

Layered Networks

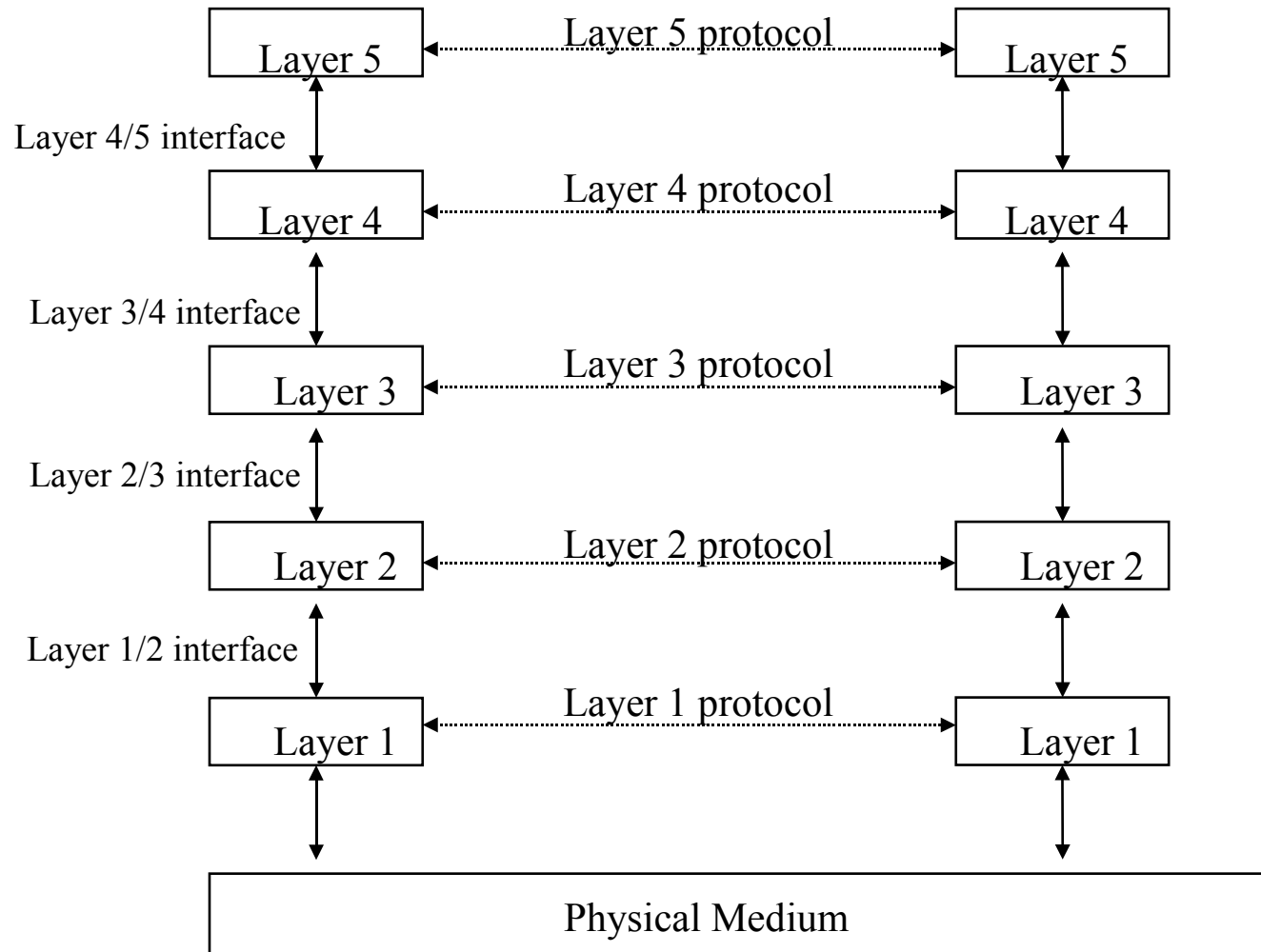
Network Design

- Networks are organised as stack of layers, built one above other
- Function of each layer is different
- Each layer provides services to higher layer
- Lower layers hide lower details from upper layers

Why a Layered Network Model?

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

Protocols and Interfaces



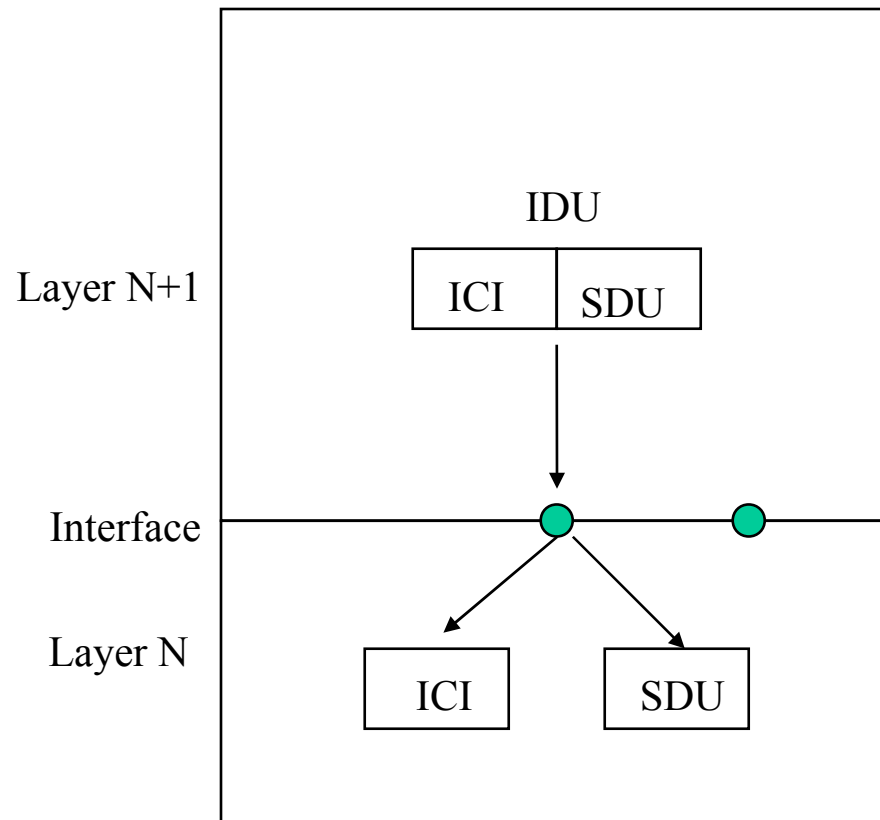
Terminology

- Peers
- Protocol
- Interface
- Virtual communication
- Real communication

Terminology

- Network architecture
 - Set of layers and protocols
 - Implementation details and interface specifications are hidden and may be different
- Protocol stack
 - List of protocol used by a system

Interface



IDU = Interface Data Unit

SDU = Service Data Unit

ICI = Interface Control Information

SAP = Service Access Point

Design Issues of Layers

- Identify sender and receiver
 - Multiple machines
 - Multiple processes
 - Addressing

Design Issues of Layers

- Rules of data transfer
 - Simplex
 - Duplex
 - Number of logical channels
 - Separate channels for separate purpose
 - ❖ Data
 - ❖ Control information

Design Issues of Layers

- Error control
 - Error detection code
 - Error correction code
 - Notification of error

Design Issues of Layers

- Order of messages
 - In sequence
 - Out of sequence
 - Numbering
 - Reassembly

Design Issues of Layers

- Flow control
 - Protecting slow receiver from a fast sender
 - Pre-decided transmission rate
 - Feedback from receiver
 - Situation analysis by sender

Design Issues of Layers

- Size of message
 - Unrestricted size
 - Restriction on size
 - Disassembly and reassembly
 - Impact of overheads on transmission efficiency

Design Issues of Layers

- Multiplexing
 - De-multiplexing
 - Utilisation of common resources
 - Physical layer multiplexing
 - Logical channel multiplexing
 - ❖ Tunnels

Design Issues of Layers

- Path selection
 - Multiple paths
 - Routing
 - Cost of path
 - Quality of path
 - Security concerns

Layered Models

- OSI
- TCP/IP
- IBM SNA
- DECNet