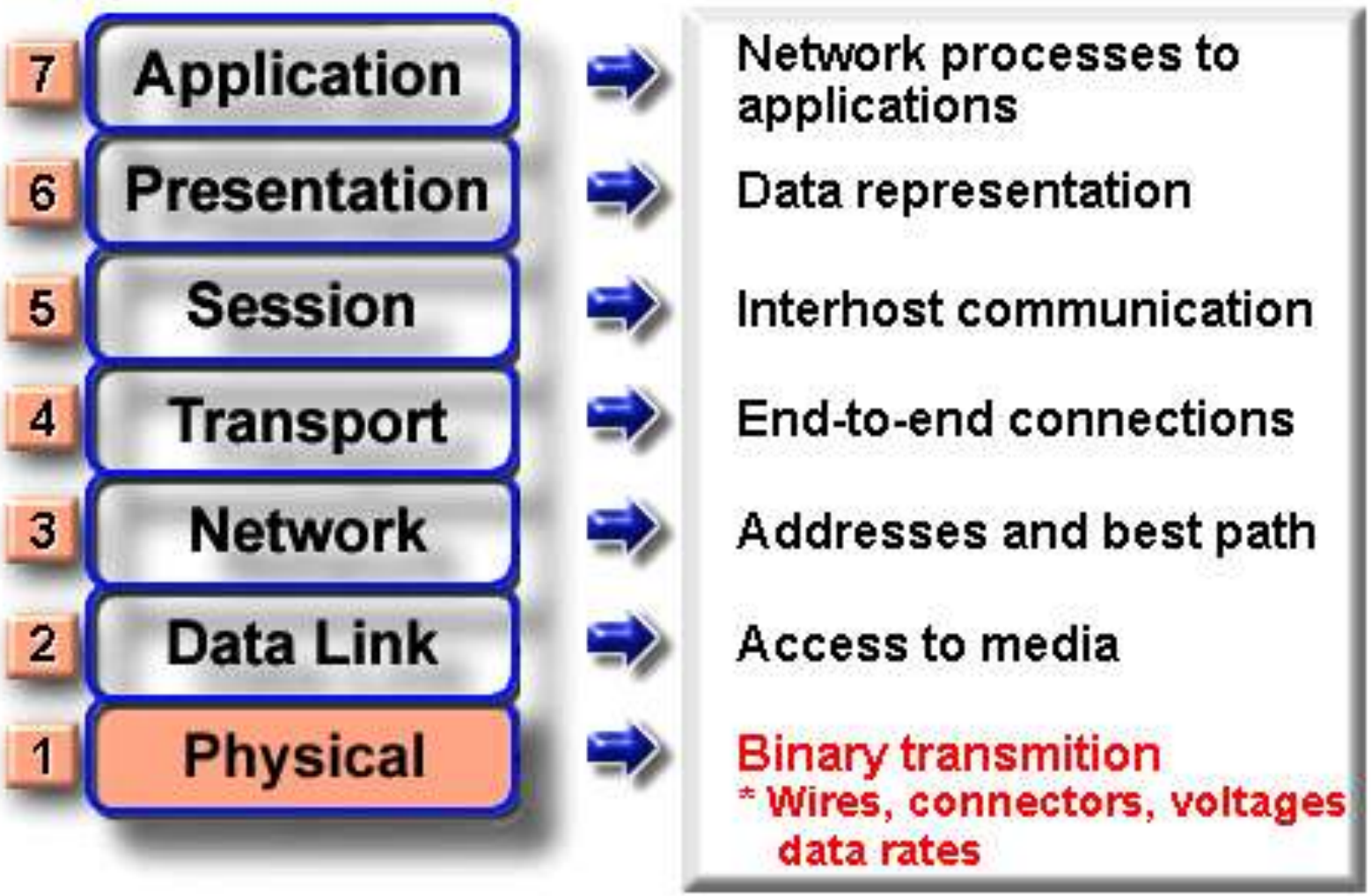
OSI Model Network Layer



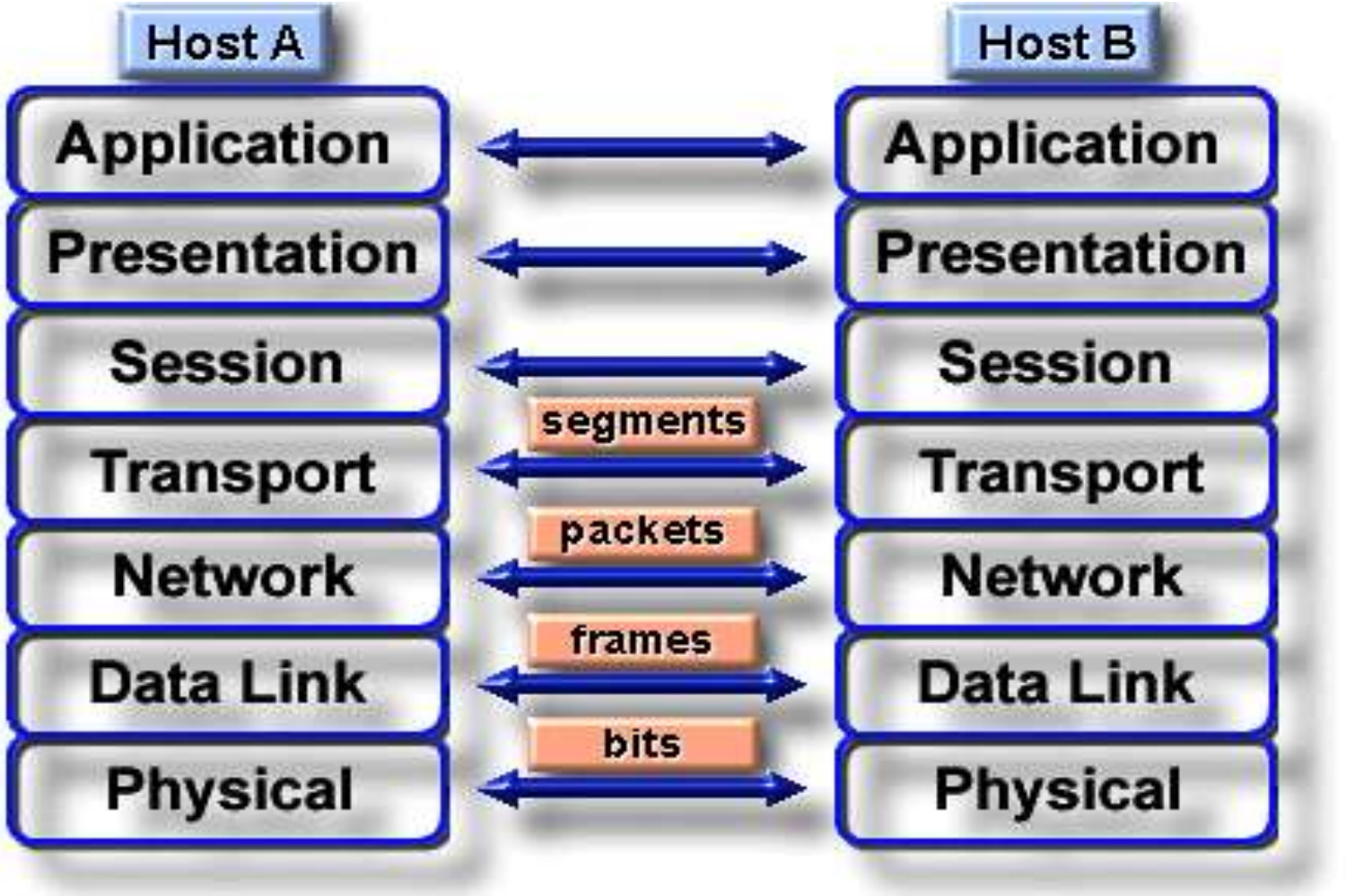
OSI Model Data Link Layer



OSI Model Physical Layer



Peer-to-Peer Communications



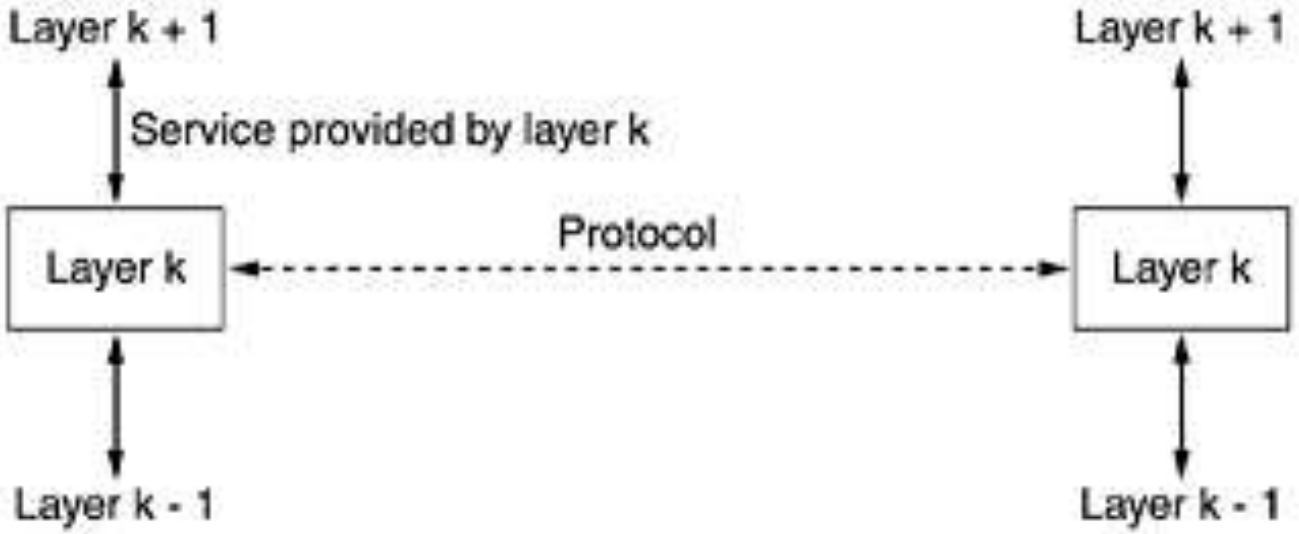
Protocol is the most important !

Service Primitives

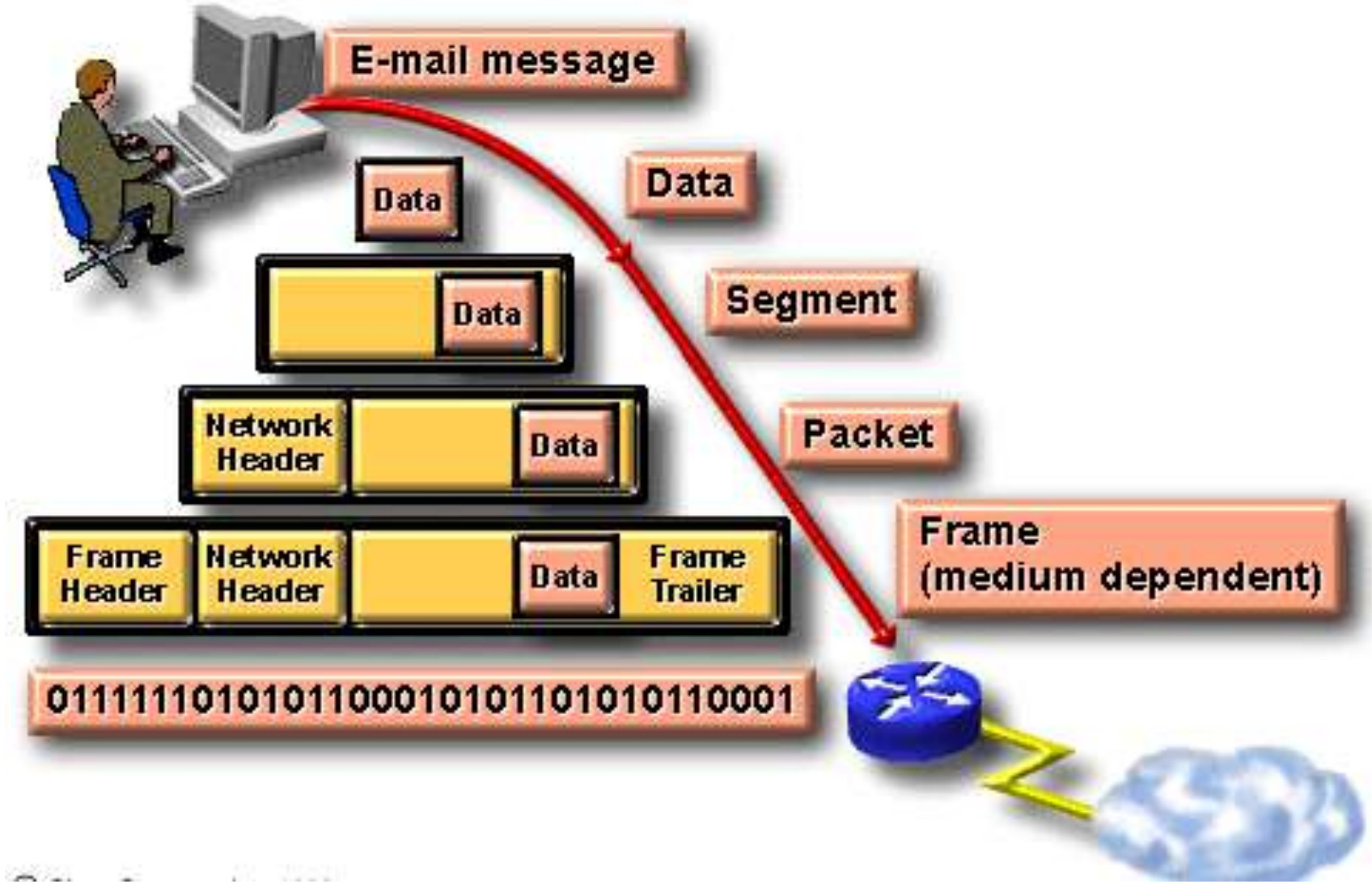
Primitive	Meaning
LISTEN	Block waiting for an incoming connection
CONNECT	Establish a connection with a waiting peer
RECEIVE	Block waiting for an incoming message
SEND	Send a message to the peer
DISCONNECT	Terminate a connection

Relationship of Services & Protocols

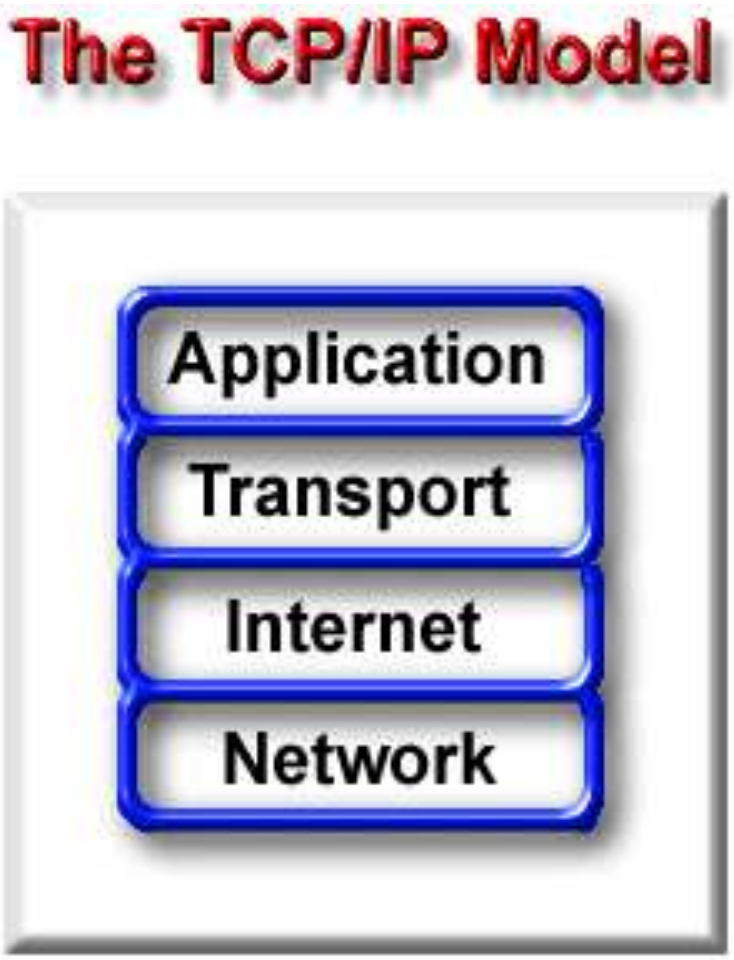
- Services： interface between two layers
- Protocols：packets sent between peer entities on different machines



Information Encapsulation Exp.

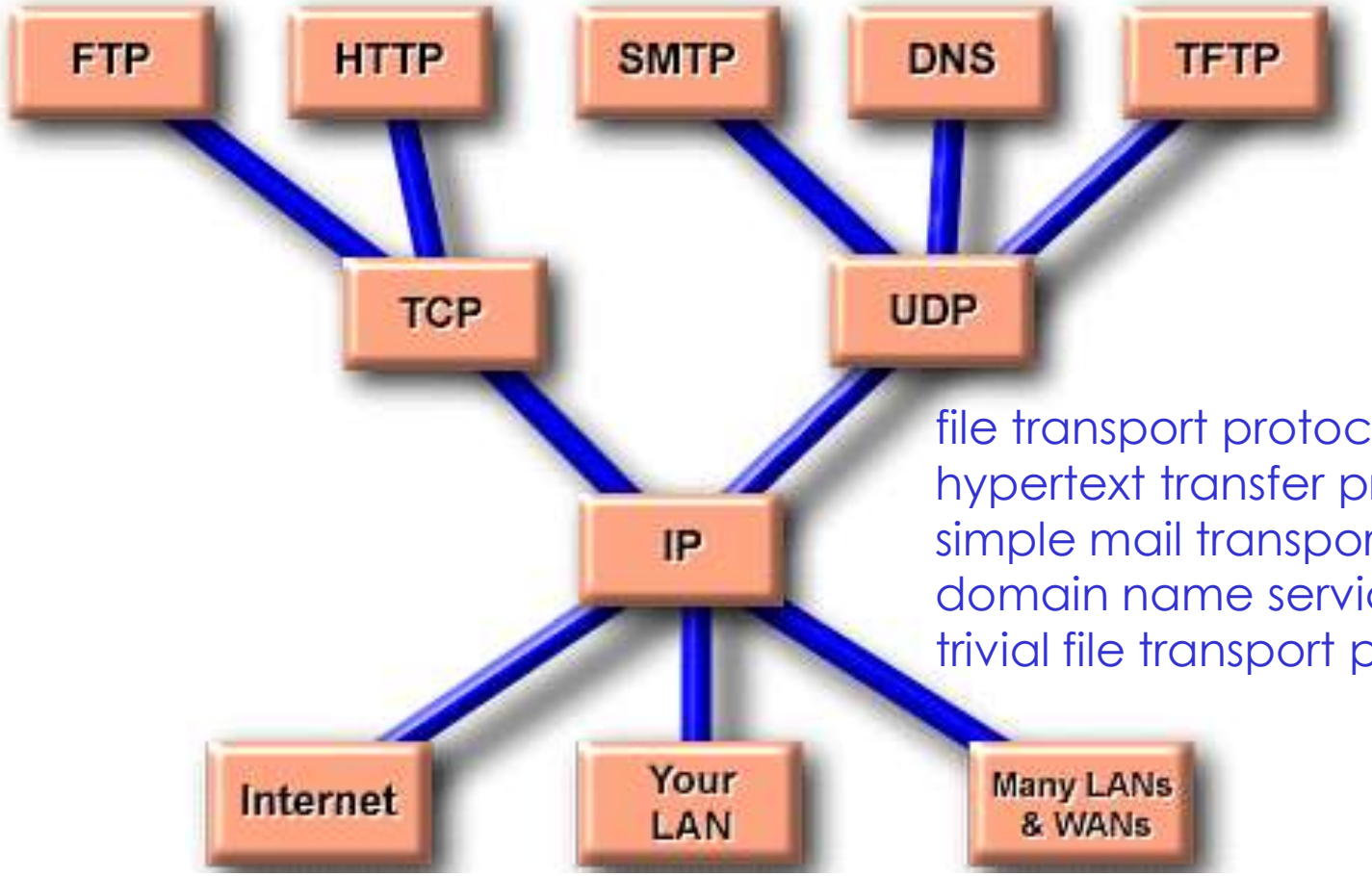


OSI: XNS, Novell-IPX, MS-NetBEUI



Physical + DataLink Layers :Ethernet

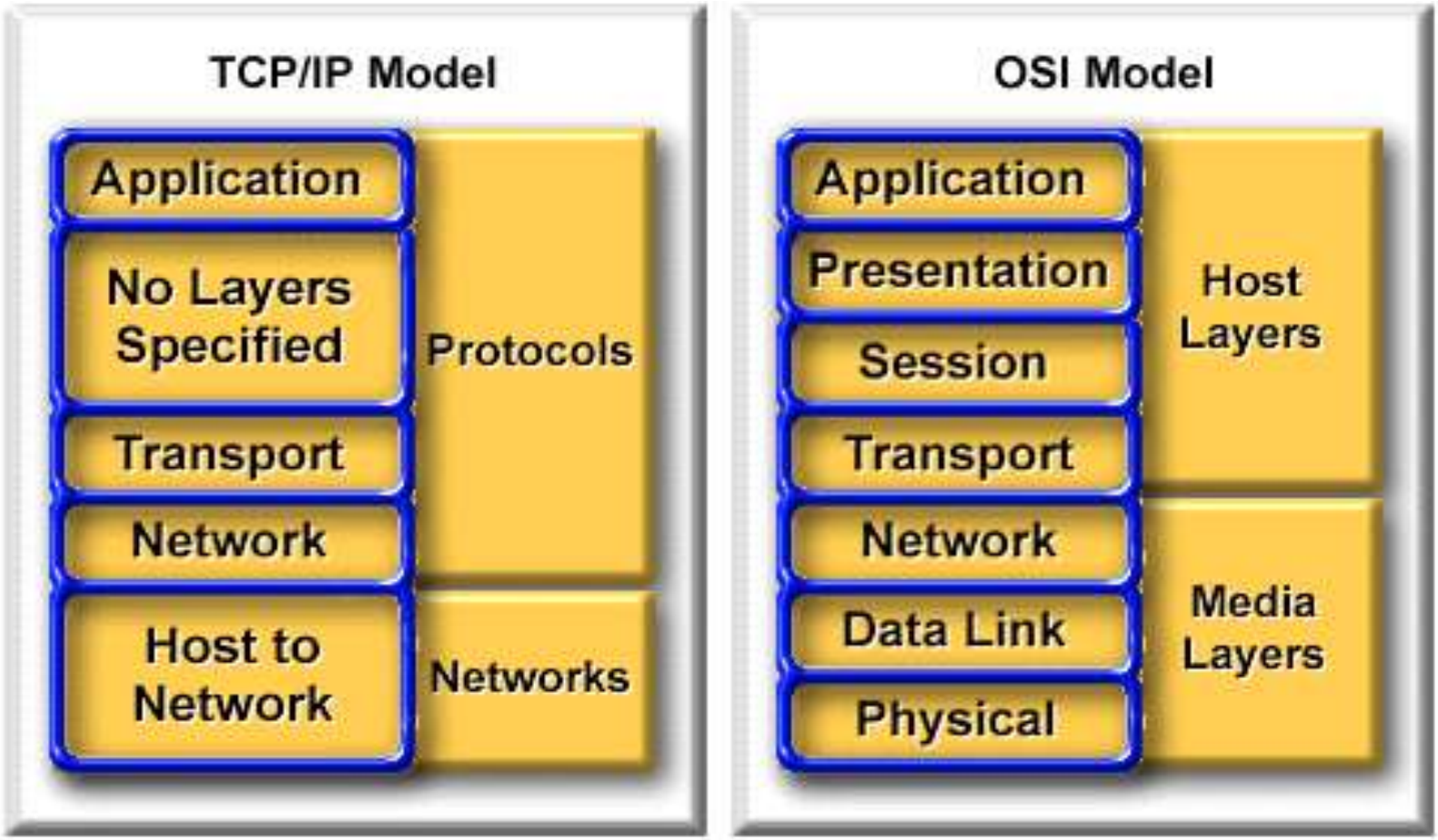
Protocol Graph: TCP/IP



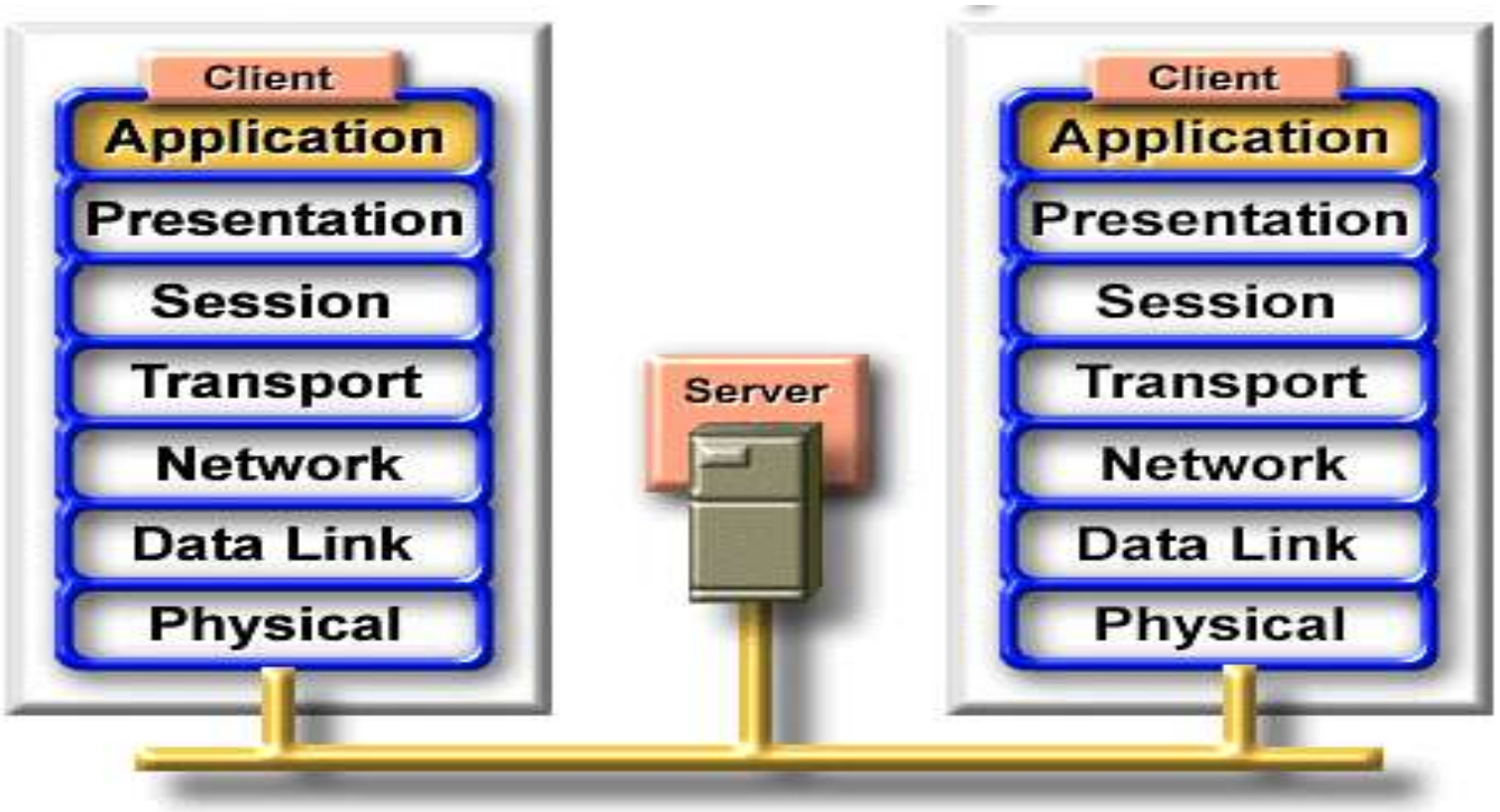
file transport protocol
hypertext transfer protocol
simple mail transport protocol
domain name service
trivial file transport protocol

You can add more and more applications

Comparing TCP/IP with OSI

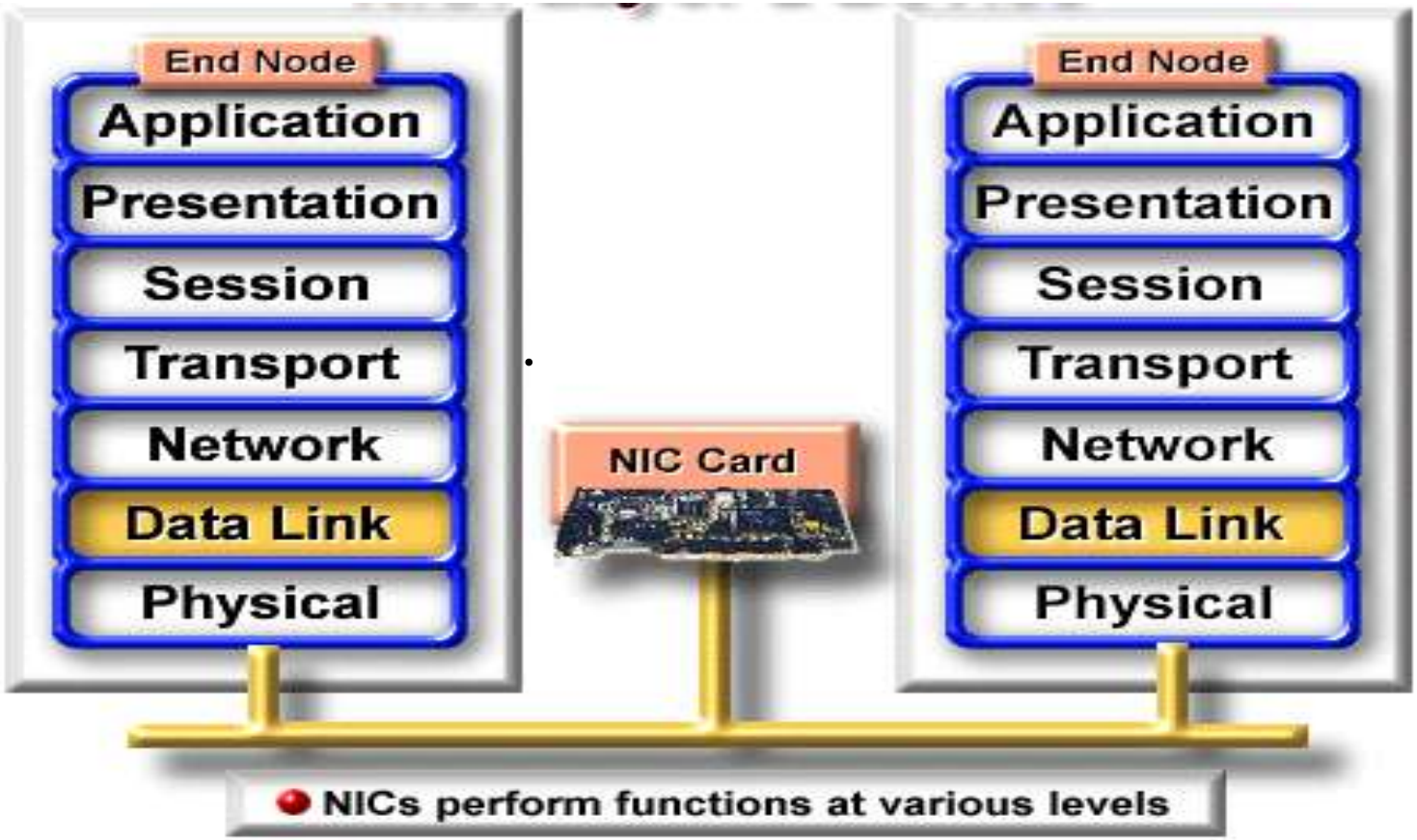


Example: Client/Server



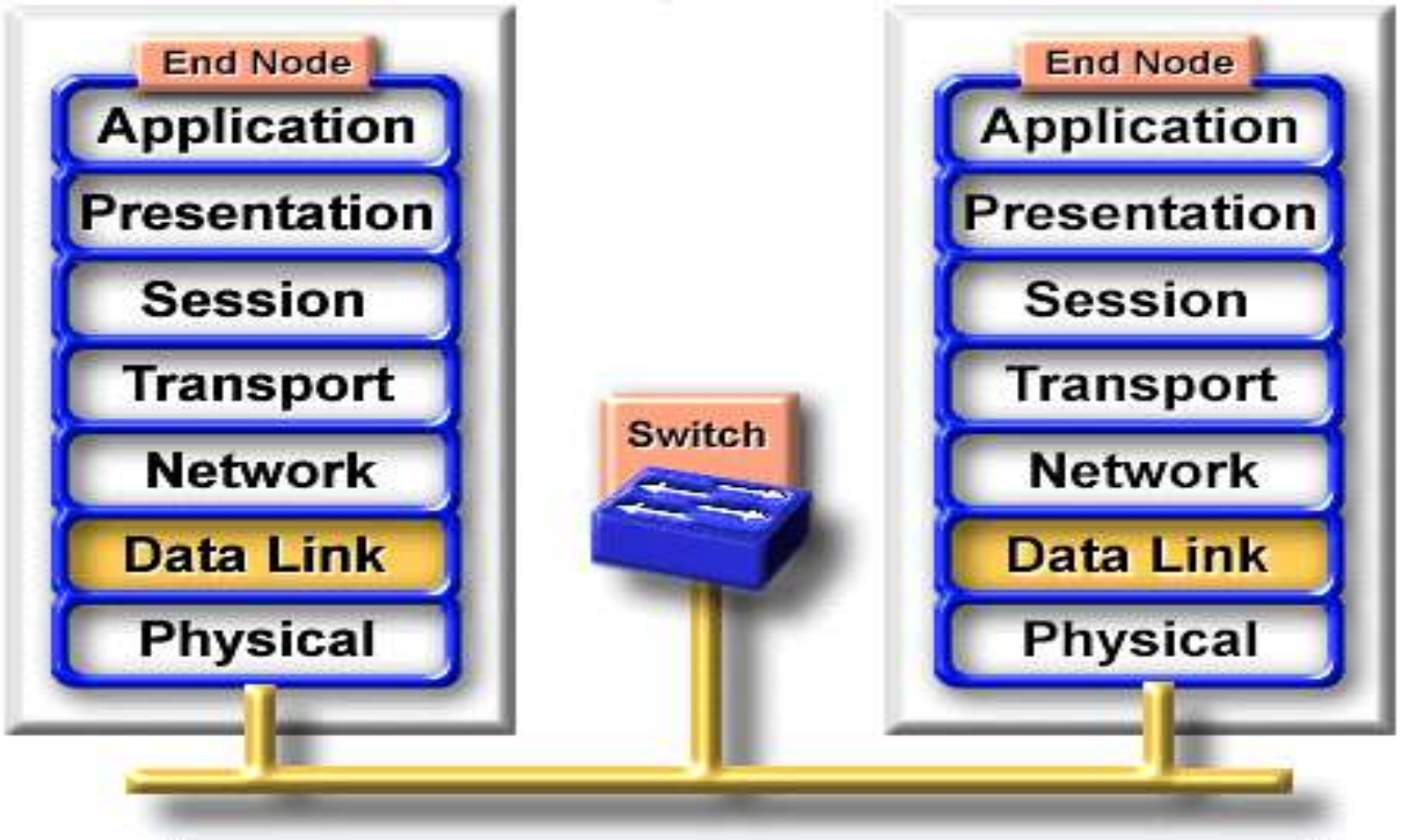
They operate at all 7 layers of the OSI model. They perform the entire process of encapsulation and decapsulation to do their job of sending e-mails, printing reports, scanning pictures, or accessing database.

Example: NIC



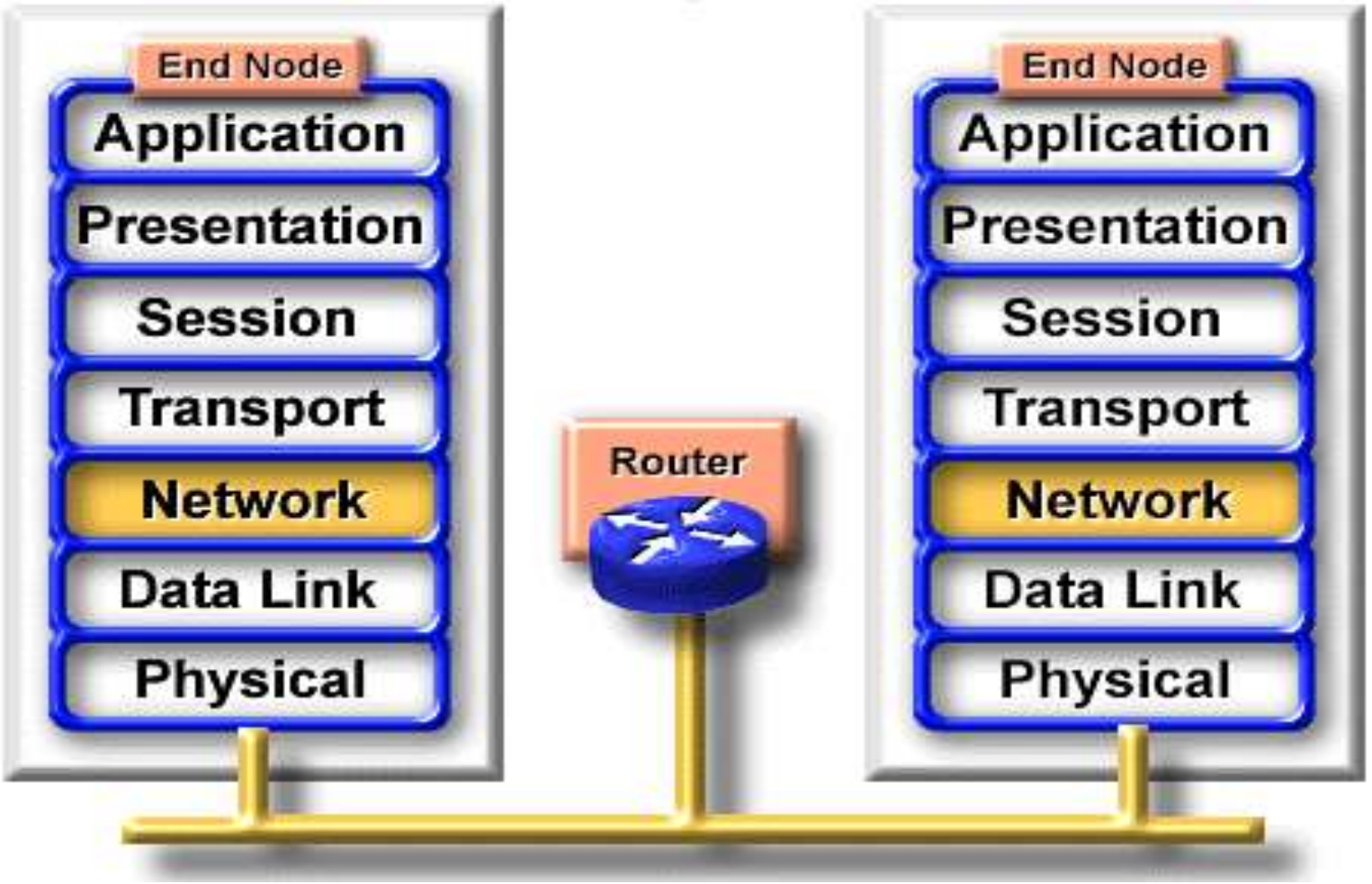
A network interface card (NIC card or NIC) is a small printed circuit board that fits into the expansion slot of a bus on a computer's motherboard or peripheral device network adapter.

Example: Switch



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

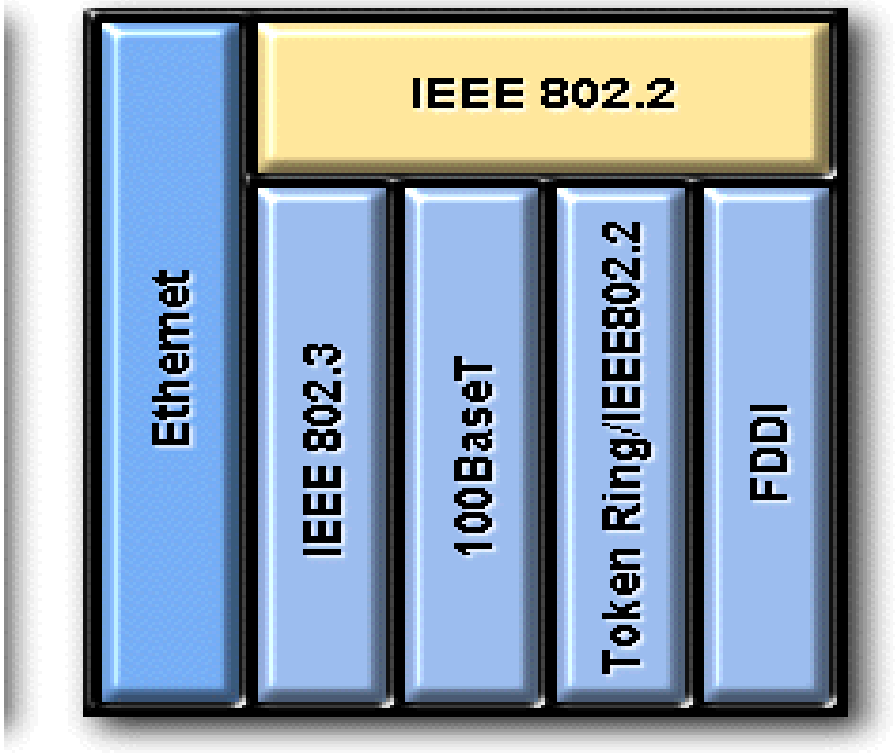
Example: Router



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

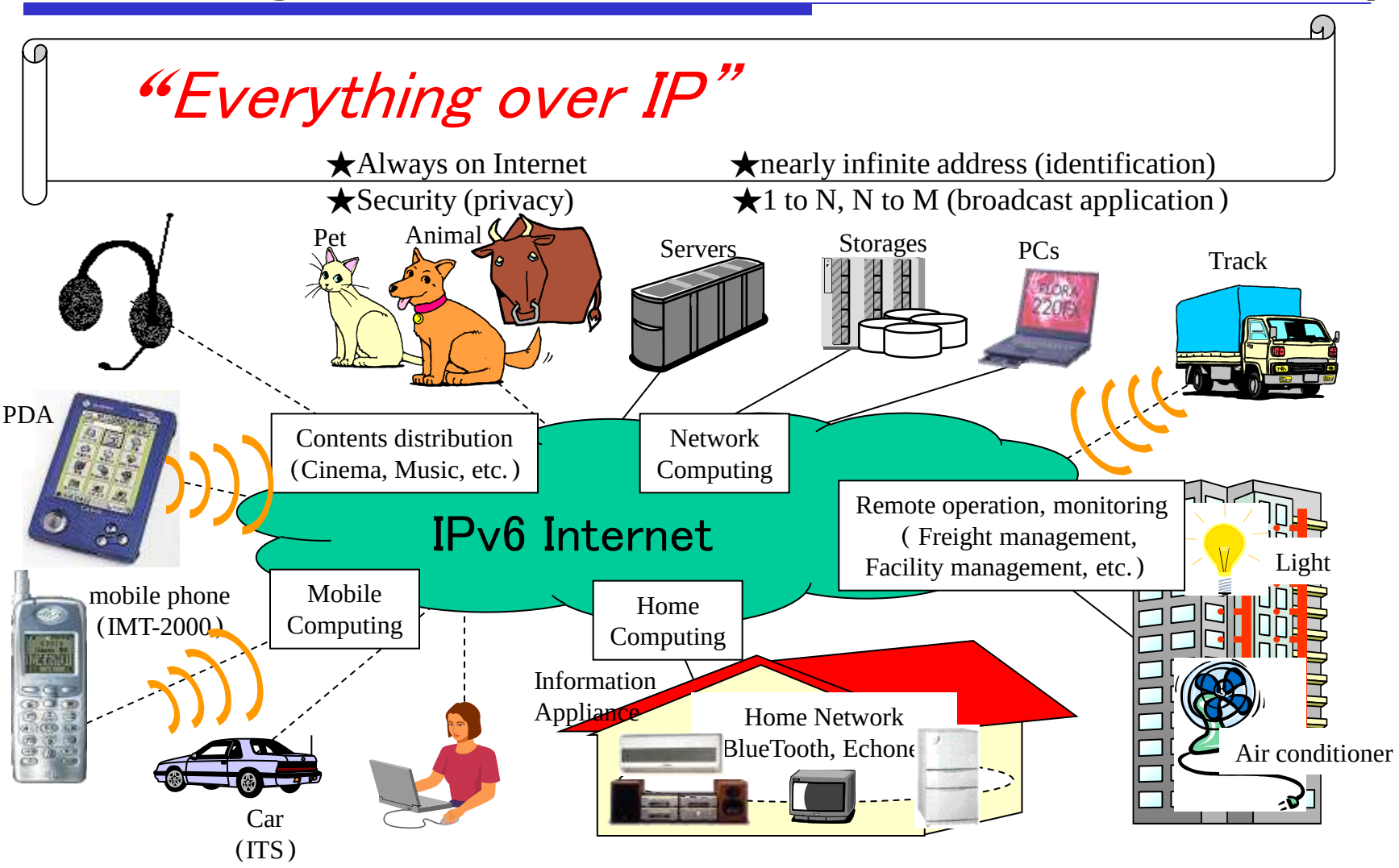
Number	Topic
802.1	Overview and architecture of LANs
802.2 ↓	Logical link control
802.3 *	Ethernet
802.4 ↓	Token bus (was briefly used in manufacturing plants)
802.5	Token ring (IBM's entry into the LAN world)
802.6 ↓	Dual queue dual bus (early metropolitan area network)
802.7 ↓	Technical advisory group 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)

Intelligent Home

Next generation network/society



Many thanks:

Layered Structure ?

Cisco Academy.