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Multimedia Congestion Control: Circuit Breakers for Unicast RTP Sessions

draft-ietf-avtcore-rtp-circuit-breakers-02

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Goal

- RTP is widely used over UDP/IP networks
- Must implement congestion control for safety
  - Not widely implemented to date – problematic with increasing deployment of high rate video conferencing
  - The RMCAT working group is developing algorithms
- RTP circuit breakers provide an envelope within which congestion control can operate
  - Circuit breakers are conditions under which an RTP sender needs to stop transmitting media data to protect the network from excessive congestion
  - Not expected to be triggered during normal operation – a safety net

Minor Changes in -02

- Update title and abstract
- Clarify: multicast is out of scope
- Clarify: why unicast RTP session might have >2 SSRCs
- Clarify: RTCP support is required
- Clarify: implementations without a circuit breaker, or equivalent, are not be used on networks subject to congestion
- Clarify: RTCP RR jitter estimate is not valid if frame is split across multiple RTP packets with the same timestamp
- Expand discussion of competition with TCP flows
- Clarify operation of congestion circuit breaker if the fraction lost is zero
- Clarify that the circuit breaker at a sender only looks at RTCP SR/ RR packets that contain reports for the SSRC values it is using to send

Significant Changes: Rate Reduction

- In media timeout circuit breaker, disallow reduction in rate by a factor of 10 as a response when circuit breaker triggered
  - A media timeout (several reporting intervals when media is being set but not received) signals significant path failure, not a transient problem, and so should stop the RTP media flow, not just reduce it's rate

Significant Changes: RTCP Intervals

- Clarify RTCP Timeout circuit breaker: note that the fixed minimum RTCP reporting intervals SHOULD be used when calculating the RTCP timeout
  - Rationale in Section 6.2 of RFC 3550: avoid premature timeouts if not all participants use reduced minimum interval
- Clarify congestion circuit breaker: use actual RTCP reporting interval, not fixed minimum interval, when determining if congestion is occurring
  - Actual interval, when using the reduced minimum interval, scales with the data rate, and so matches the dynamics of the congestion circuit breaker

Significant Changes: Cease Transmission

- Break out the description of what it means to cease transmission into a separate section, and expand
- When deciding when to restart transmission, clarify that the destination 3-tuple (transport, port, IP addr) rather than the full 5-tuple is used when checking if congestion has eased
  - Rationale: is not okay to simply change the source port, and try again on the same path; need a different IP-layer path

Significant Changes: Reduced-size RTCP

- Clarify behaviour with reduced-size RTCP:
  - Reduced-size RTCP packets containing RTCP SR or RR packets MUST be counted towards the circuit breaker conditions
  - Reduced size RTCP packets that don't contain SR or RR packets are not counted towards the circuit breaker
- Intention: allow use of low-overhead reduced-size RTP/AVPF NACKs for congestion control without risk of triggering circuit breaker, whilst reacting to significant loss events reported by SR/RR packets

Significant Changes: ECN

- Expand discussion of how and when ECN-CE marks are counted towards the circuit breaker
  - RFC 6679 provides RTCP extensions to feedback ECN-CE marks in RTCP XR, and these are counted towards the circuit breaker
  - ECN-CE marks reported in a reduced size RTCP packets along with SR or RR blocks are processed; if the SR or RR block is not present, they're ignored
- Conceptually same rules as for packet loss

Open Issues

- No current open issues – please send feedback to the list

Next Steps

- Several groups conducting simulations to validate circuit breaker algorithm
  - University of Glasgow
  - Aalto University
  - University of Aberdeen
- Expect to report results at next IETF meeting, then proceed to working group last call
- Further implementation experience desirable – can you help?