Datagram Congestion Control Protocol
Overview

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Connection overview and packet types

- Two ends, (potentially) two-way data transfer
- Explicit connection setup and teardown
  - Request, Response, CloseReq, Close, Reset
- Data transfer and most feature negotiations use Data and DataAck
  - Data = data only; DataAck = data + acknowledgement
- Other types: Move
Connection breakdown

- Two half-connections

Data from A to B plus acks from B to A
Data from B to A plus acks from A to B

Ack piggybacking: a single packet relevant to both half-connections
DCCP core idea

• Let each half-connection choose a congestion control mechanism
  Possibly different for the two half-connections
  CC is negotiated: both endpoints must agree
  CC determines form of acknowledgements, . . .

• Congestion control mechanisms represented by CCIDs
  CCID 0: Single-Window (not much data to send)
  CCID 1: unspecified sender-based (expect Ack Vector)
  CCID 2: TCP-like
  CCID 3: TFRC (rate-based)
Packet properties

- Every packet has a sequence number
  - Includes pure acknowledgements
  - Increments every time
- Acknowledgement information
  - DataAck acks *largest* received seqno
  - Ack Vector option: which packets were received? ECN marked?
  - TFRC options: loss event rate, ...
Reliably negotiated features

• Half-connection properties agreed upon by both ends
  CCID, ECN capability, mobility capable, . . .

• Three options negotiate feature values
  Ask (A → B): “I want to use this value”
  Choose (B → A): “No, try this value instead”
  Answer (B → A): “Value OK”

• Example
  A: Ask CCID(4); B: Choose CCID(3);
  A: Ask CCID(3); B: Answer CCID(3)
Mobility

- Negotiate capability beforehand
  Produces a nonce (shared secret)
- Send a Move packet after you’ve moved
  Includes nonce
- Patent status unclear (!?)
Example half-connection (1)

- A → B 0: Request, Ask(CCID 2), Choose(CCID 0)
- B → A 100: Response[0], Answer(CCID 2), Ask(CCID 0)
- A → B 1: DataAck[100], Answer(CCID 0), [app request]
- B → A 101: Data, [media data]
- B → A 102: Data, [media data]
- A → B 2: DataAck[102], Ack Vector($\sqrt{102} \sqrt{101}$)
Example half-connection (2)

- B → A 103: Data, [media data]
- B → A 104: Data, [media data] * LOST *
- B → A 105: Data, [media data]
- B → A 106: DataAck[2], [media data]
- A → B 3: DataAck[103], Ack Vector(\sqrt{103}, \sqrt{102}, \sqrt{101})
- A → B 4: DataAck[106], Ack Vector(\sqrt{106}, \sqrt{105}, X_{104}, \sqrt{103})
Example half-connection (3)

- B → A 107: DataAck[4], [media data]
- B → A 108: Data, [media data]
- A → B 5: DataAck[108], Ack Vector(√108,√107)
- ...

- B → A 200: CloseReq[80]
- A → B 81: Close[200]
- B → A 201: Reset[81]