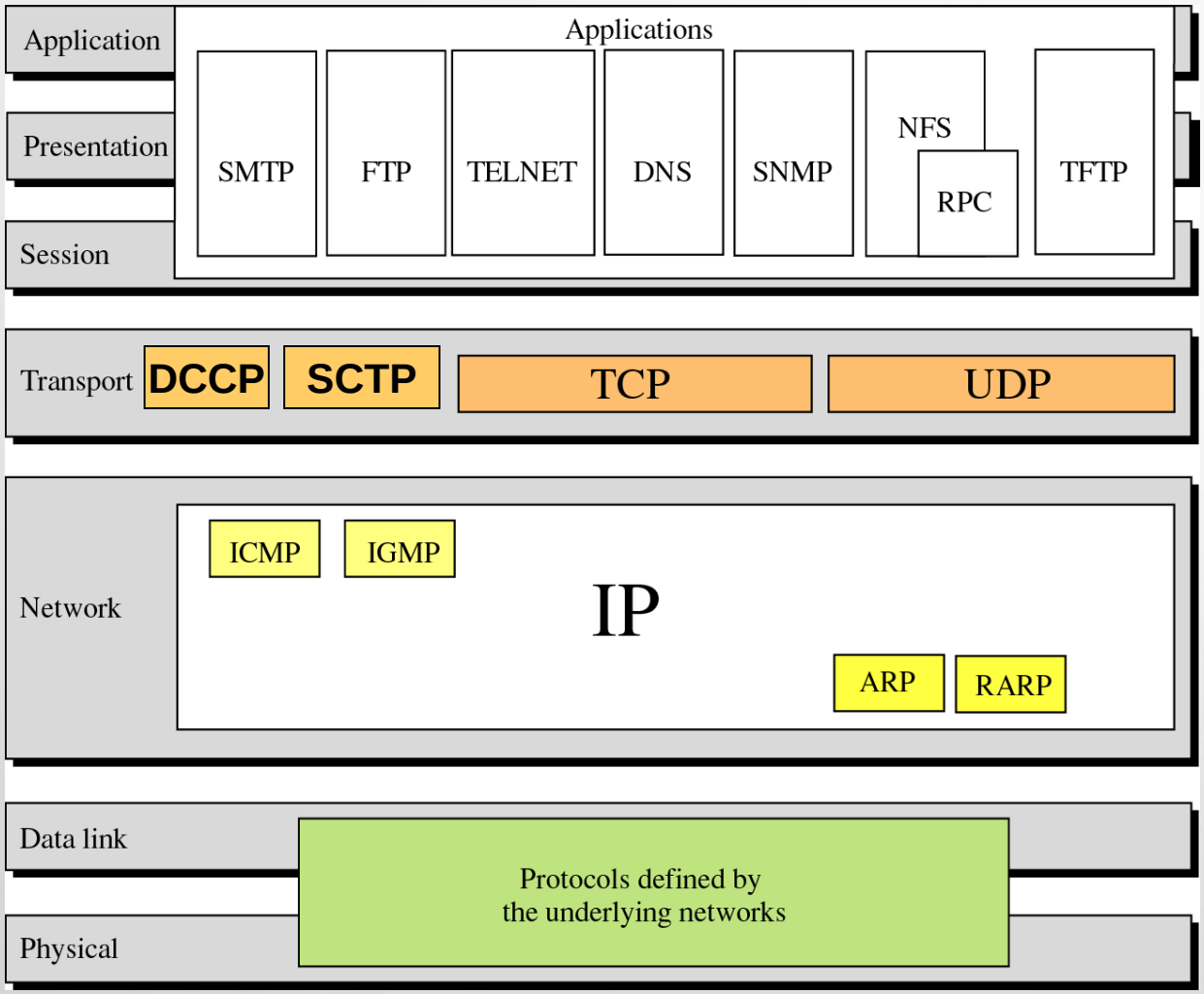
Datagram Congestion Control Protocol (DCCP)

Overview

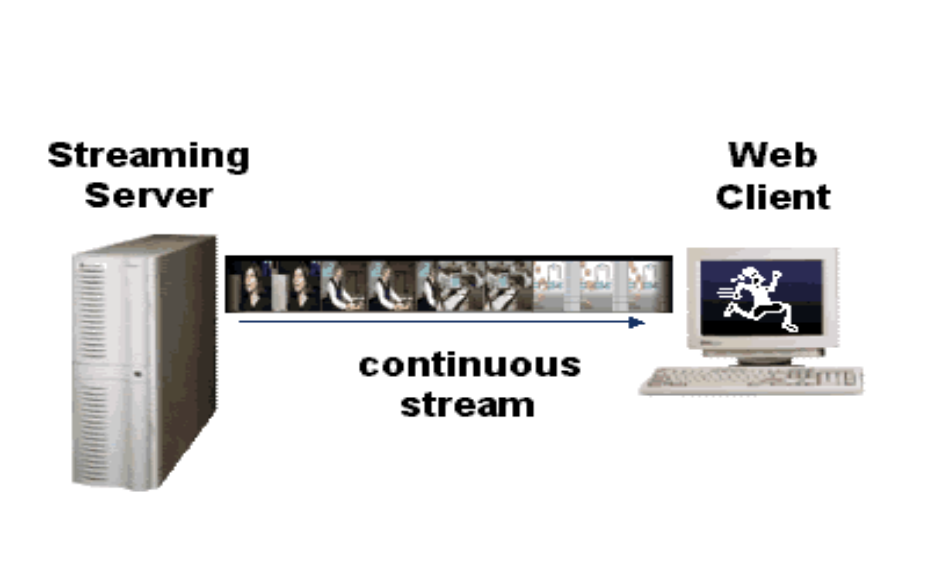
- Motivation
- Connections
- Unreliable datagram transfer
- Modular congestion control
- Miscellaneous issues

DCCP: Which Layer?



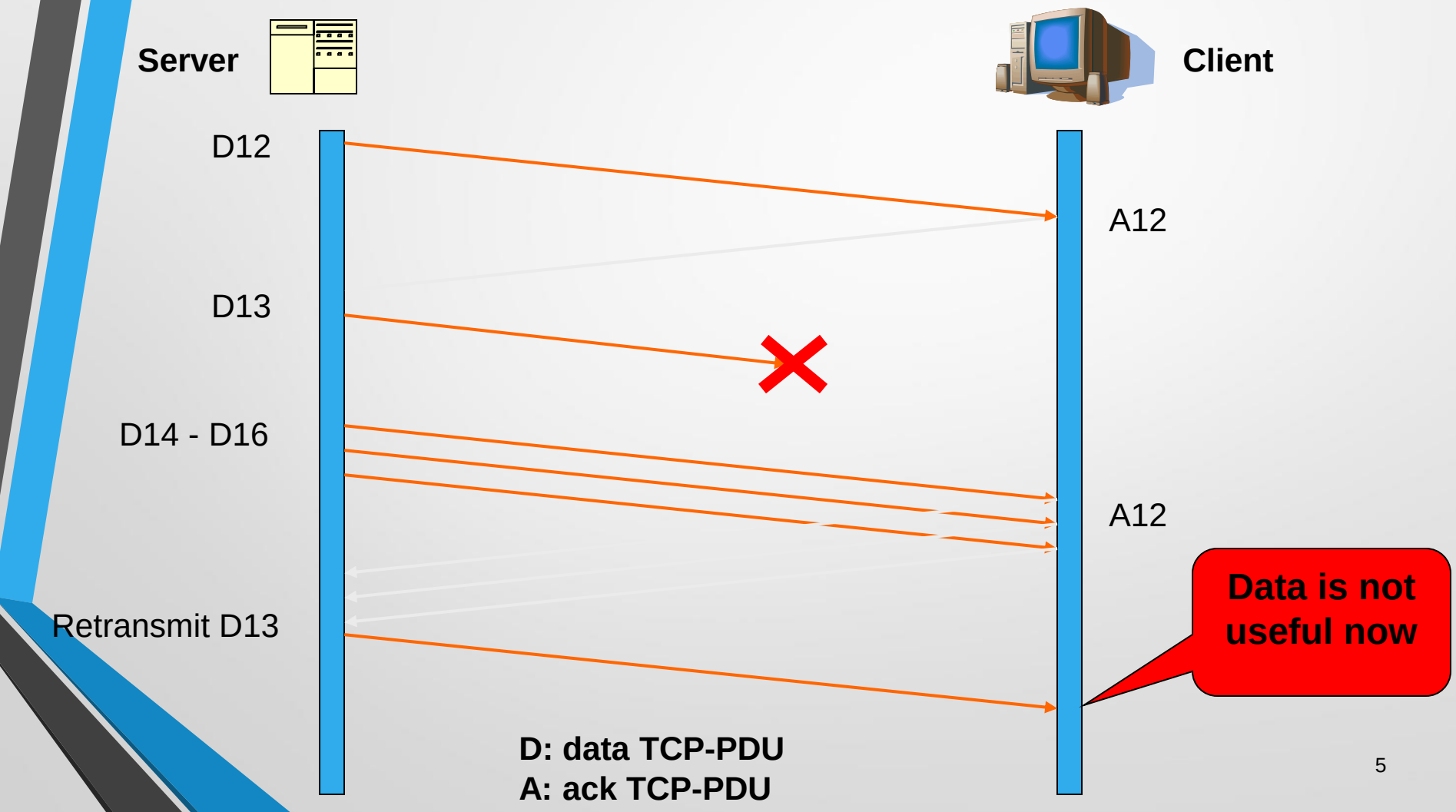
Adapted from Figure 2-11 TCP/IP Protocol Suite, Behrouz A. Forouzan

Streaming Media

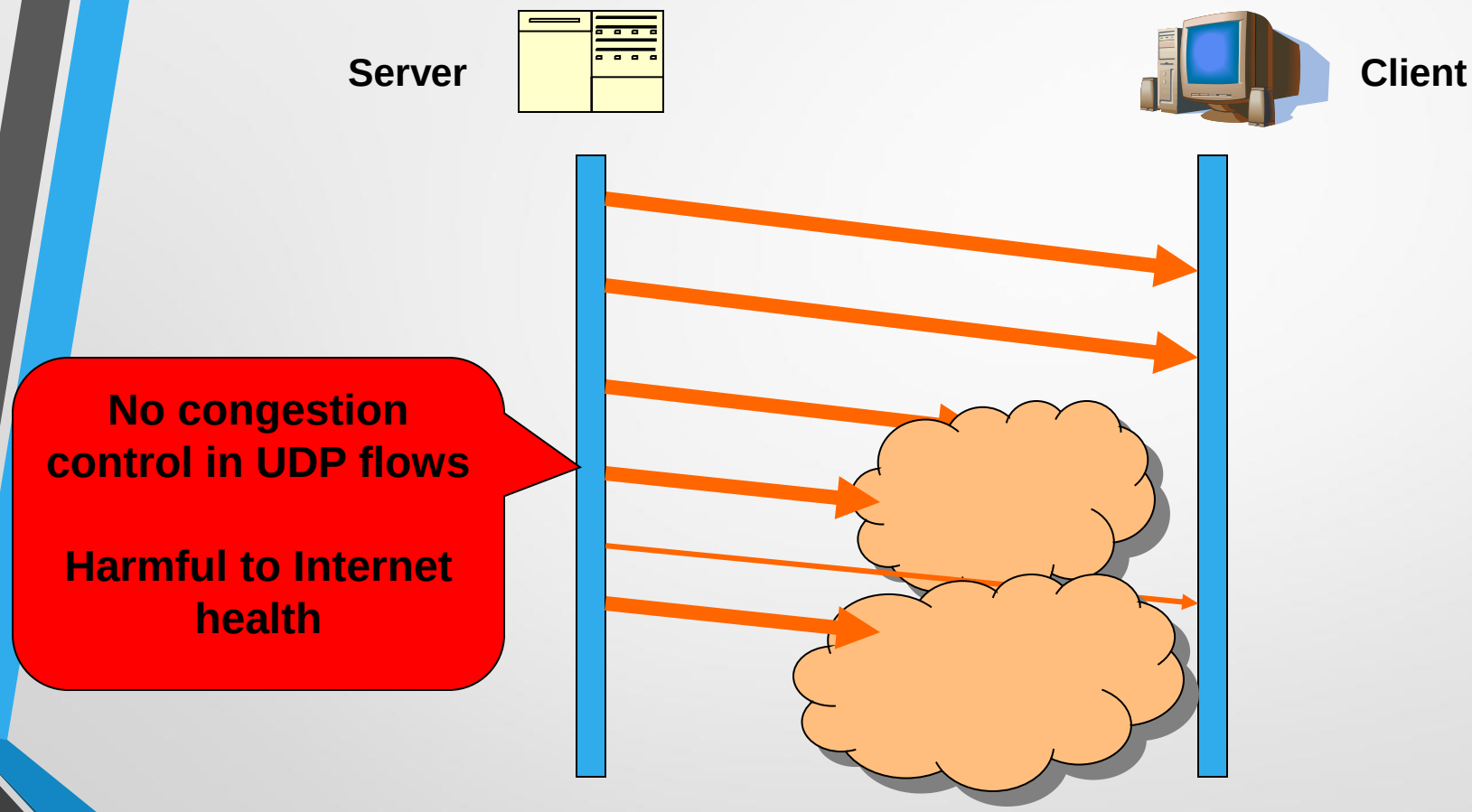


- What streaming media needs?
  - **Timeliness of data**
- What streaming media doesn't need?
  - **Retransmissions of lost/expired packets**
  - **Annoying "*rebuffering…*" – HOL blocking**

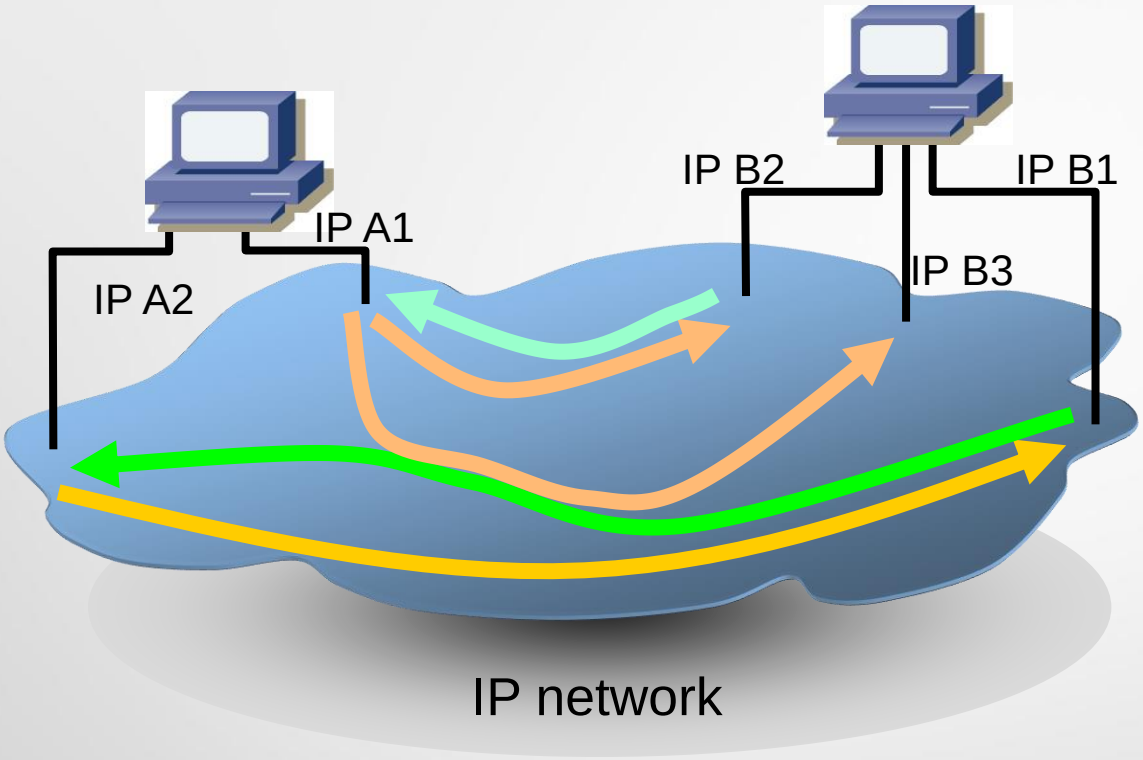
Streaming Media Over TCP



Streaming Media Over UDP



Streaming Media with SCTP



- Multi-streams over a single association
- Uses TCP-like congestion control
- Retransmission
- Partial Reliability: require at least 1 RTT

Other target applications

- Internet Telephony
  - Constant-packet-rate sources
  - Change data rate by adjusting packet size
  - Extremely sensitive to delay
  - Demands a slower congestion response
- Interactive games
  - Can quickly make use of available bandwidth
  - Prefers TCP-like sawtooth congestion response

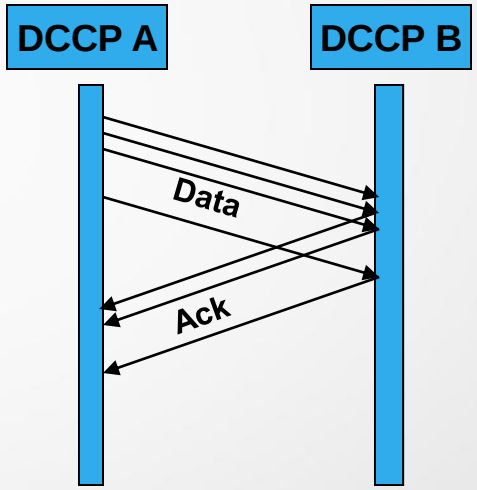
Solution: DCCP

- provides unreliable flow of datagrams
- provides congestion control using
  - Acknowledgment
  - Sequence number
  - Connection oriented
- does not provide
  - Full reliability: no-loss & no-error & in-order & no-duplicate
  - flow control
  - streaming
- DCCP = UDP + congestion control

  or

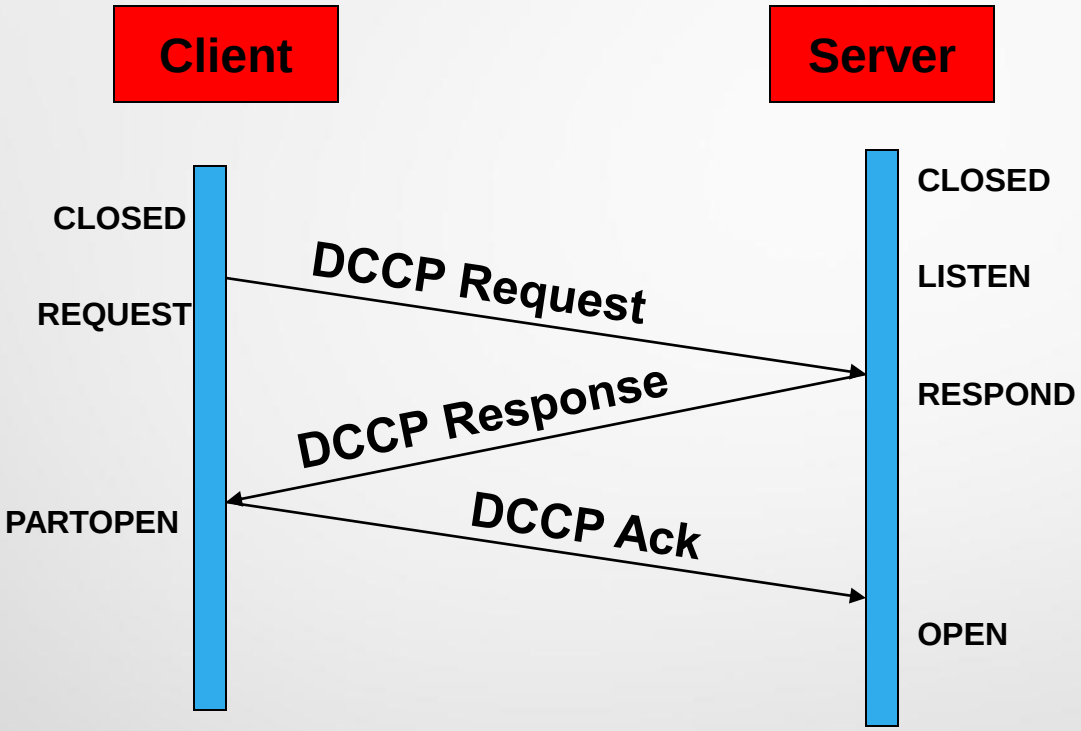
  = TCP – bytestream semantics – full reliability

DCCP connections

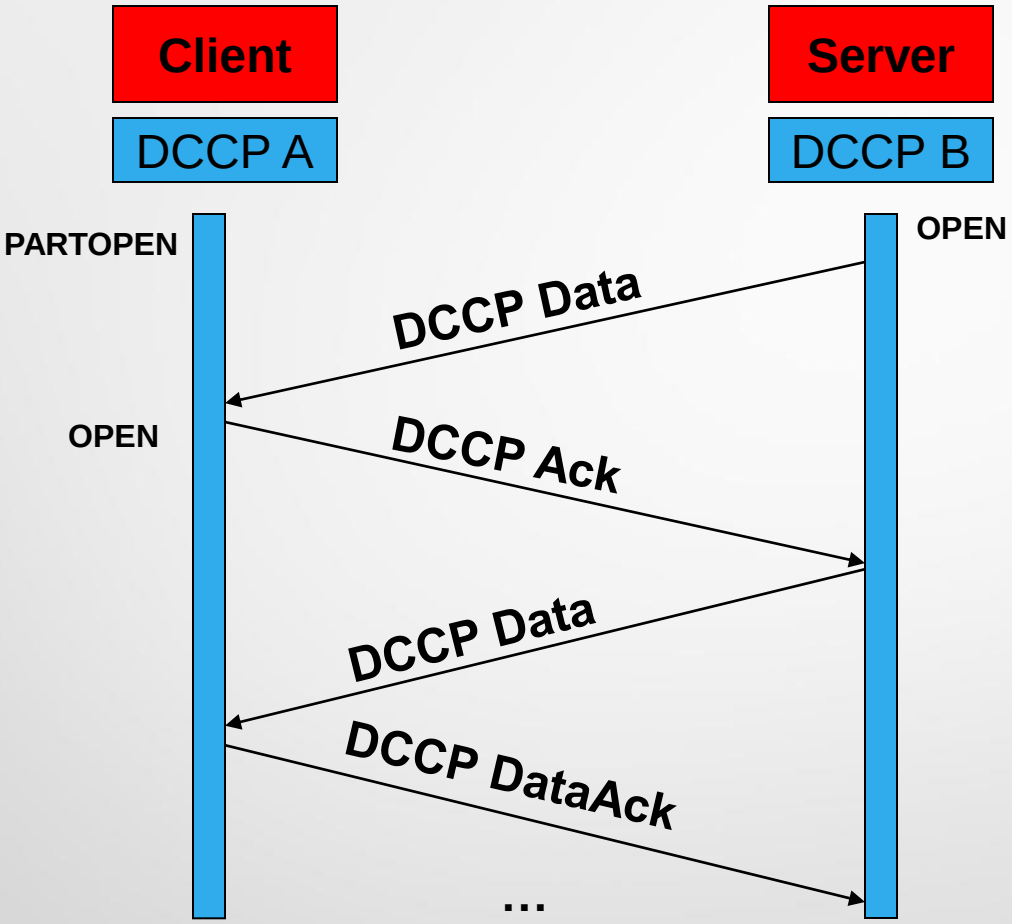


- Full-duplex bi-directional connection
  - Two logical half connections
  - A-to-B half connection:
    - Application data sent from A to B
    - Corresponding acks from B to A
  - In practice overlapped: DataAck
- Each half connection can have independent features negotiated during connection initiation, e.g., different congestion control mechanism

DCCP Connection Initiation



DCCP Data Transfer Phase



DCCP Connection Termination