The Saigon CTT

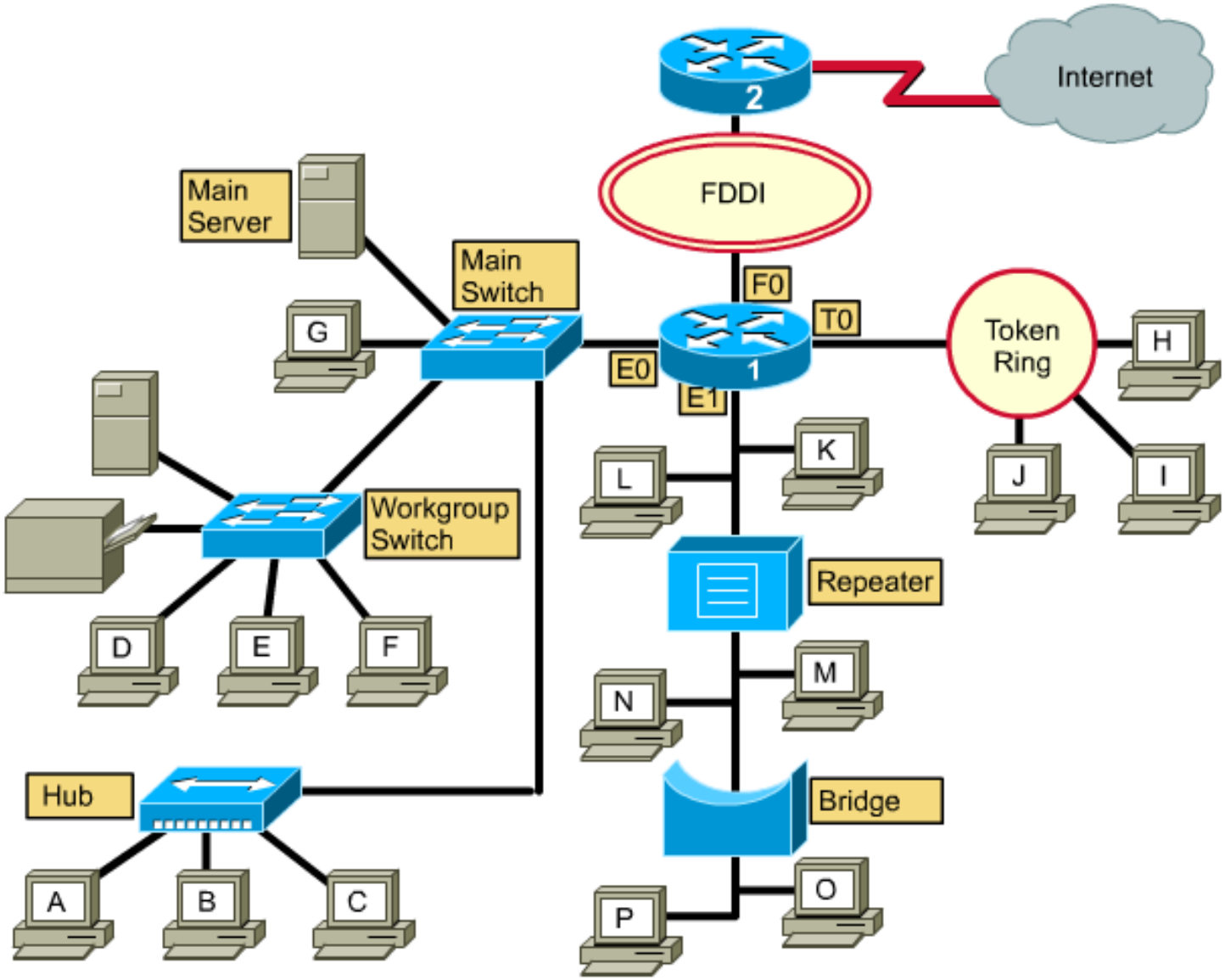
Chapter 3

LOCAL AREA NETWORK

The Saigon CTT

BASIC LAN DEVICES

Are you able to describe this diagram?

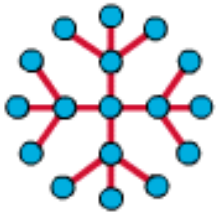


Physical & Logical Topologies

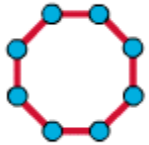
- **Physical topologies**
  - **Define the actual layout of the wire (media)**
- **Logical topologies**
  - **Define how the media is accessed by the hosts**

Physical Topologies

Bus

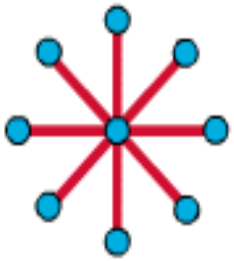


Extended Star

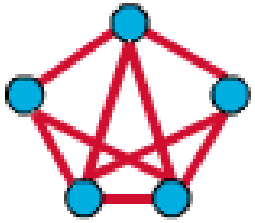


Ring

Hierarchical

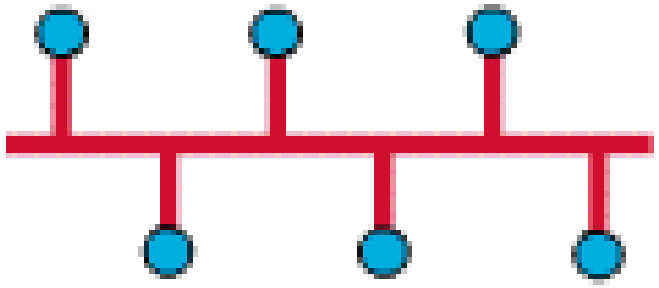


Star



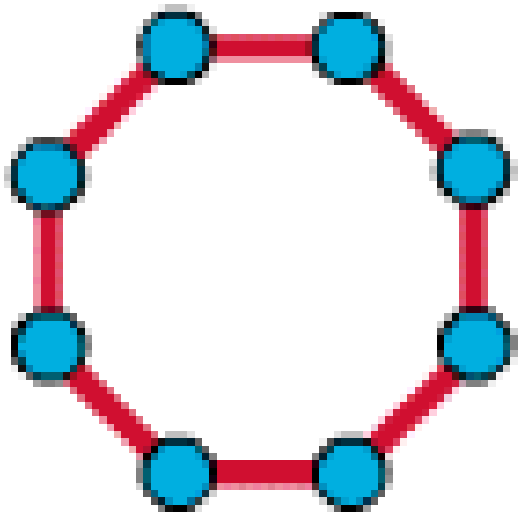
Mesh

Physical Topology: Bus



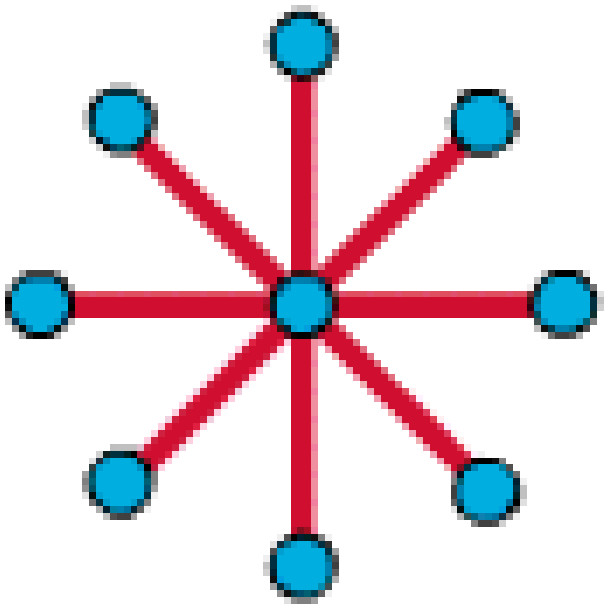
- Single backbone
- All hosts directly connected to backbone
- Each end of the bus must be properly terminated

Physical Topology: Ring



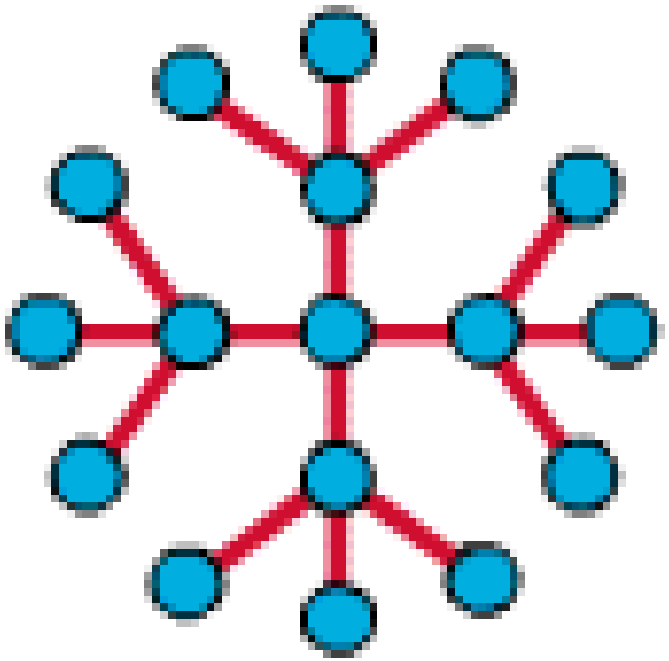
- No backbone
- A host is directly connected to each of its neighbors

Physical Topology: Star



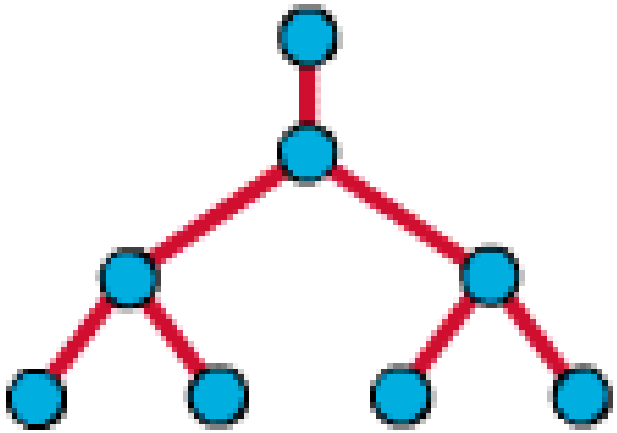
- All devices connected to a central point
- Center of star is usually a hub or a switch

Physical Topology: Extended Star



- Connects individual star topologies together.
- At the center of the star is a hub or a switch.
- Extends the length and size of the network.

Physical Topology: Hierarchical



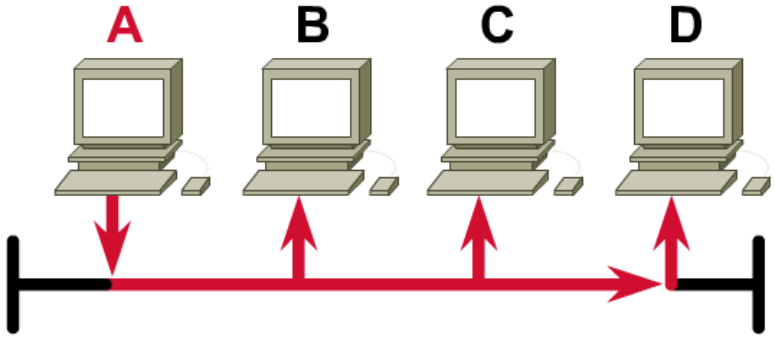
- Like the extended star except a computer controls traffic (not a hub or a switch).

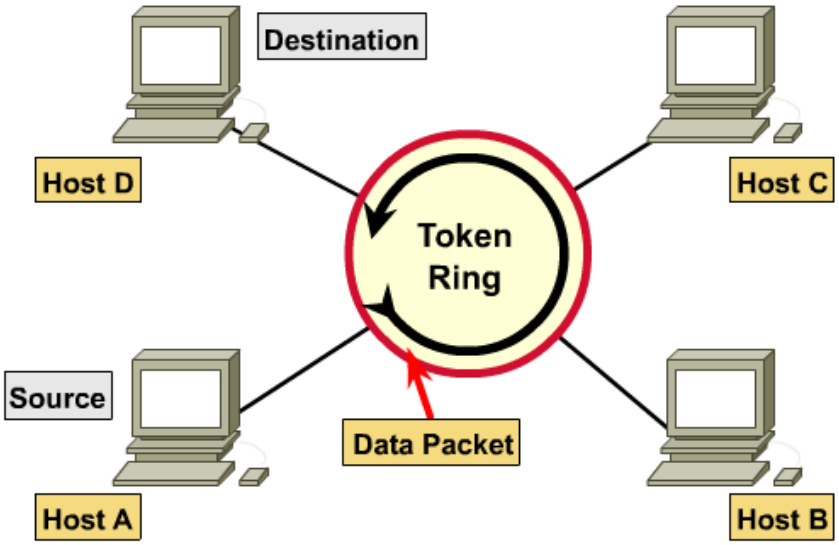
Physical Topology: Mesh

- Each host has its own connection to every other host.
- Used in situations where communication must not be interrupted.

Logical Topologies

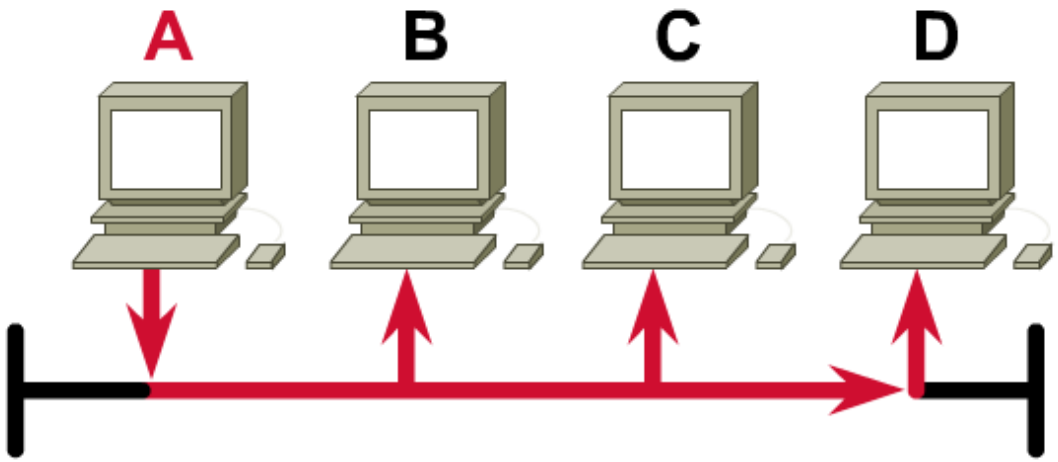
Broadcast





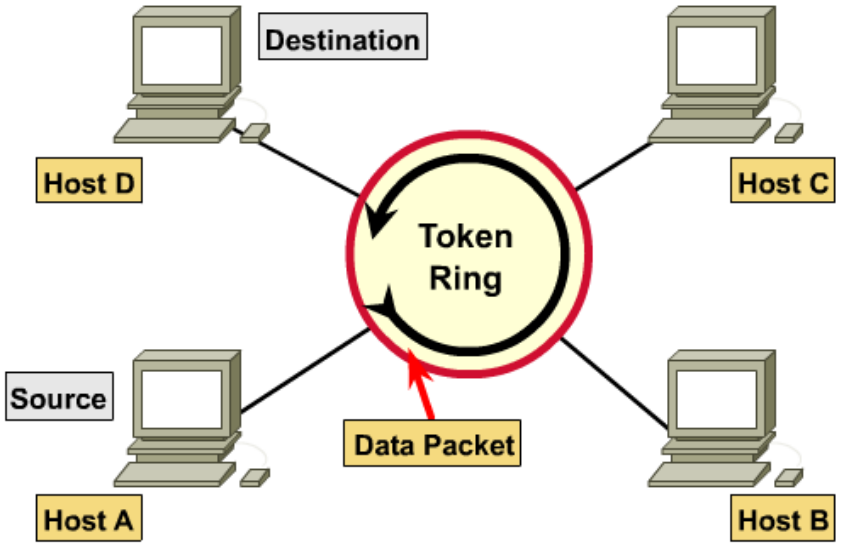
Token Passing

Logical Topology: Broadcast



- Each host on the LAN sends its data (or broadcasts its data) to every other host.
- First-come, first-serve.

Logical Topology: Token Passing

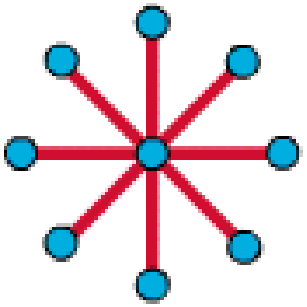


- Access to media is controlled by an electronic token.
- Possession of the token gives the host the right to pass data to its destination.

Technologies

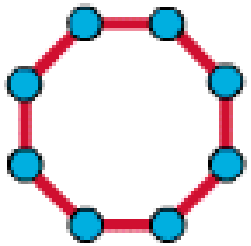
Broadcast

Ethernet



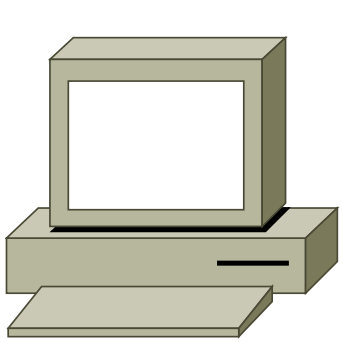
Token Passing

Token Ring

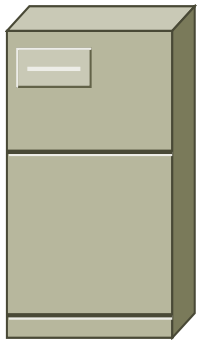


FDDI

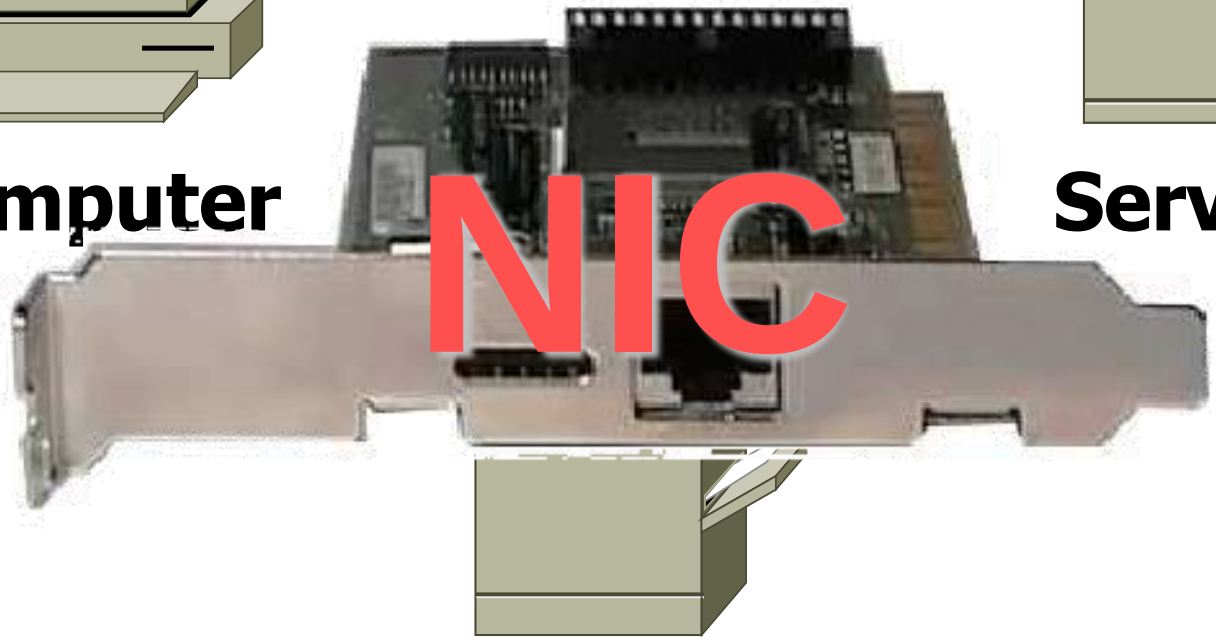
Hosts



Computer



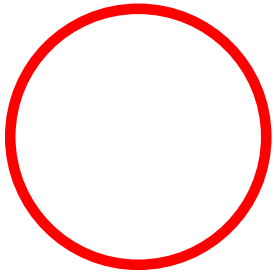
Server



Printer

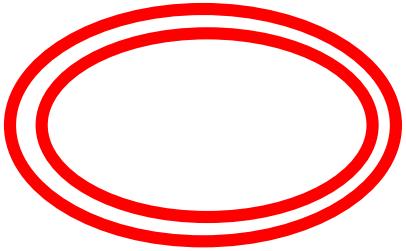
LAN Media Symbols

Ethernet Line



Token Ring

Serial Line

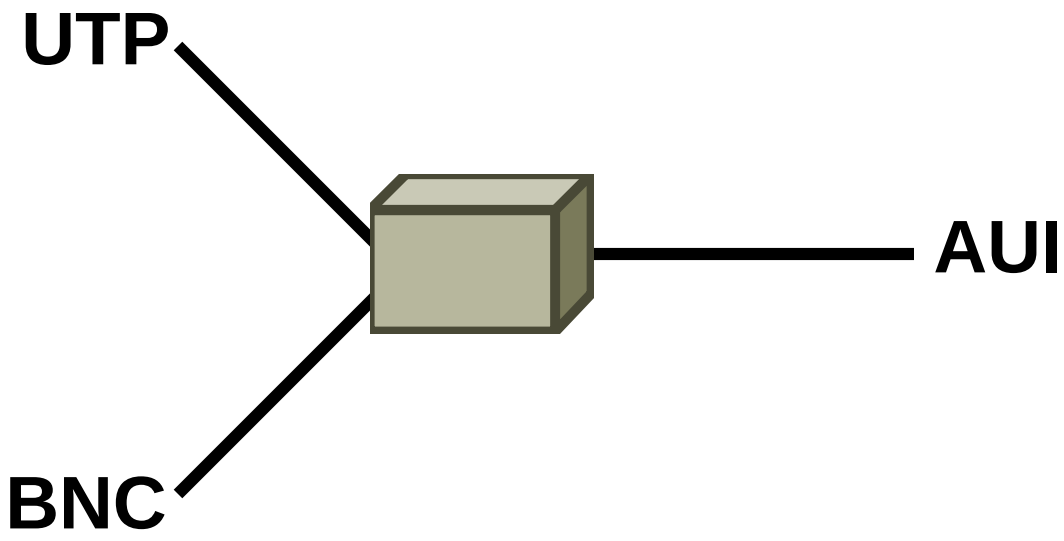


FDDI Ring

OSI Review: Layer 1

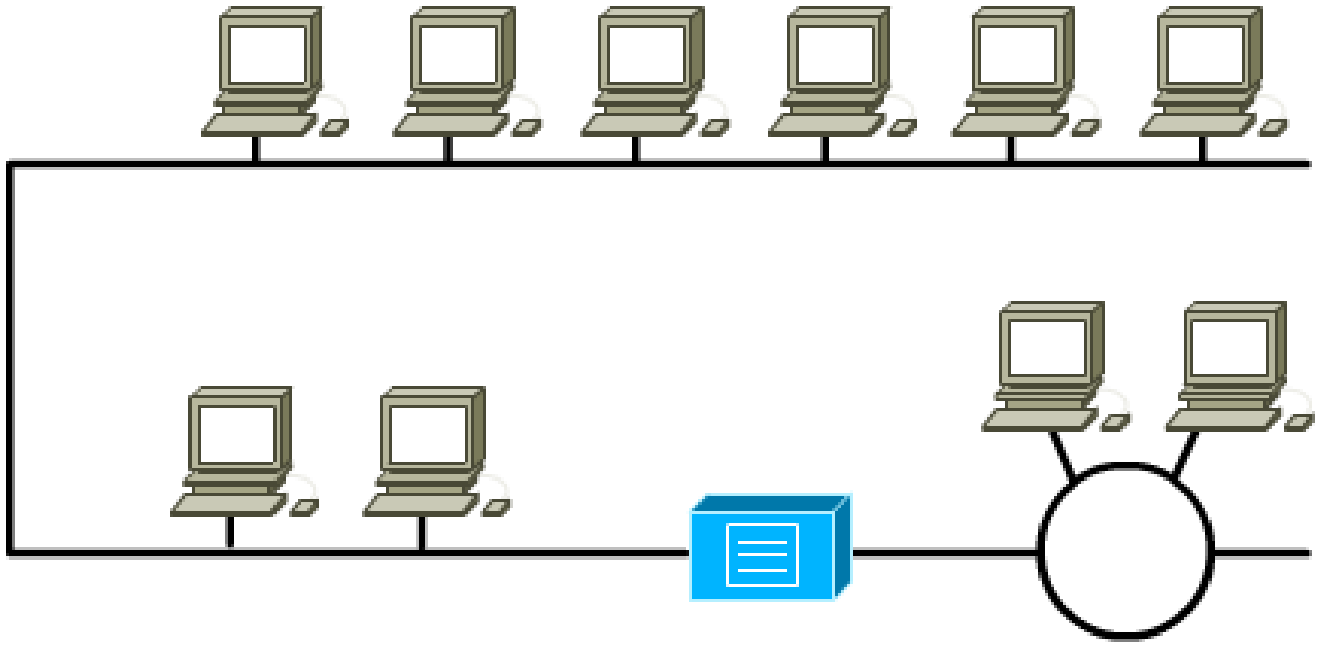
- **Responsibility:**
  - Transmission of an unstructured bit stream over a physical link between end systems.
- **Concerned:**
  - Bits.
  - Electrical specifications.
  - Physical data rate.
  - Distances.
  - Physical connector.

LAN Device: Transceiver



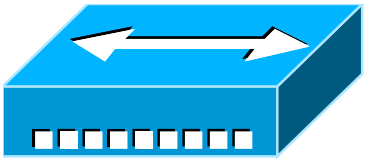
- Connect different media technologies.
- Layer 1 device.

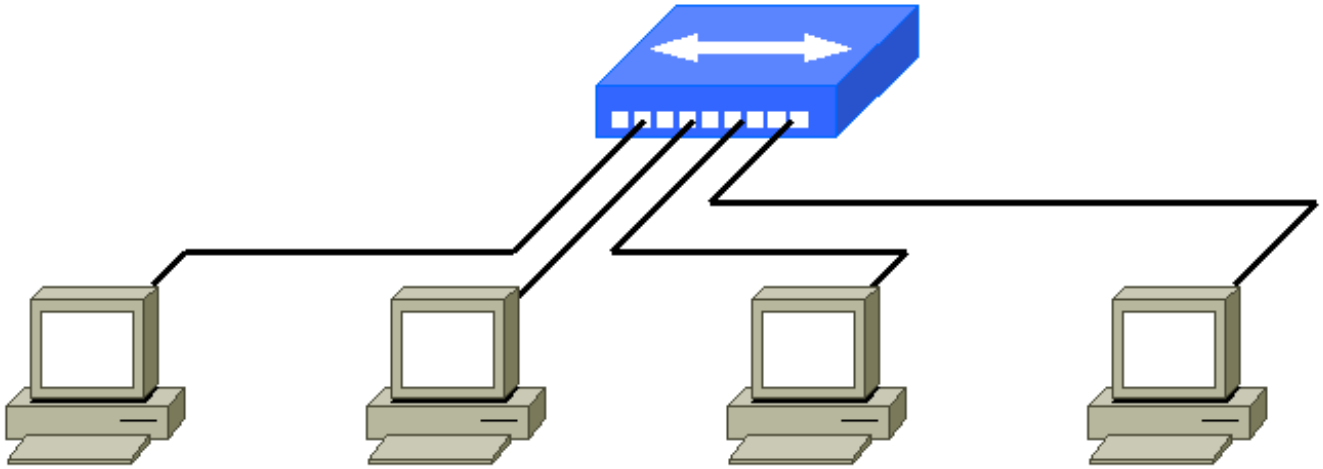
LAN Device: Repeater



- Regenerates and repeats the signal.
- Layer 1 device.

LAN Device: Hub



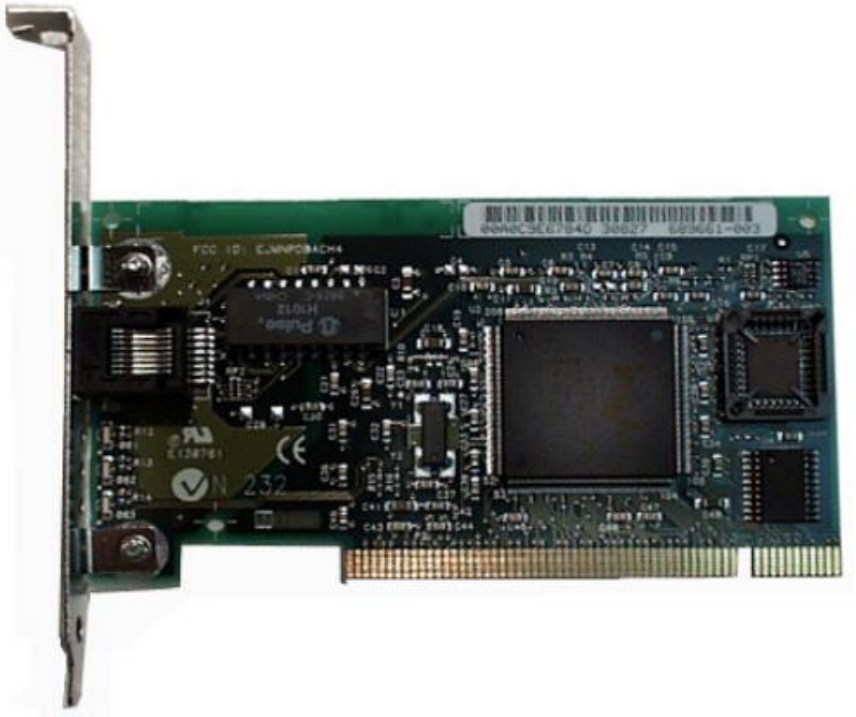


- A multi-port repeater.
- Layer 1 device.

OSI Review: Layer 2

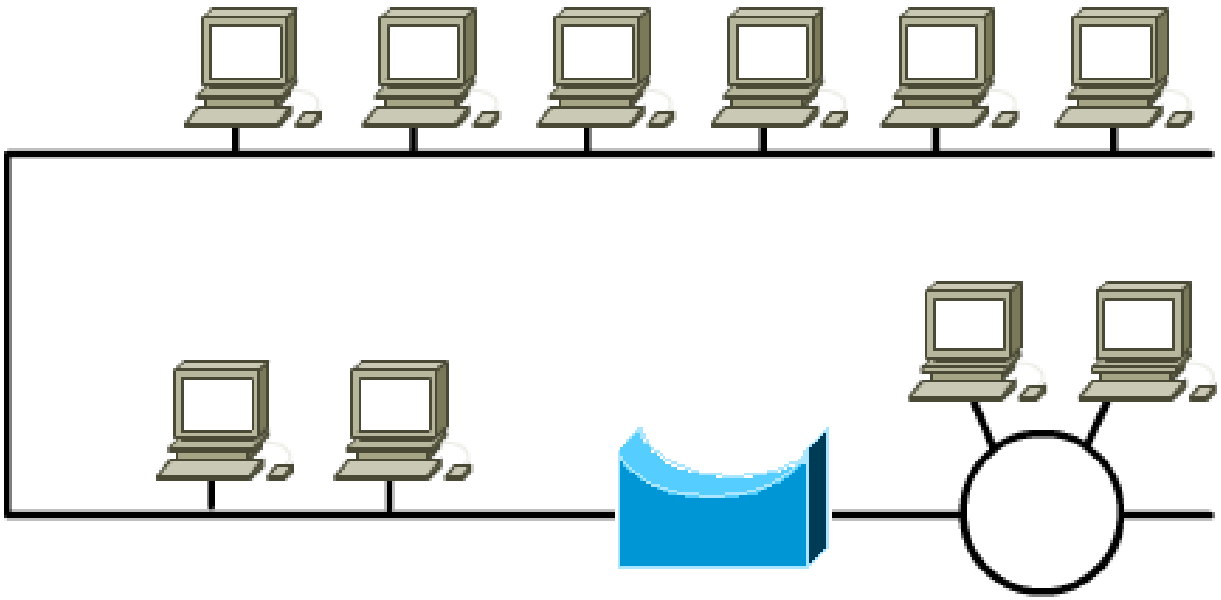
- **Responsibility:**
  - Provides for the reliable transfer of data cross a physical link.
- **Concerned:**
  - Frames.
  - Physical address (HW or MAC): Flat.
  - Line discipline.
  - Error and flow control.
  - "Segment".

LAN Device: NIC



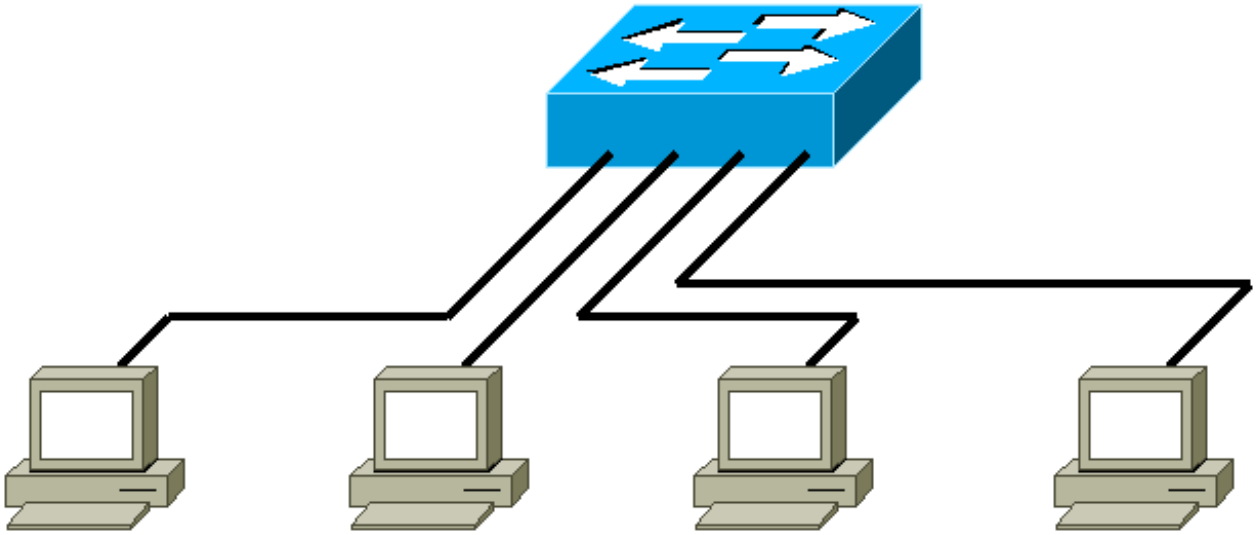
- Network interface of hosts.
- Build-in physical address.
- Layer 2 device.

LAN Device: Bridge



- Keeps traffic local by filtering traffic based on physical addresses.
- Layer 2 device.

LAN Device: Switch

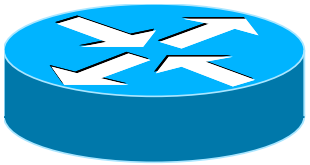


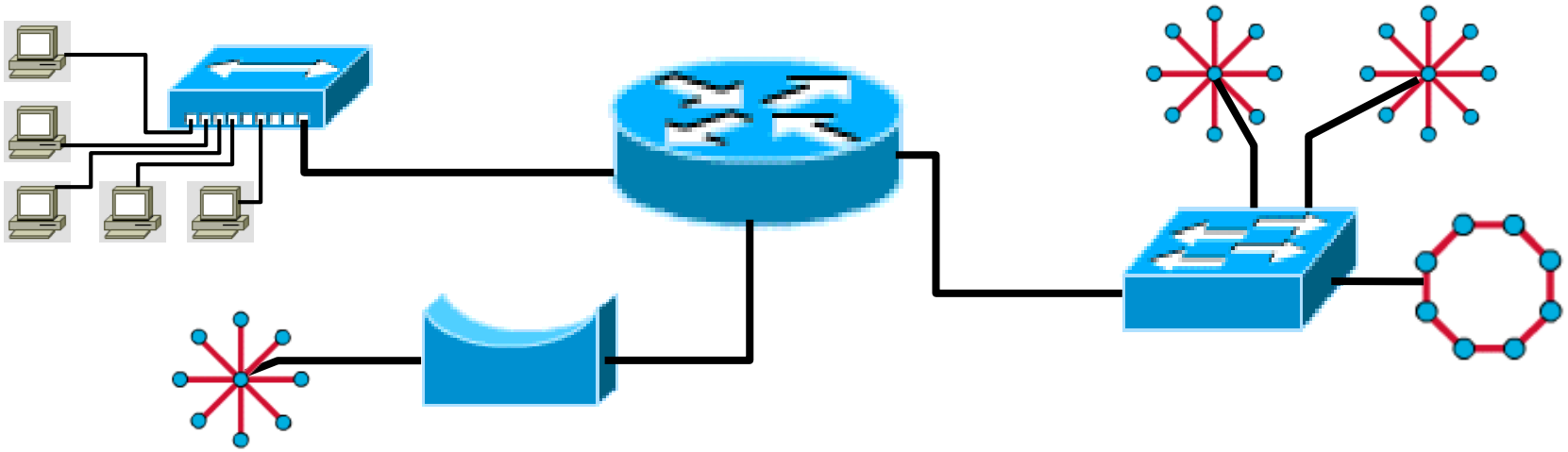
- A multi-port bridge.
- Layer 2 device.

OSI Review: Layer 3

- **Responsibility:**
  - **Connection and path selection between two end system across networks.**
- **Concerned:**
  - **Packets.**
  - **Logical address: Hierarchical.**
    - **Networks and Hosts addressing.**
  - **Route , Routing table, Routing protocol.**
  - **“Network”.**

LAN Device: Router



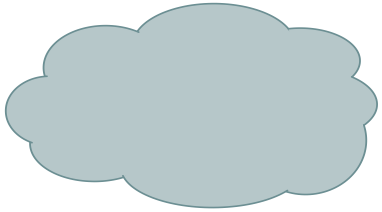


- **Makes decisions based on network addresses (logical addresses).**
- **Layer 3 device.**

LAN Device: Router Functions

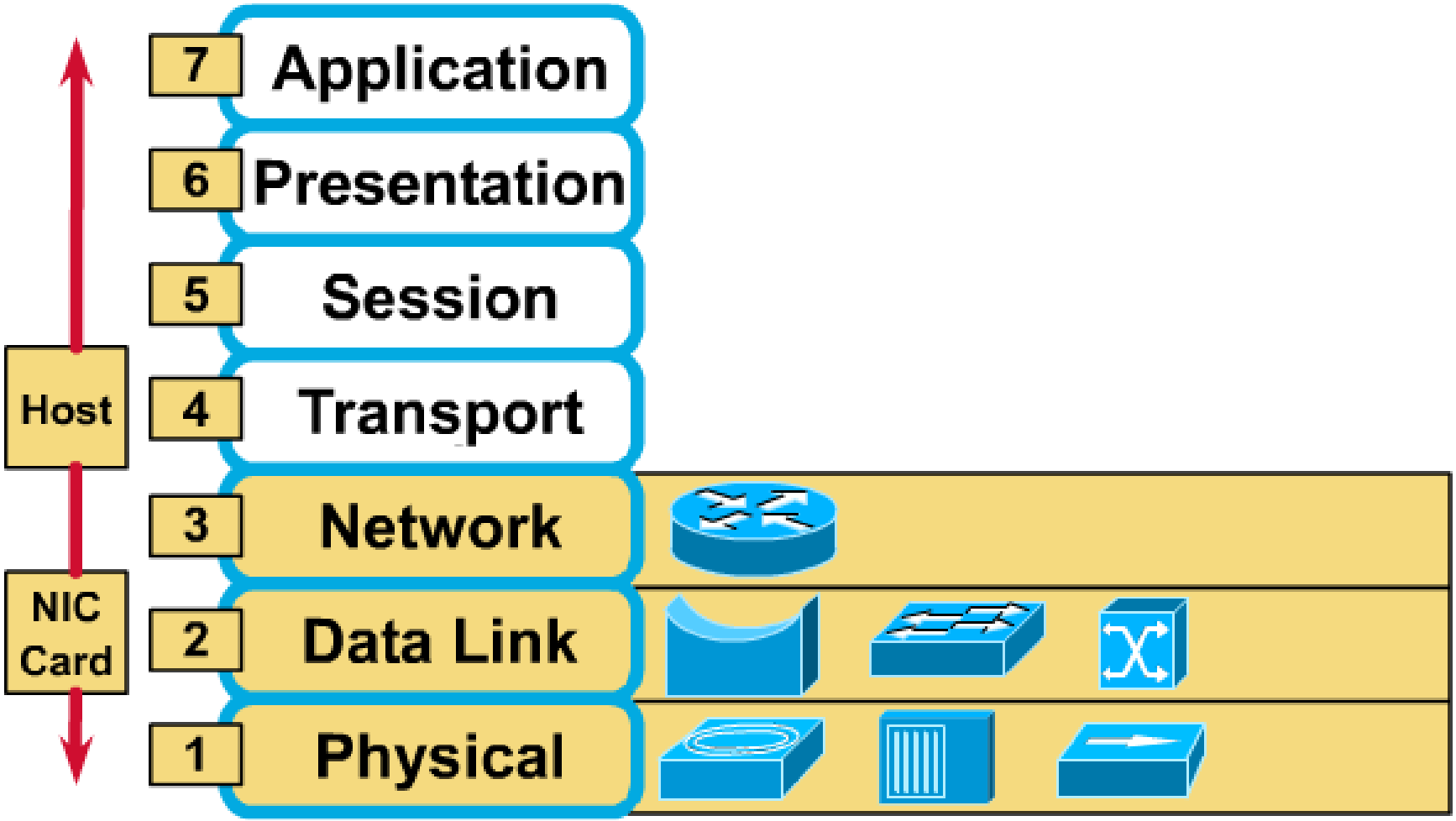
- **Path determination**:
  - The process of evaluating a packet's destination IP address so that the router can decide which port to send out the packet.
- **Packet switching**:
  - The router re-encapsulates the packet in the protocol needed for the specified port and then switches the packet out that port.

LAN Device: Cloud

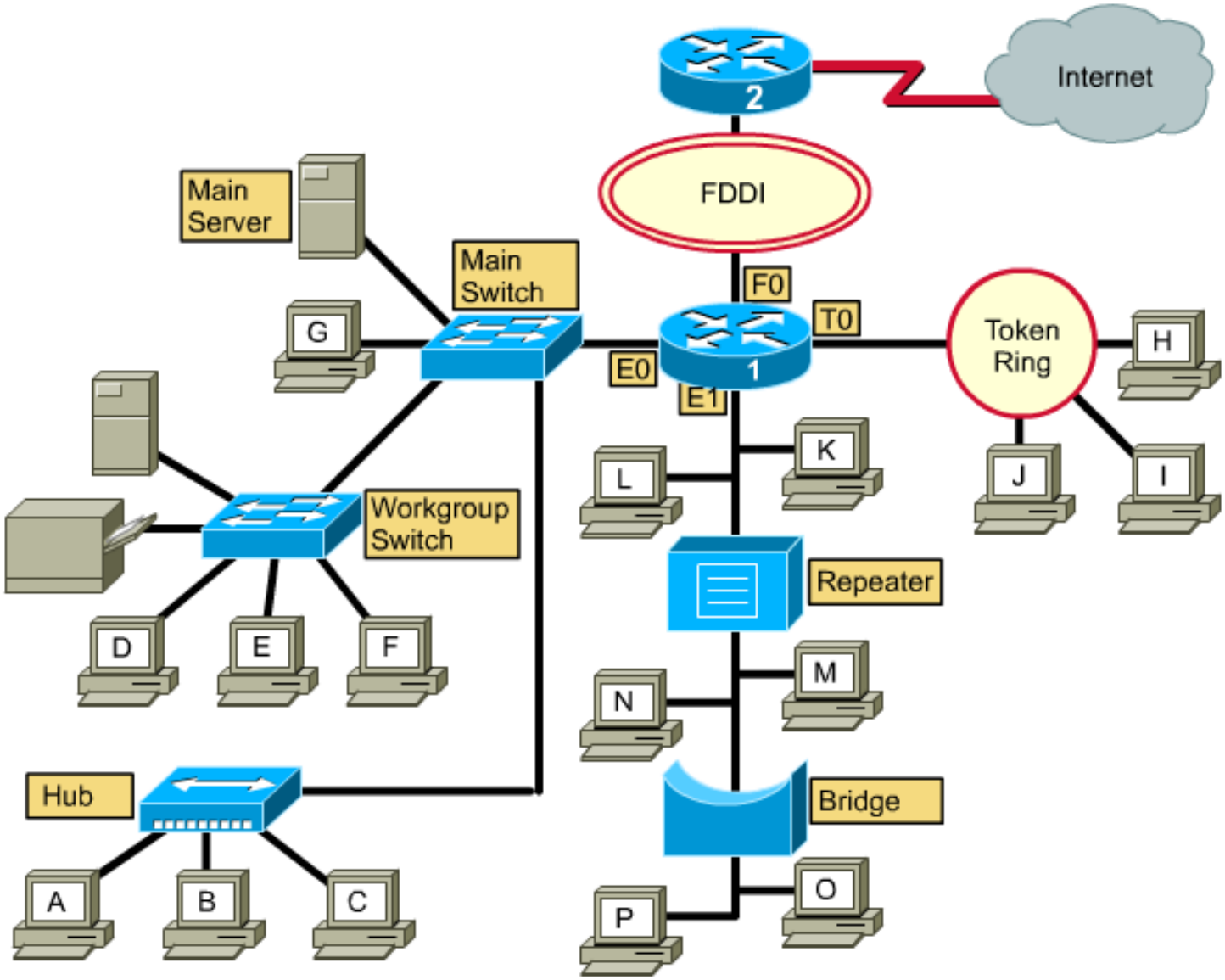


- Another network
- Include layer 1 – 7 devices

Devices function at Layers

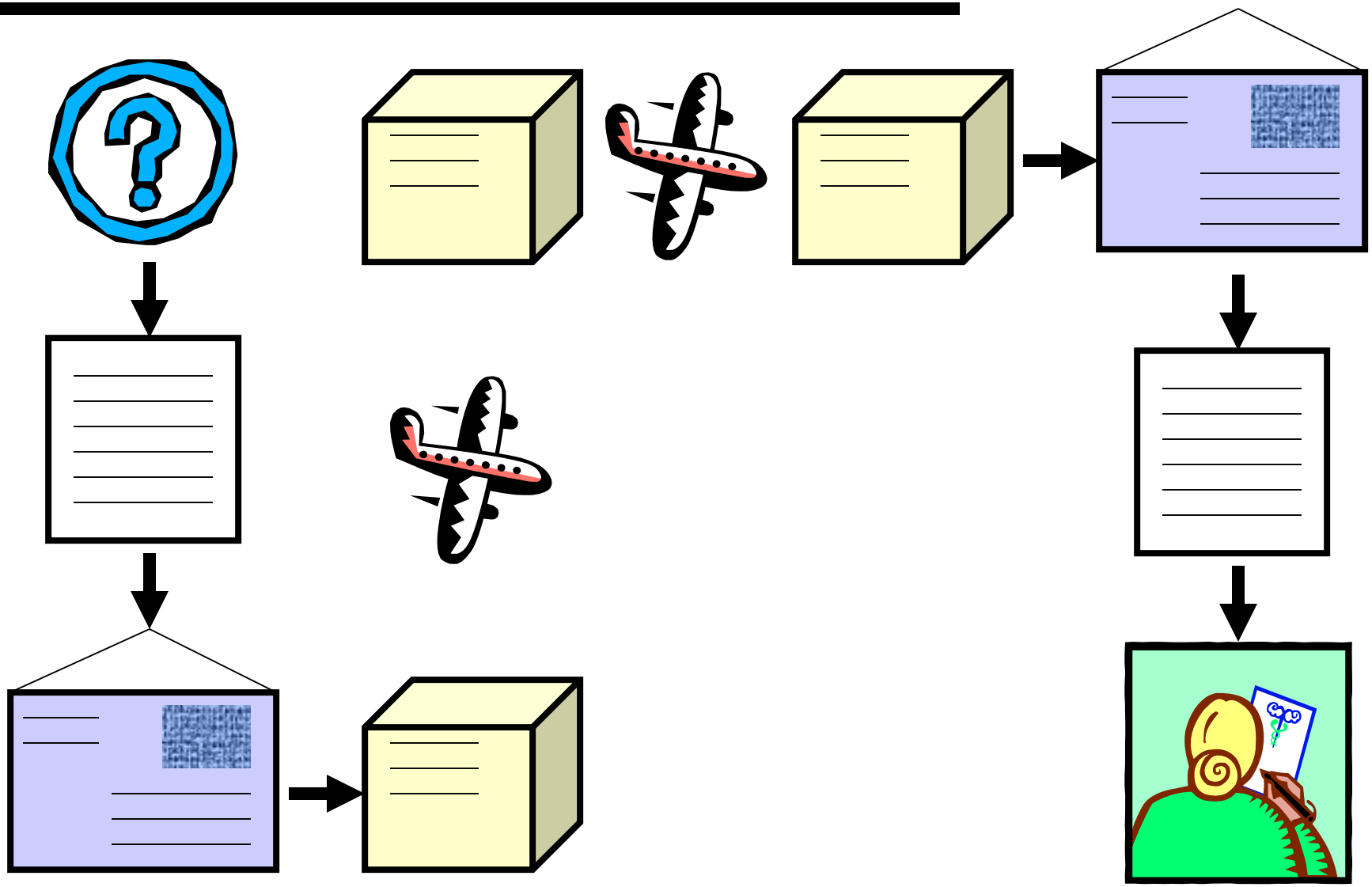


Teaching Topology

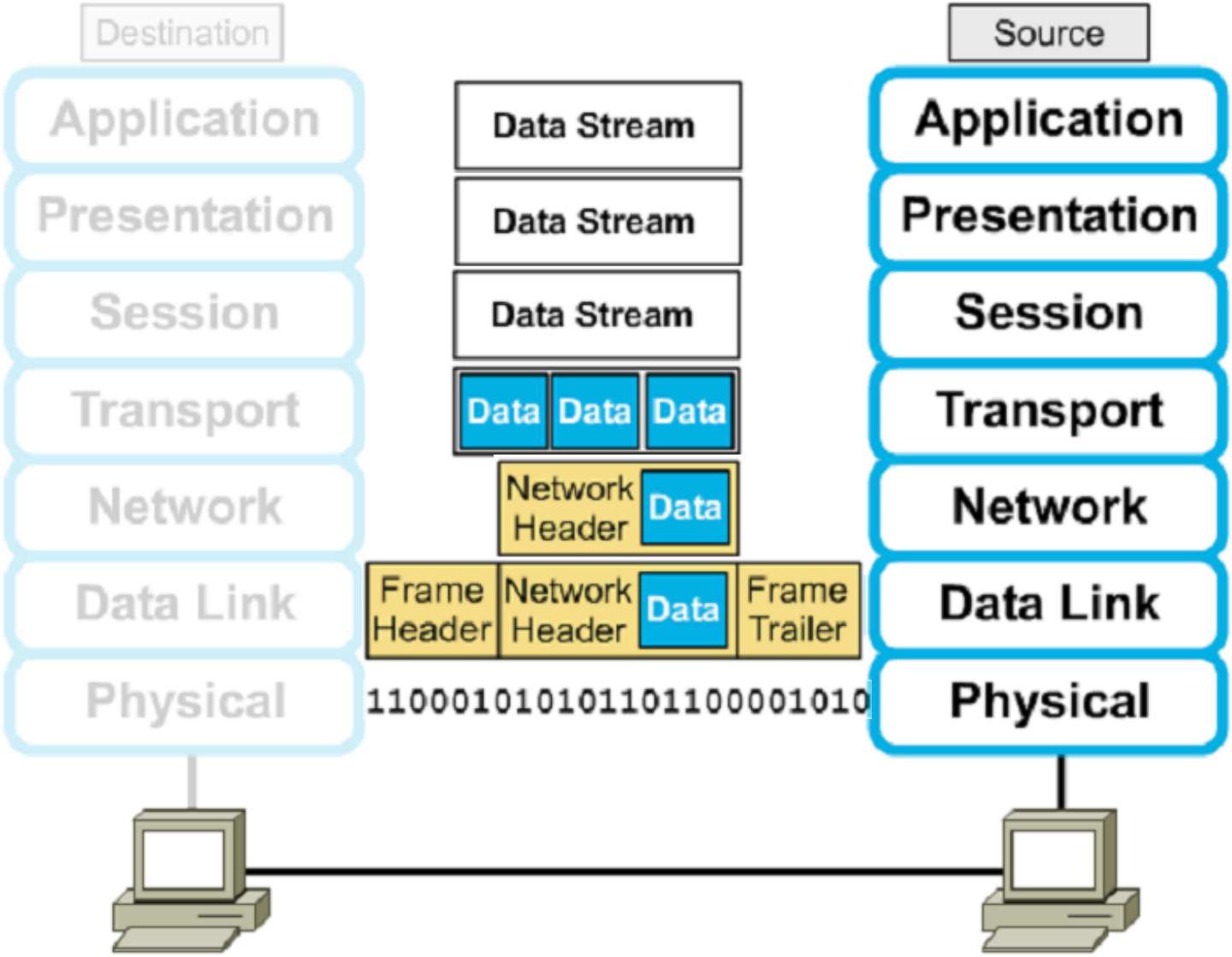


DATA FLOW THROUGH LANs

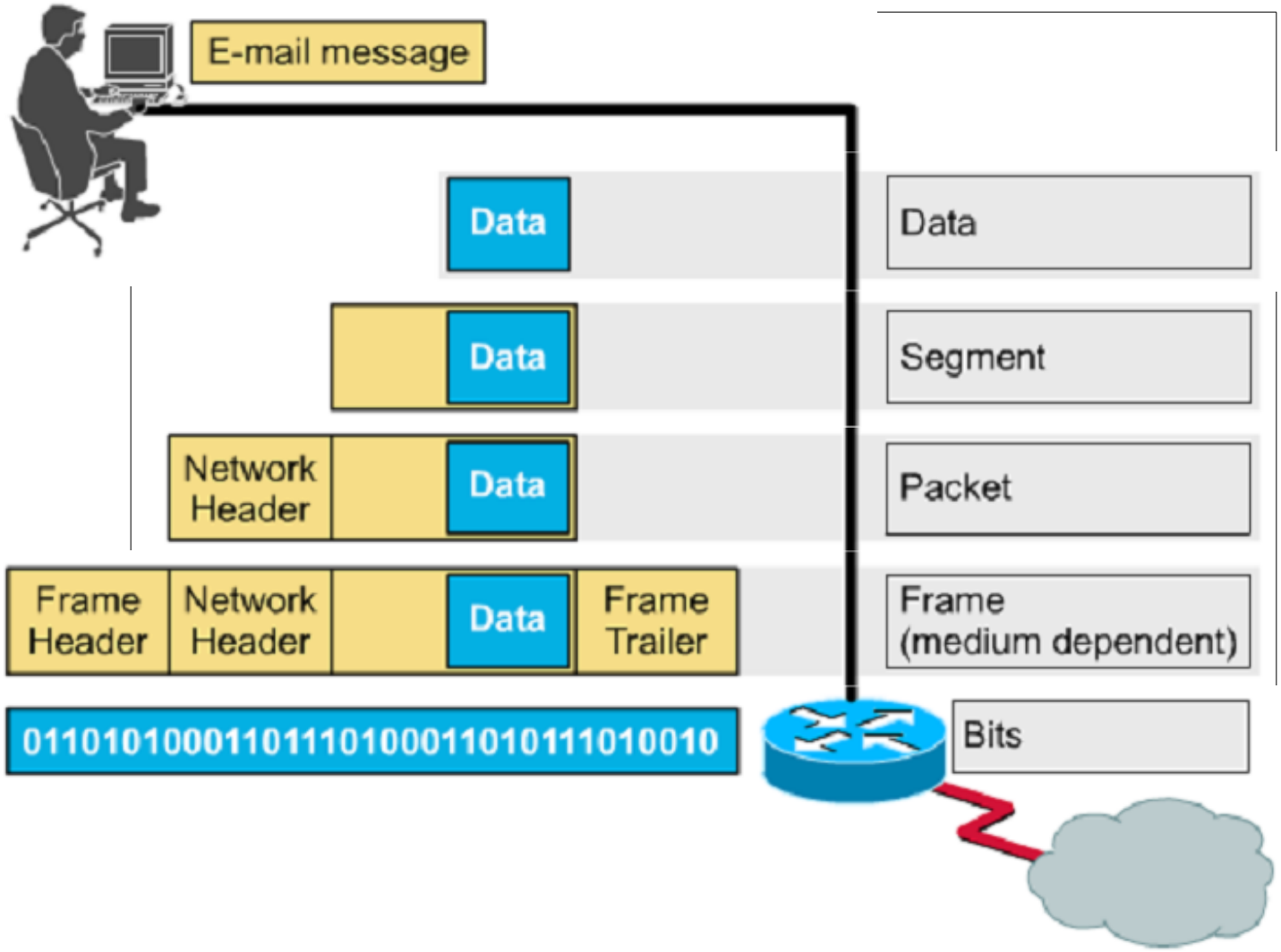
Air Mail Example



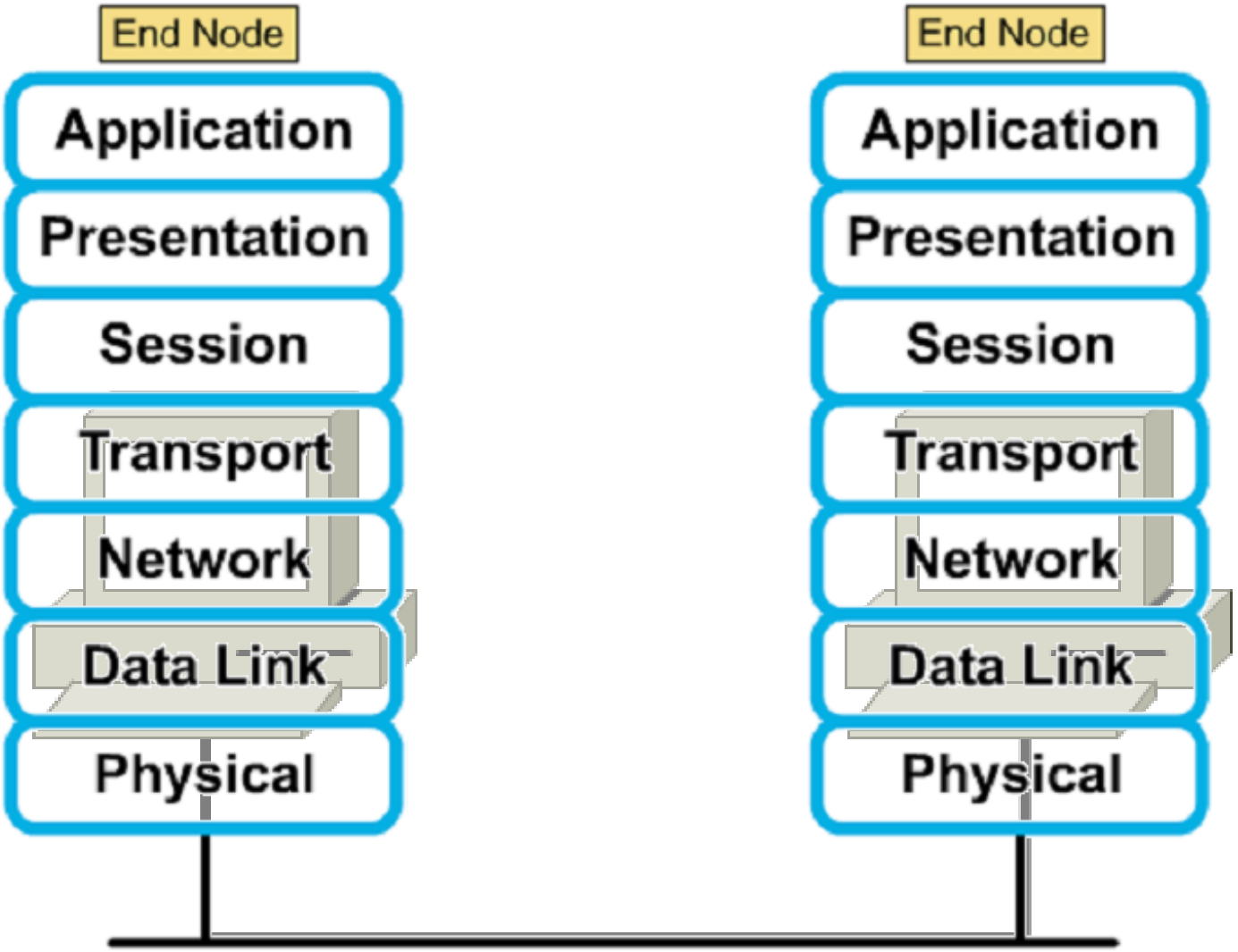
Encapsulation



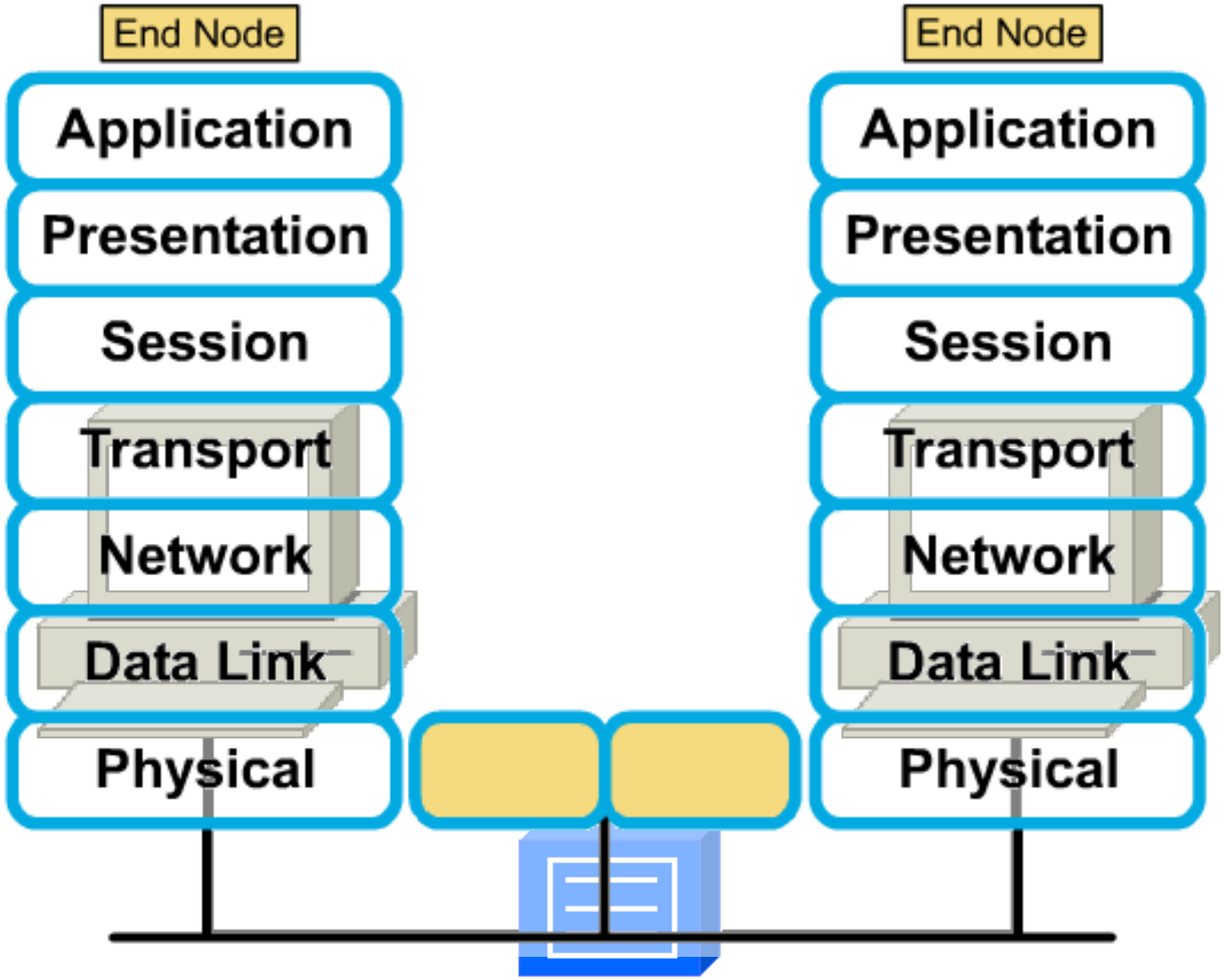
Encapsulation: Example



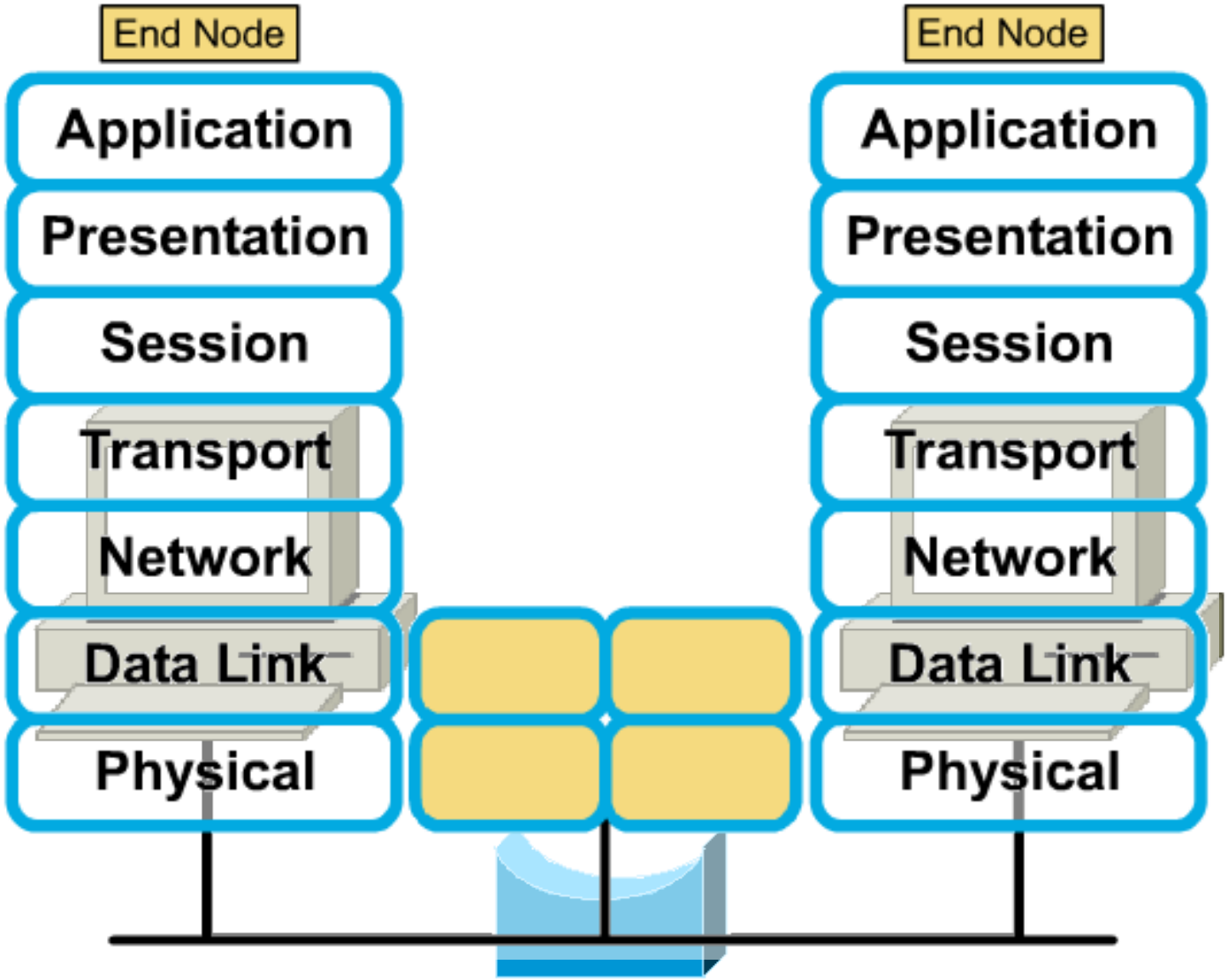
Host to host communication



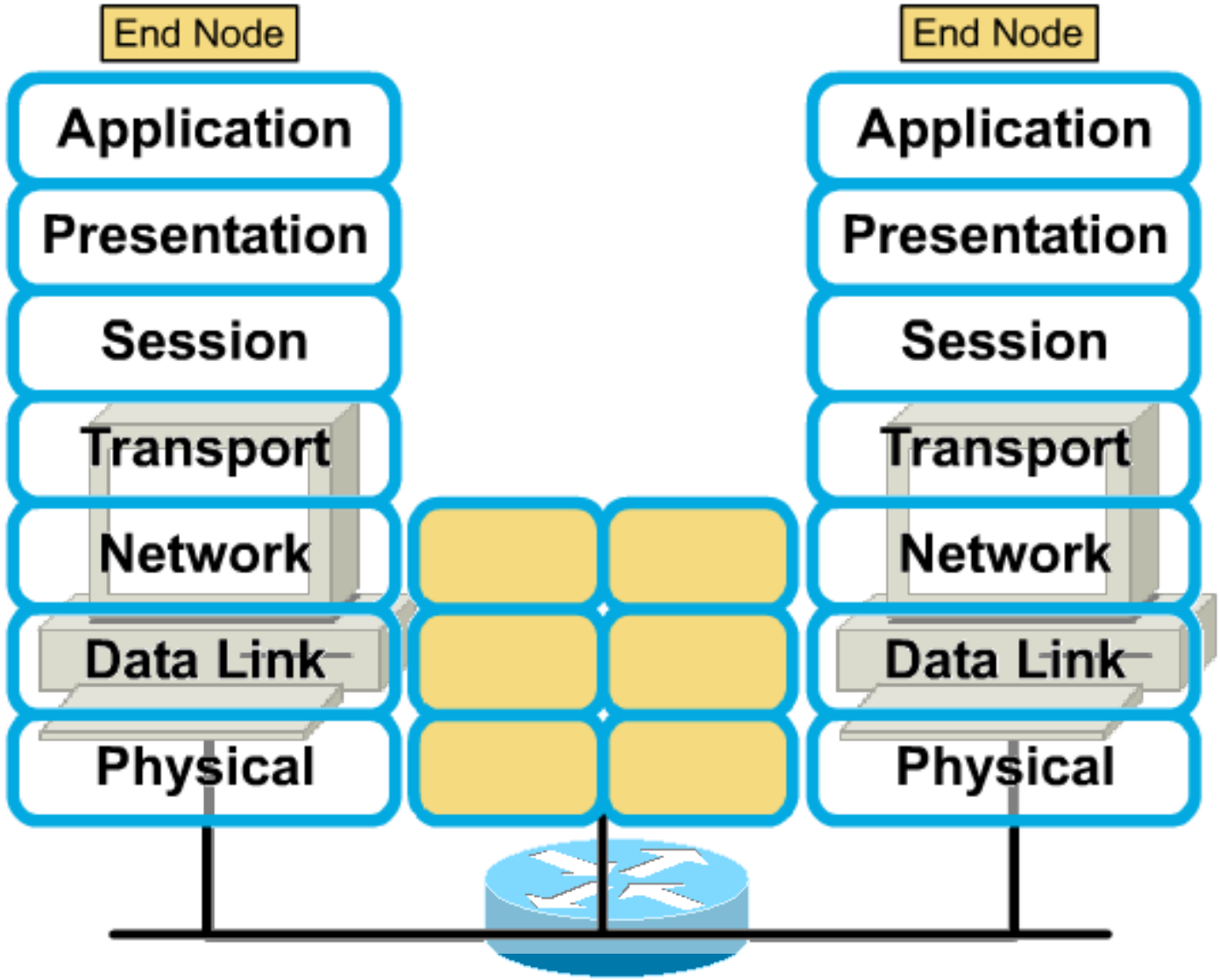
Packet Flow: Layer 1 Device



Packet Flow: Layer 2 Device



Packet Flow: Layer 3 Device



Packet Flow: Layer 1-7 Device