

# Computer Networks

## Reference Models (§1.4, §1.6)





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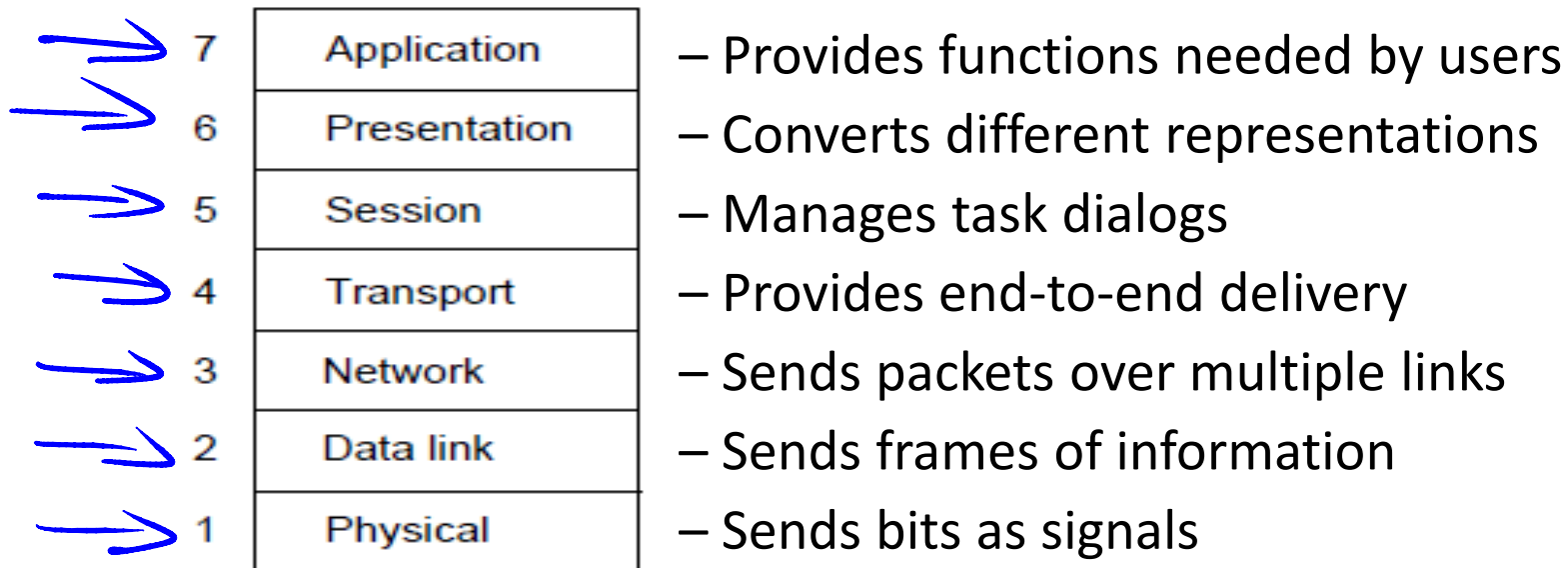
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# A Little Guidance Please ...

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

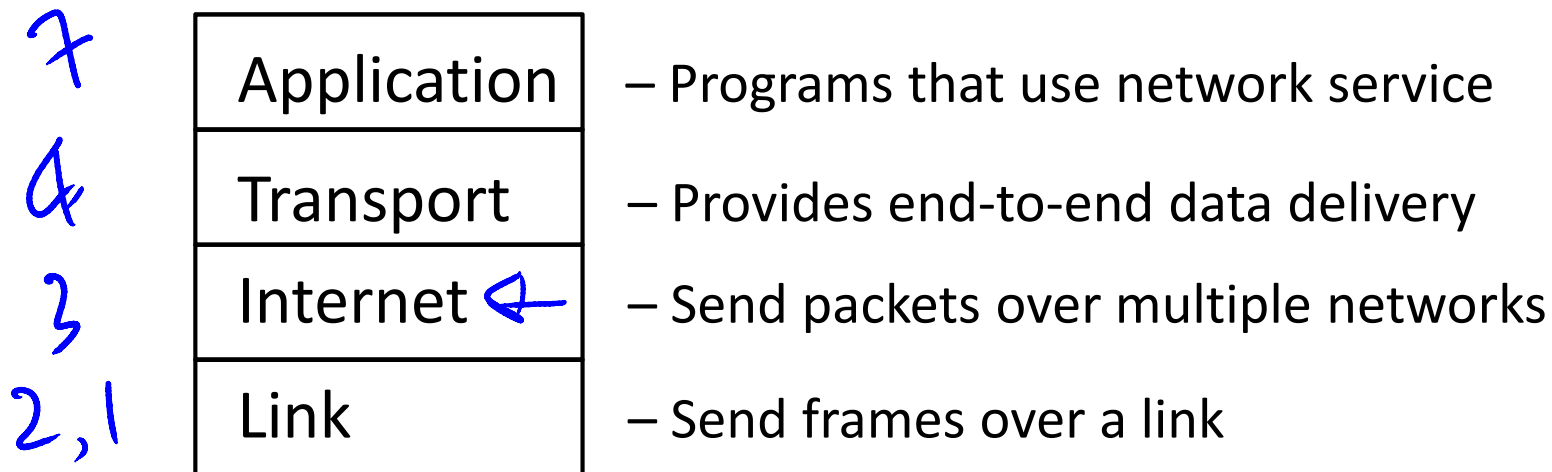
# OSI “7 layer” Reference Model

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



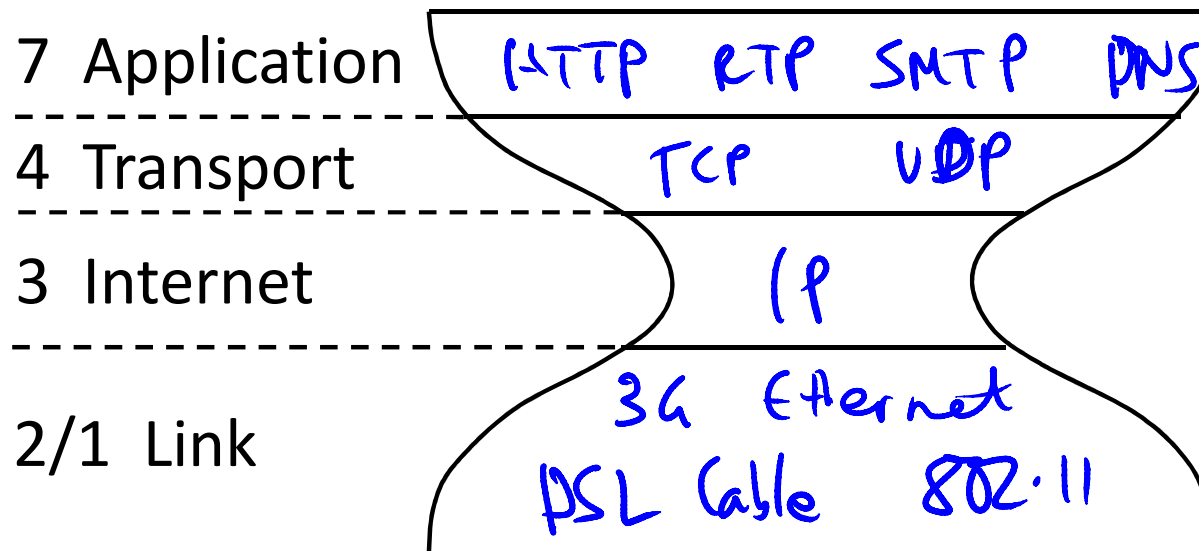
# Internet Reference Model

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



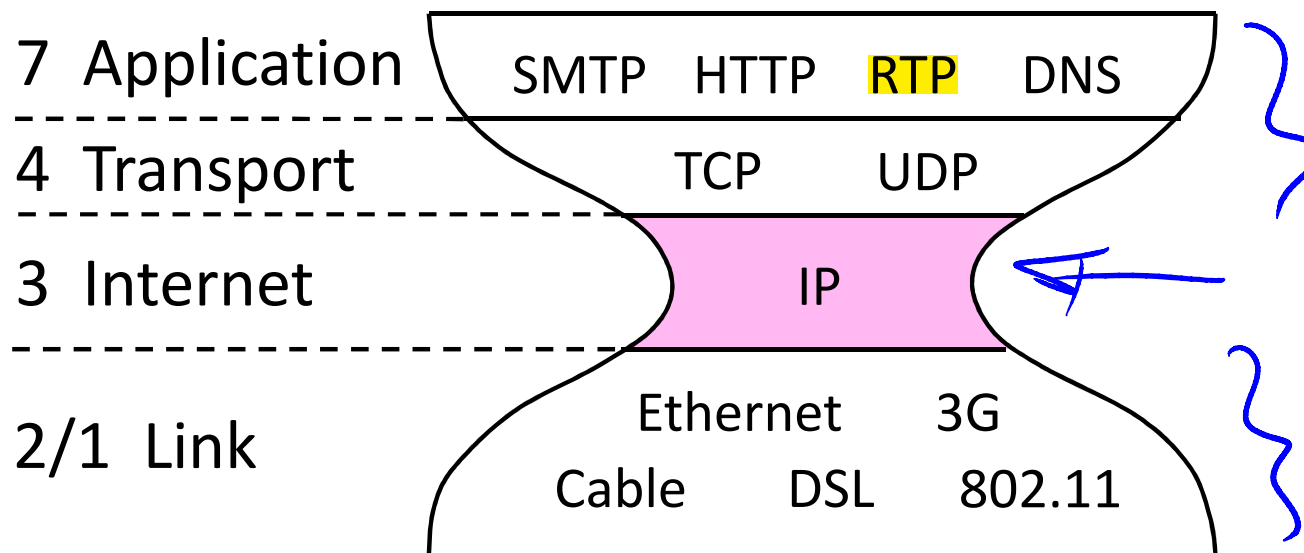
# Internet Reference Model (2)

- 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



# Standards 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:

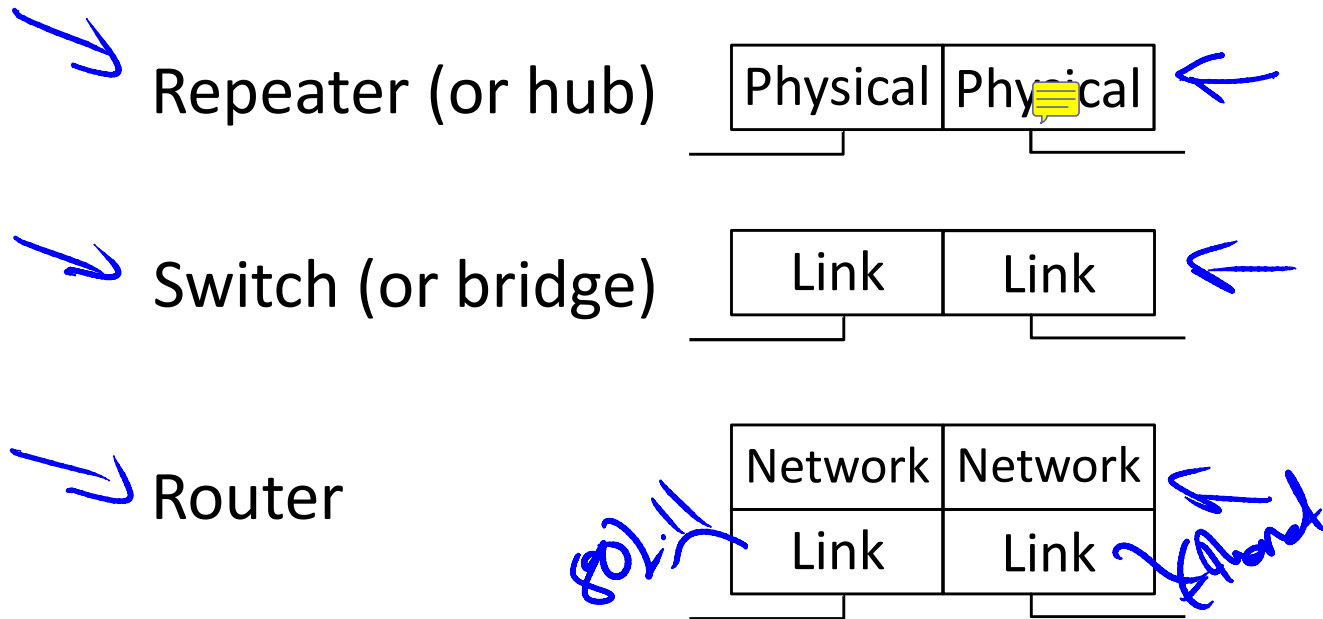


Layer	Unit of Data
Application	Message
Transport	Segment
Network	Packet
Link	Frame
Physical	Bit



# Layer-based Names (2)

- For devices in the network:



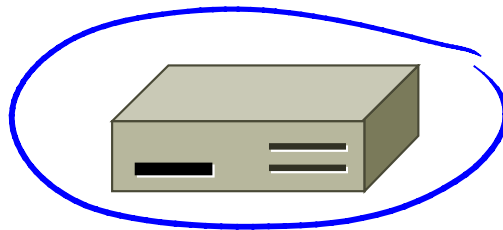
# Layer-based Names (3)

- For devices in the network:

Proxy or  
middlebox  
or gateway

App	App
Transport	Transport
Network	Network
Link	Link

But they all  
look like this!



# A Note About Layers

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

# END

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