Panel 1

OST - Open Systems Interconnection Model

An ISO standard to abstractly model all networks
OST has 7 layers:

7. Application
6. Presentation
5. Session
4. Transport
3. Network
2. Data Link
1. Physical

Panel 2

Interface: each layer provides services to upper layer and uses services of lower layer. The interface defines how to access these services.

Peer-to-Peer Protocol: Each layer N on machine A talks virtually to layer N on machine B using the same protocol!

Key: As long as interface + protocol remain same, implement does not matter.
Panel 3

The Physical Layer

Transmitting bit streams between directly connected nodes

Worries about:
- What is a 1 (how many volts) what is a 0 (+4.5 V = 1, -4.5 V = 0)
- How long does a 1 or 0 last = transmission rate

\[
\begin{array}{c}
\text{V} \\
\uparrow 4.5 \\
\downarrow -4.5 \\
\text{equals 111011001}
\end{array}
\]

Panel 4

The Data Link Layer

Transforms physical layer into a reliable link between nodes on one network.

Framing: divides bits into groups called frames

Physical address: e.g., MAC address of sender + receiver

Flow control: mechanism to control transmit speed so as not to overwhelm node

Error control: must detect + retransmit incorrect frames

\[
\text{CRC (checksum)} \quad \text{Send} \quad \text{CRC (checksum)}
\]
Panel 5

**The Network Layer**

Source to destination delivery of packets across networks. (vs. data link - sends frames between 2 nodes)

Responsibilities:

Addressing (logical)

Routing: determine the path across the network of packets.

Panel 6

**The Transport Layer**

Source to destination delivery of cohesive messages. (a sequence of packets that belong together)

Data Link: frames between nodes

Network: packets between source/dest.

Transport: messages between source/dest.

Service point addressing (port): allows multiple progs. to use one connection on one computer

Sequencing + Reassembly:

Connection Control: connectionless or connection-oriented

Flow + Error Control: