CSc 450/550
Computer Networks
Assignment 1

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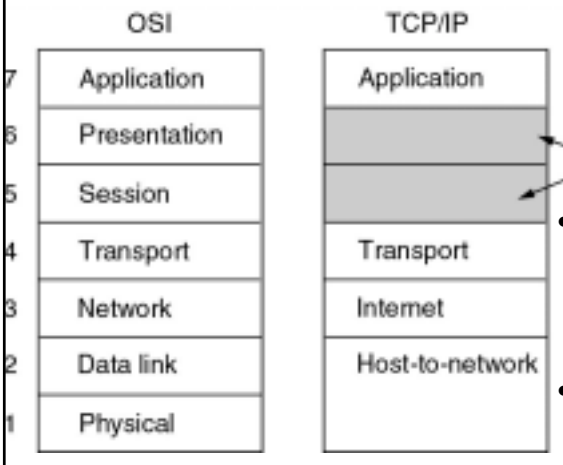
Q1: OSI vs TCP/IP



- Not needed?
  - plain-text ASCII
  - in-band signaling
- If indeed needed?
  - e.g., XDR (RPC)
  - e.g., SIP

Q2: communication channel

- Bandwidth: Hertz
  - the range of frequencies with minimum attenuation
- Baud rate: sample-per-second
  - at most 2*bandwidth samples per second necessary
- Symbol rate: symbol-per-second
  - one sample is considered to represent one symbol
- Data rate: bit-per-second
  - one symbol can represent multiple bits of information

Q3: Shannon limit

- Signal-to-noise ratio
  - ratio: S/N
  - Bel: $\log_{10}$S/N
  - dB: 10$\log_{10}$S/N
- Shannon's limit
  - H $\log_2(1+S/N)$ bps
  - H: available bandwidth
  - S/N: achievable S/N

Q4: 56Kbps

- H $\log_2(1+S/N)$
  - increase H, or
  - increase S/N (increase S or reduce N)
- 56Kbps
  - remove the analog local loop on ISP's end
    - N is reduced
  - allocate more bandwidth for downlink
    - H is increased

Q5: circuit vs packet switching

- Circuit switching: e.g., PSTN
  - resource allocated and dedicated
    - need path setup
  - quality guaranteed
    - may lower system utilization for bursty traffic
- Packet switching: e.g., the Internet
  - resource shared
    - no need for path setup
  - quality not guaranteed

Q6: persistent connection

- HTML
  - anchor links: e.g.,
  - embedded objects: e.g., <img src=“”>
- HTTP connections
  - non-persistent: one connection for one request
  - persistent: one connection for all requests to the same server
    - non-pipelining
    - pipelining