Network Reading Group

OSI Reference Model -- The ISO Model of Architecture for Open Systems Interconnection

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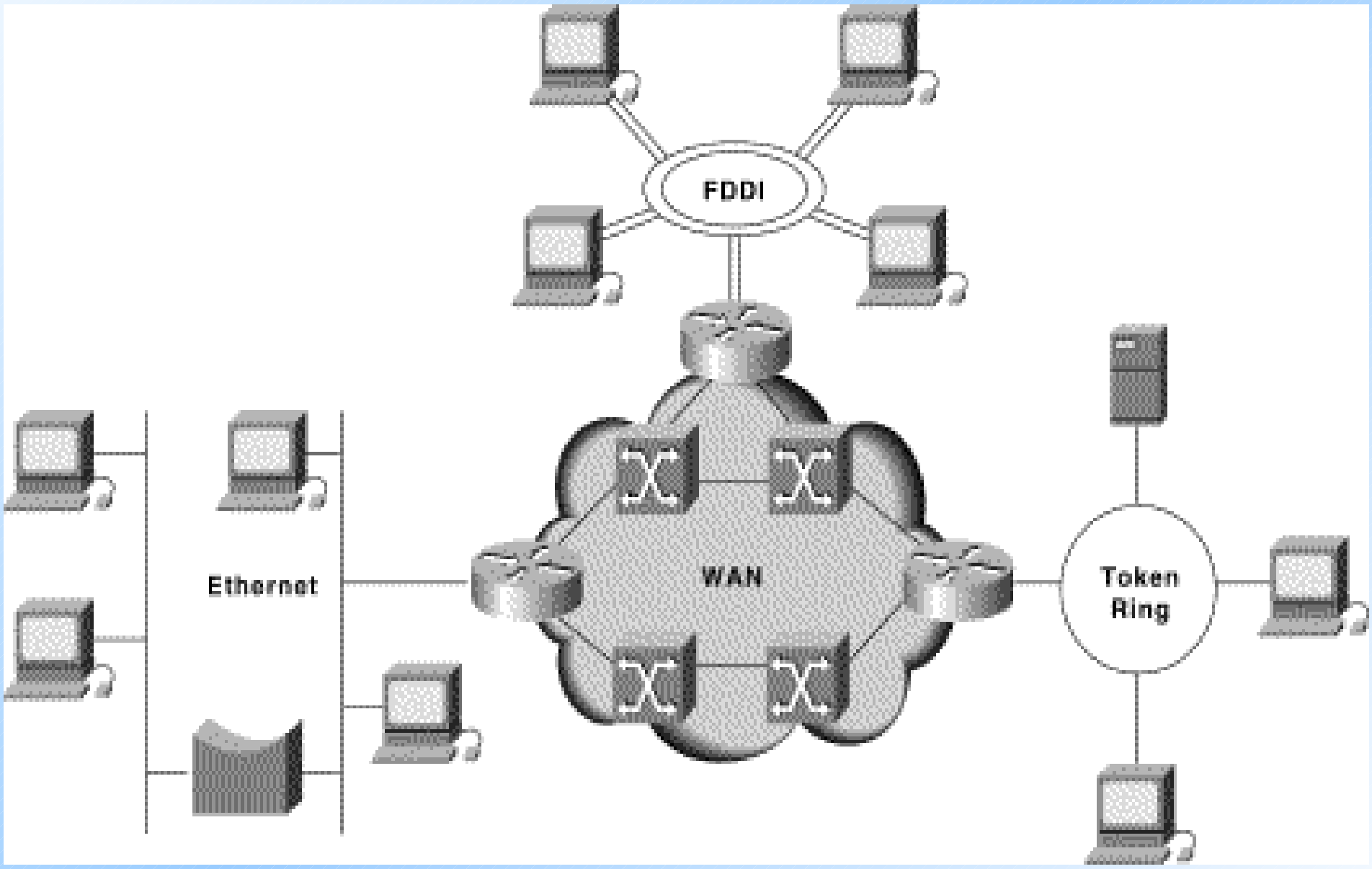
http://home.iitk.ac.in/~chebrolu/net-read.html

Recap

- What is Internet?
- What concept is behind Internet?
- Importance of Datagram Service

Interconnection Architecture



Interconnection Architecture

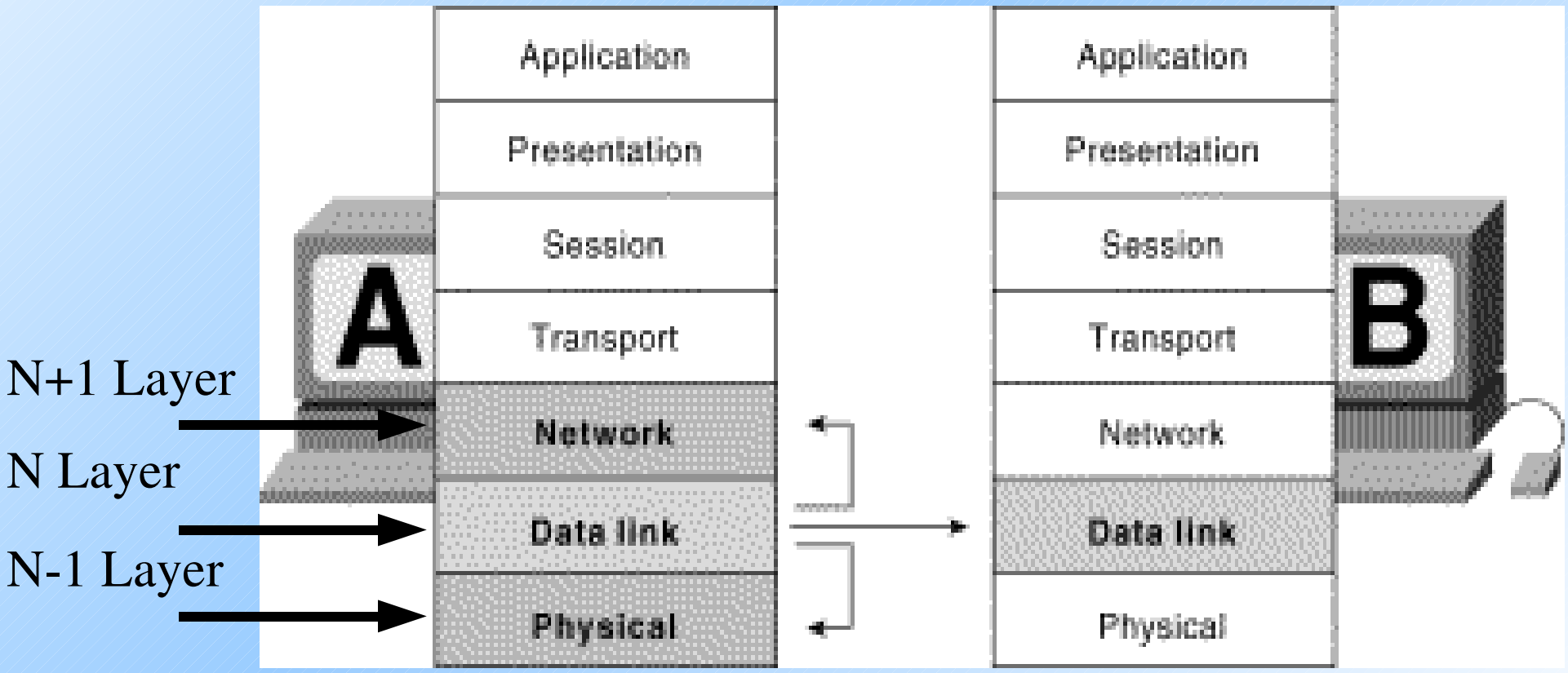
- 1977, ISO recognized universal need for interconnecting systems from different manufacturers
- Standardize rules of interaction between interconnected systems
- External behavior of systems must conform to OSI Architecture
- Internal organization and functioning of each individual systems is out of scope of OSI standards

Underlying Concept: Layering

- *"Layering is a structuring technique which permits the networks to be viewed as logically composed of a succession of layers, each wrapping the lower layers and isolating them from the higher layers"*
- Divide the task involved in moving information between systems into smaller, more manageable tasks (Layers)
- Each layer adds value to services provided by lower layers

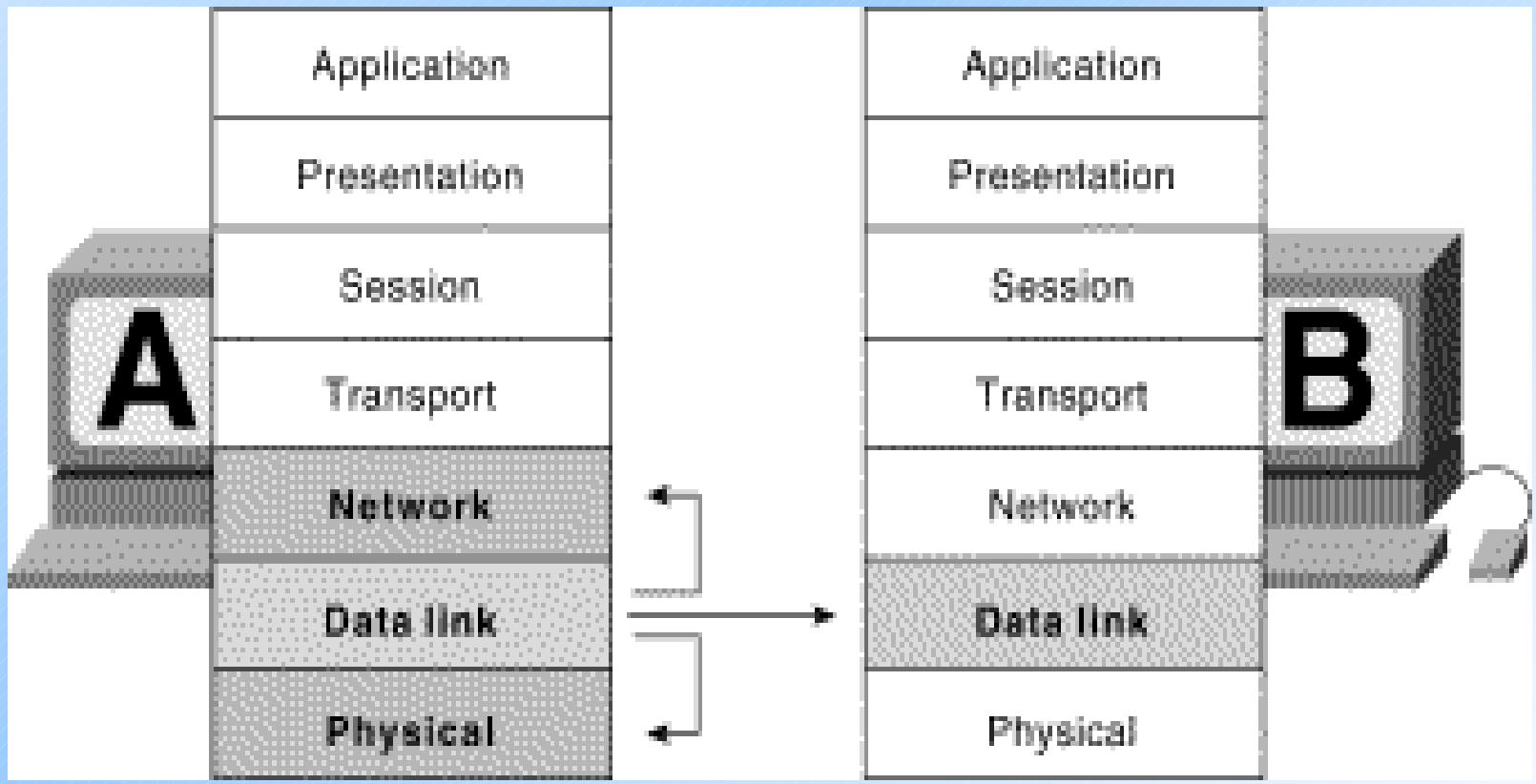
Layering

- Each Layer is self contained
  - Can be implemented independently
  - Solutions offered by a layer can be updated without affecting higher layers



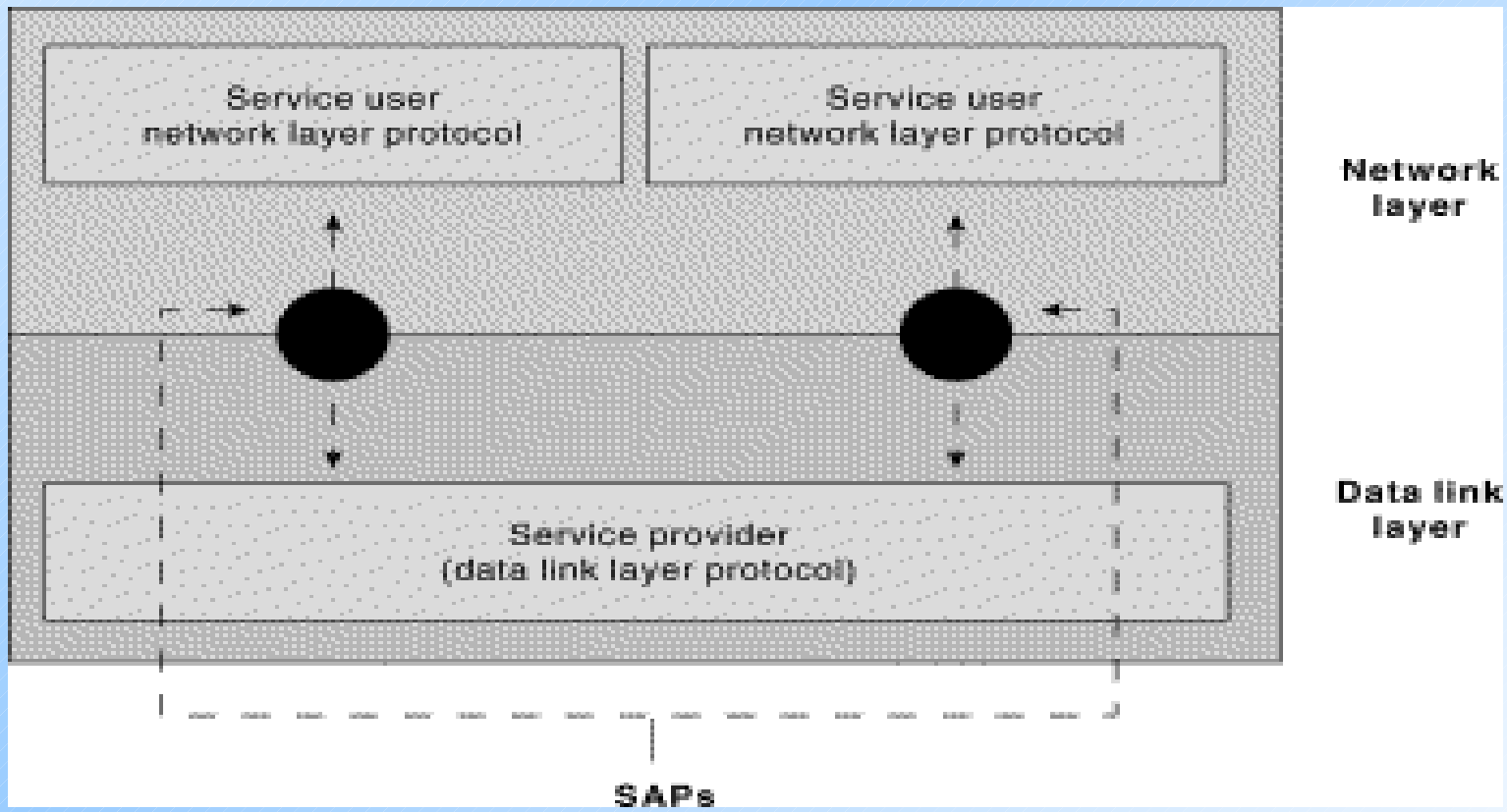
Interaction between OSI Layers

- Each layer communicates with 3 others
  - The layer below
  - The layer above
  - Its peer layer in the other computer system



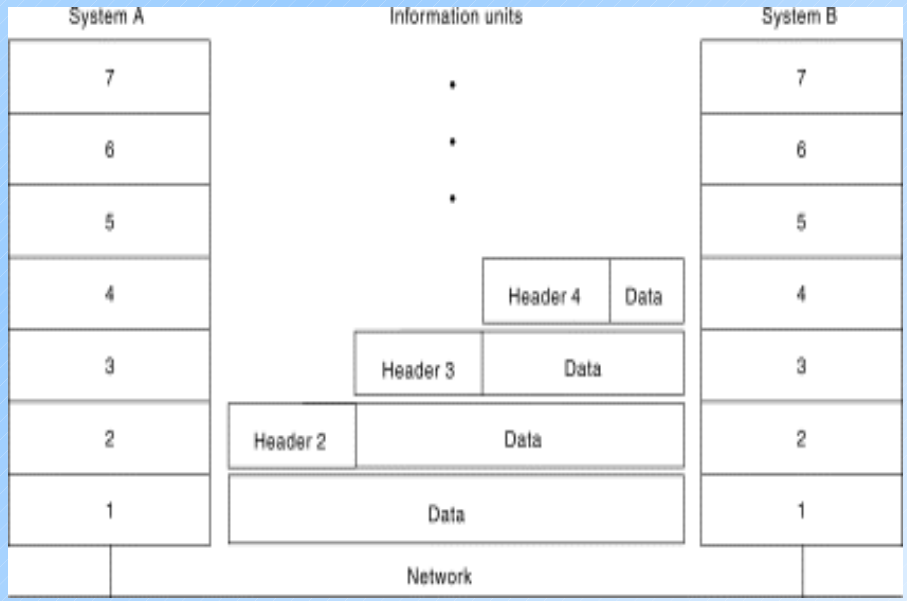
Layer Service

- Services provided by adjacent layer help a given layer to communicate with its peer
  - Service user requests service from adjacent layer
  - Service provider provides service to service user



Information Exchange

- Layers use control information to communicate with peers
- Control information takes two forms
  - Headers (prepended to data from upper layers)
  - Trailers (appended to data from upper layers)
- Encapsulation: A data portion at a given layer may contain headers/trailers of higher layers



Application Layer

- Closest to the end user
- Functions include identifying communication partner, determining resources and synchronizing the communication
- Examples: FTP, Telnet, SMTP (email)

Presentation Layer

- Provides a set of services to help application layer to interpret the meaning of data exchanged
- Examples include data compression, data encryption, data representation (jpeg, gif etc)

Session Layer

- Session Layer establishes, manages and terminates communication sessions
- Examples: Zone Information Protocol (ZIP), Session Control Protocol (SCP)

Transport layer

- Provides transparent data transfer between entities.
  - Responsible for delivering data error-free and in sequence
  - Employs flow control, error checking, retransmissions
- Examples: TCP, UDP

Network Layer

- Provides functional and procedural means to exchange data units between two transport entities.
  - Defines network address
  - Routers use this layer to determine how to forward packets
- Example implementation: IP

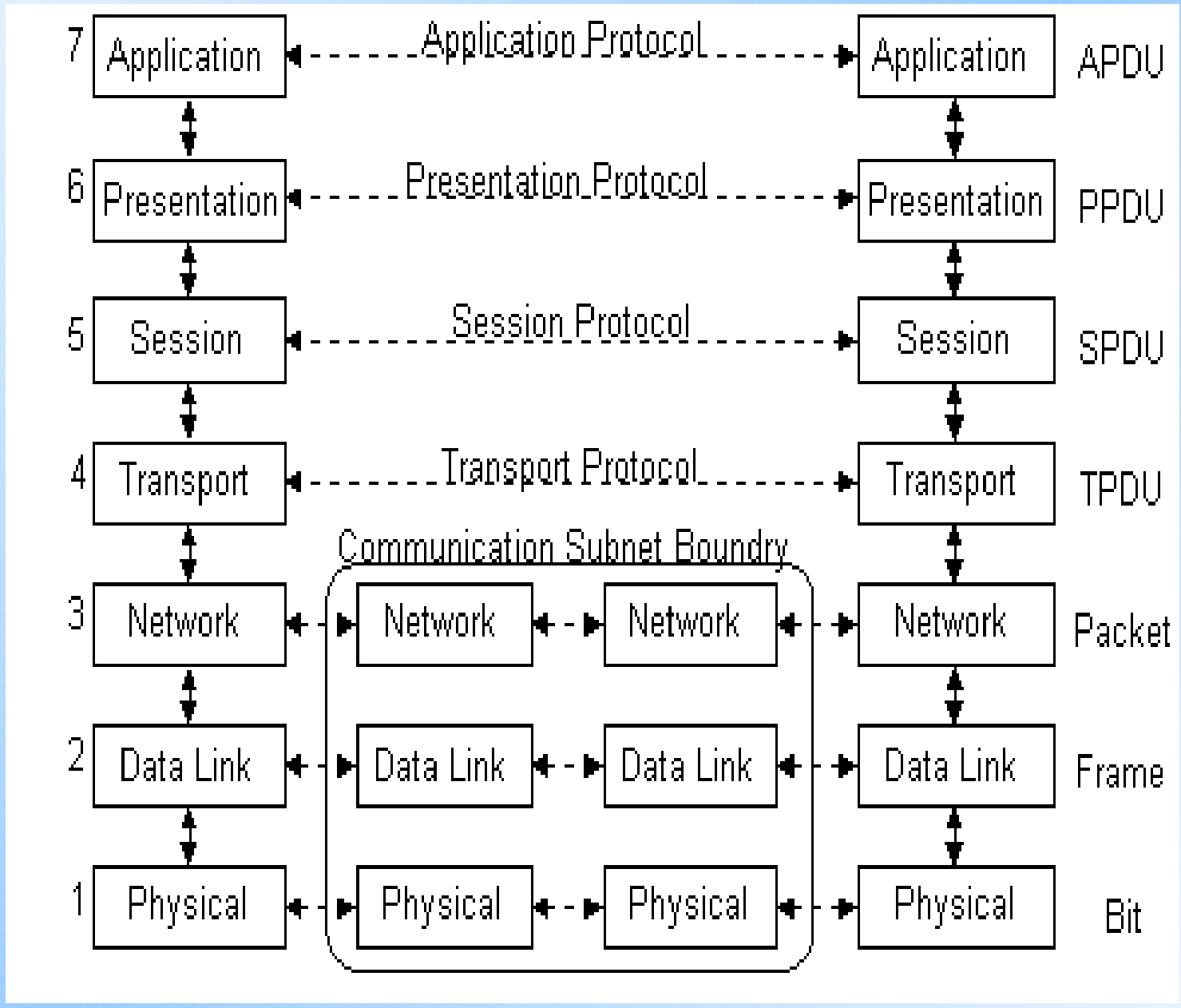
Data Link Layer

- Provides reliable transit of data across a “physical” network link
- Divided into LLC (Logical Link Control) and MAC (Media Access Control)
- MAC provides protocol access to the “physical” media
- Example: CSMA/CD

Physical Layer

- Provides mechanical, electrical, functional and procedural characteristics to establish, maintain and release physical connections
  - Voltage levels, Timings of voltage changes, transmission rates
- Physical layer implementation can be Ethernet, Token Ring, X.21

Example Operation



Next Meeting

End-to-end Arguments in System Design"

Marc J. Saltzer, D. Reed, and D. Clark

March 8th, 2005

(Tue: 5.30pm- 6.30pm)