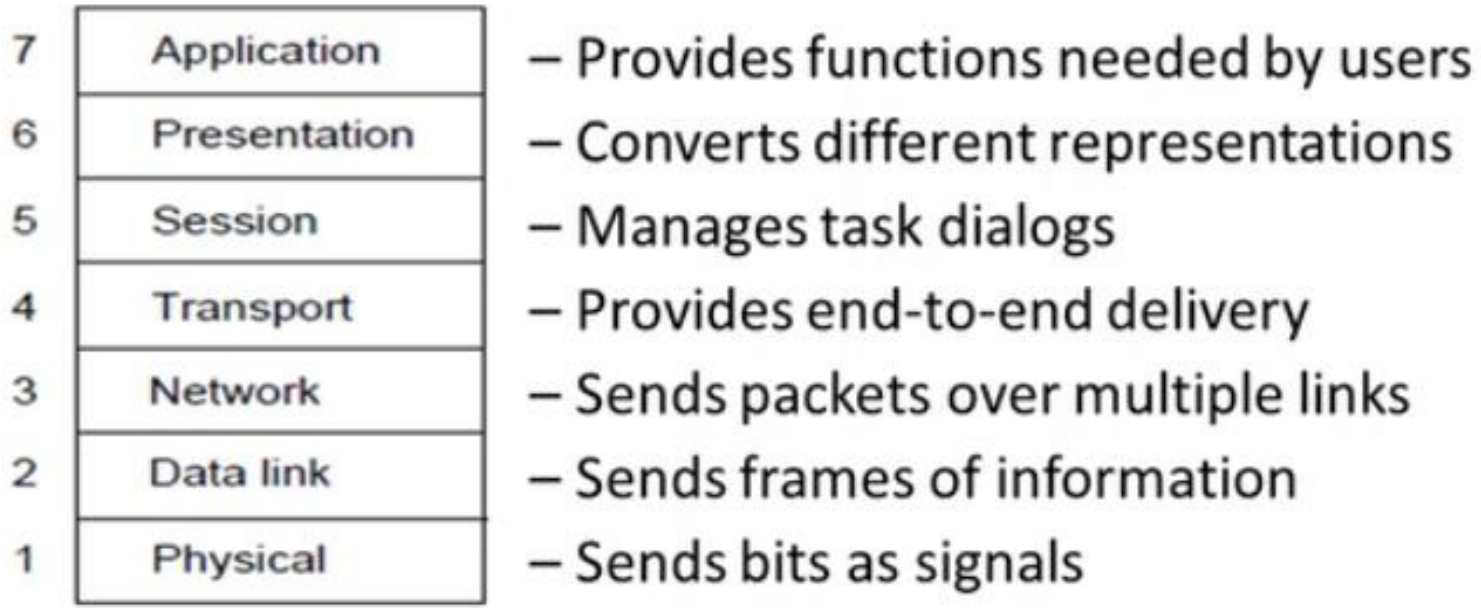
Reference Models

Overview

- What functionality should we implement at which layer?
  - This is key design question
  - Reference models provide frameworks that guide us.

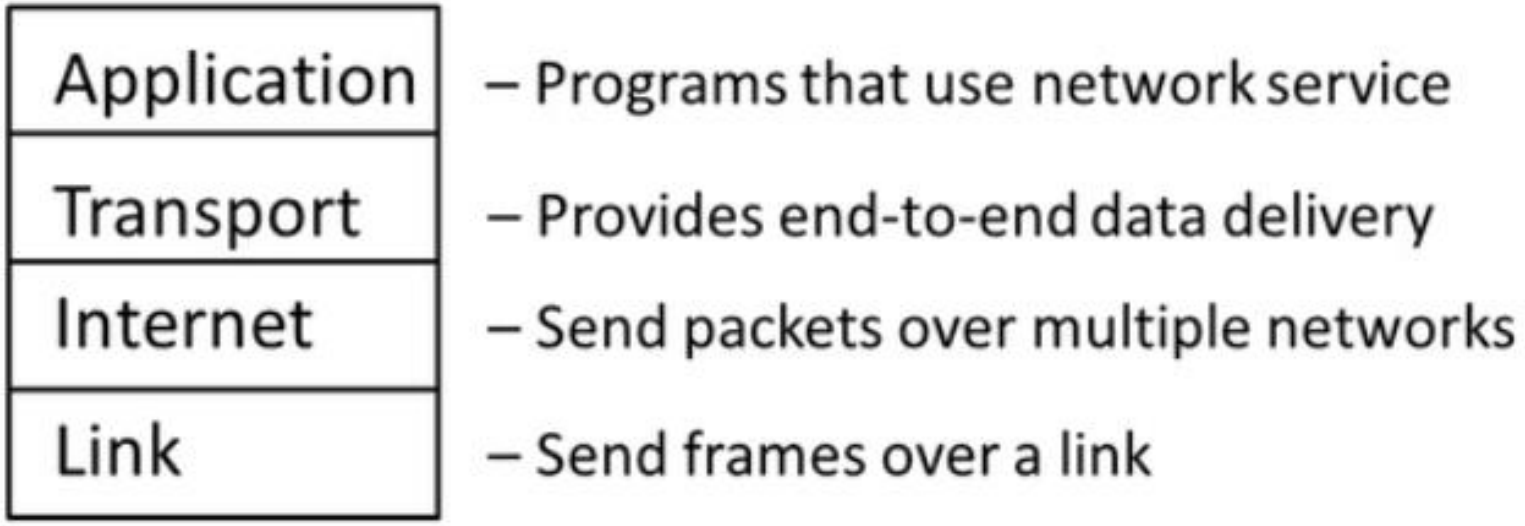
OSI “7 layer” Reference Model

- A principled, international standard, to connect systems
- Influential, but not used in practice.



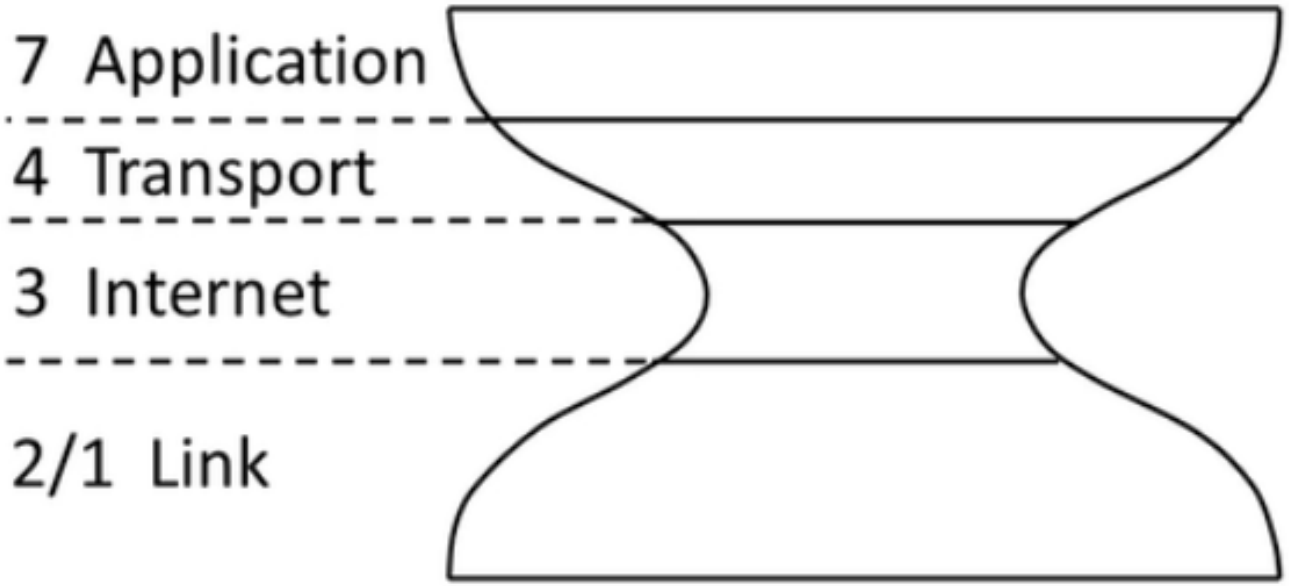
Internet Reference Model

- A four layer model based on experience; omits some OSI layers and uses IP as the network layer



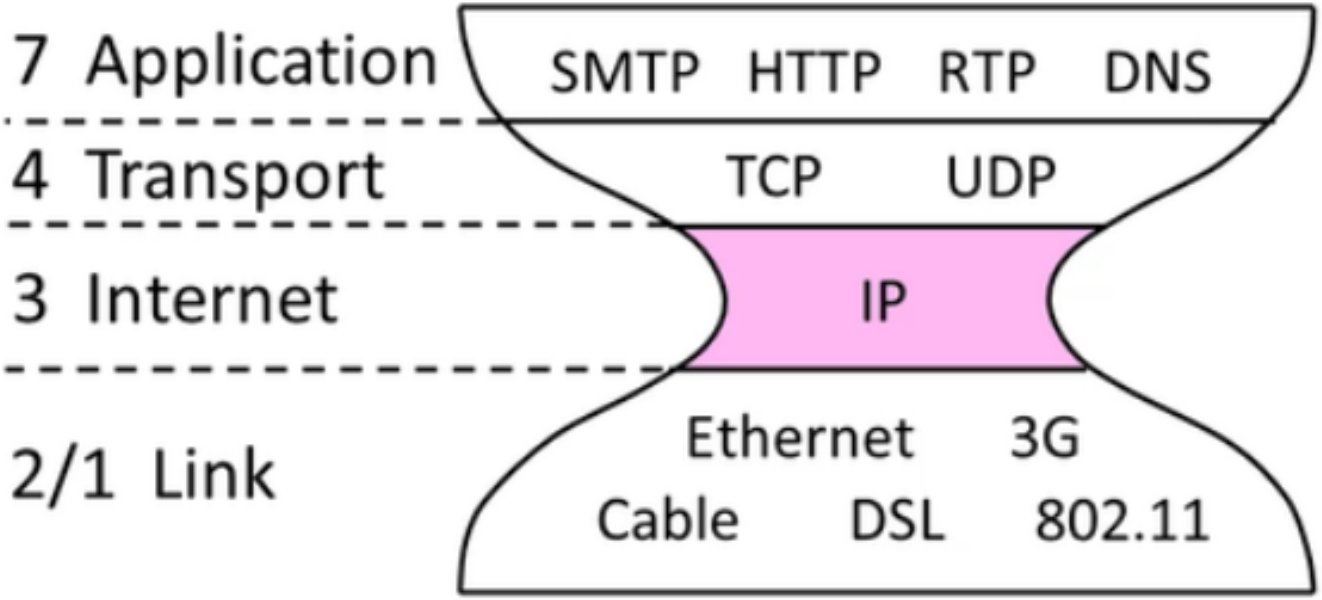
Internet Reference Model (2)

- With examples of common protocols in each layer



Internet Reference Model (3)

- IP is the "narrow waist" of the internet
- Supports many different links below and apps above



Standard Bodies

- Where all the protocols come from!
- Focus is on interoperability

Body	Area	Examples
ITU	Telecom	G.992, ADSL H.264, MPEG4
IEEE	Communications	802.3, Ethernet 802.11, WiFi
IETF	Internet	RFC 2616, HTTP/1.1 RFC 1034/1035, DNS
W3C	Web	HTML5 standard CSS standard

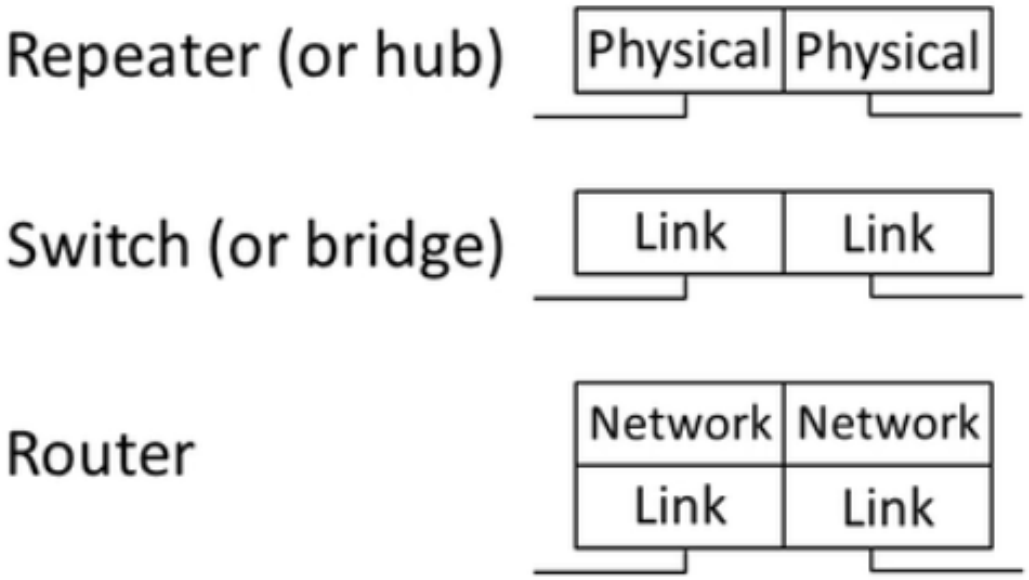
Layer-based Names

- For units of data:

Layer	Unit of Data
Application	Message
Transport	Segment
Network	Packet
Link	Frame
Physical	Bit

Layer-based Names (2)

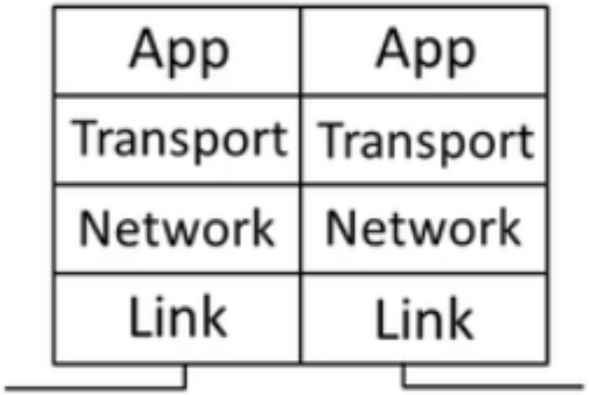
- For devices in the network:



Layer-based Names (2)

- For devices in the network:

Proxy or
middlebox
or gateway



But they all
look like this!

A Note About Layers

- They are guidelines, not strict
  - May have multiple protocols working together in one layer
  - Maybe difficult to assign a specific protocol to a layer