CSc 461/561
Multimedia Systems
Assignment 3: Discussion

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Q1: multicast trees

- Sender-specific tree
  - shortest path from a sender to all receivers
  - Dijkstra's algorithm
    - add, *relax*, add …; loop-free
- Shared tree
  - minimal spanning tree among all members
    - Kruskal's algorithm or Prim's algorithm; *avoid* loop
  - center-based tree

Q2: RTP timestamp and seqno

- Timestamp
  - *logic* sample counter (e.g., 8KHz 20ms audio)
  - synchronization within a stream
  - when missing: e.g., silence; when duplicated?
- Sequence number
  - *consecutive* packet counter
  - when missing: packet losses; when duplicated?
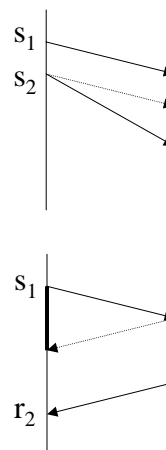- Why we need both?

Q3: RTCP OWJ and RTT

- One-way jitter
  - $V = (r_2 - r_1) - (s_2 - s_1) = (r_2 - s_2) - (r_1 - s_1)$
  - EWMA: $J = J + (V - J)/16$
- Round-trip delay
  - $R = (r_2 - s_1) - (s_2 - r_1)$
  - $(s_2 - r_1)$: DLSR
  - s_1: LSR
- Use information from RTCP!

Q4: SIP proxy vs redirect

- Proxy
  - "transparent" to caller
    - relaying, chaining, forking, etc.
  - caller - proxy - callee
- Redirect
  - "interactive" with caller
    - "move temporarily or permanently"
  - first: caller - redirect; then: caller - callee

Q5: RSVP

- Reservation for multicast receivers
  - sender-oriented: "one size fits all?"
  - receiver-oriented: heterogeneous receivers
    - filter aggregate
- Signaling
  - hard-state: explicit setup and tear-down
  - soft-state: periodic refresh, implicit release
    - fault tolerant
    - adaptive

Q6: WFQ

- WFQ
  - in every virtual round, every active flow is served by one unit
    - each round is *variable* in length in real clock!
  - finish round number for an incoming packet
    - active flow: last finish number + packet length
    - inactive flow: current system round + packet length
    - finish round# for existing packets NOT change
  - serve the packet with the smallest round# first

Q7: TCP and multimedia

- What TCP offers
  - point-to-point
  - bi-directional
  - connection-oriented
  - reliable, in-sequence, stream-like
  - embedded flow, error and congestion control
- Multimedia
  - diverse application requirements

Q8: error detection

- Little endian vs big endian
  - bits in big endian format on wire!
- CRC
  - remainder with regard to generator polynomial
- TCP/IP-style checksum
  - one's complement of one's complement sum
  - carry bit!
- CRC vs checksum

Q9: error concealment

- Receiver-oriented error recovery
  - without information resent by sender
  - feasible on some data formats
    - small information loss below perceptual threshold
- Popular techniques
  - substitution
  - repetition
  - interpolation