COMPUTER NETWORKS

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Computer Networks and the Internet

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"Protocol Layers" and reference models

Networks are complex, with many "pieces":

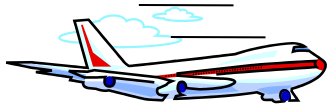
- hosts
- routers
- links of various media
- applications
- protocols
- hardware, software

Question:

is there any hope of *organizing* structure of network?

…. or at least our *discussion* of networks?

Example: Organization of Air Travel



ticket (purchase)

baggage (check)

gates (load)

runway takeoff

airplane routing

ticket (complain)

baggage (claim)

gates (unload)

runway landing

airplane routing

airplane routing

airline travel: a series of steps, involving many services

Layering of Airline functionality

layers: each layer implements a service

- via its own internal-layer actions
- relying on services provided by layer below

Q: describe in words the service provided in each layer above

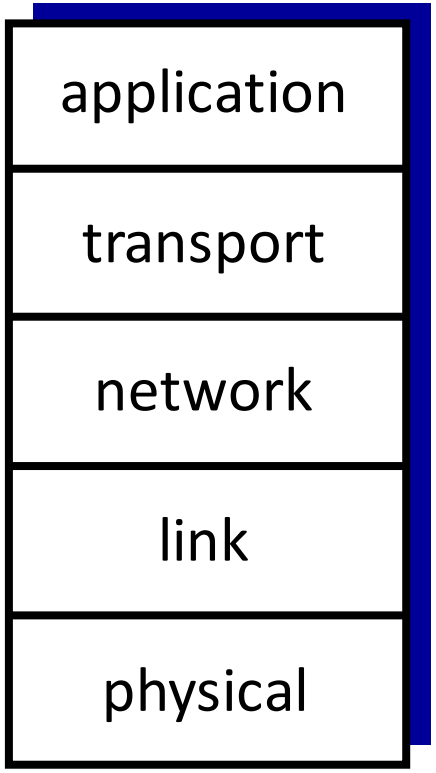
Why layering?

dealing with complex systems:

- explicit structure allows identification, relationship of complex system's pieces
  - layered *reference model* for discussion
- modularization eases maintenance, updating of system
  - change in layer's service *implementation*: transparent to rest of system
  - e.g., change in gate procedure doesn't affect rest of system
- layering considered harmful?
- layering in other complex systems?

Internet Protocol Stack

- *application:* supporting network applications (access to network resources)
  - IMAP, SMTP, HTTP
- *transport:* process-process data transfer (segmentation & reassembly, sockets, connection, flow and error control)
  - TCP, UDP
- *network:* routing of datagrams from source to destination (addressing, routing)
  - IP, routing protocols
- *link:* data transfer between neighboring network elements (framing, addressing, flow & error control)
  - Ethernet, 802.11 (WiFi), PPP
- *physical:* bits "on the wire"



Queries

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Thank You
For Your Attention

THANK YOU

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