TCP ACK Rate Request (TARR) option

draft-ietf-tcpm-ack-rate-request-03

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Intro: motivation

• Delayed ACKs
  • Intended to reduce protocol overhead
  • But may also contribute to suboptimal performance

• “Large” cwnd scenarios (i.e. cwnd >> MSS):
  – Saving more than 1 of every 2 ACKs may improve performance

• “Small” cwnd scenarios (i.e. cwnd up to ~1 MSS):
  – Delayed ACKs may incur delay, limit cwnd growth...
Intro: main TARR option format

- R carries binary encoding of ACK rate
- Maximum value of R: 127

• “R” is the ACK rate requested by the sender
  - R = 0: request an immediate ACK (but keep steady state R)
Status

• WG adoption
  • draft-ietf-tcpm-ack-rate-request-00
    – Same content as draft-gomez-tcpm-ack-rate-request-06
  • February 2023

• Version -03
  • Aims to address comments from IETF 117
  • Incorporates feedback from draft-ietf-quick-ack-frequency authors
Updates (I/V)

• Section 3.1: “Sender behavior”
  • Clarifications (in red):
    – A TCP sender MUST NOT communicate a value of R corresponding to an amount of data bytes to be acknowledged at once by the receiver greater than the last known rwin size or greater than the current cwnd size
  • Also, added:
    – Requesting an immediate ACK from the receiver can help reduce the time it takes to detect and/or recover from packet loss
Updates (II/V)

• Section 3.2: “Receiver behavior” (I/II)
  • Clarifications/Additions (in red):
    – Following the behavior specified in RFC 5681, in order to aid the sender in segment loss detection and repair, a TARR-option-capable receiver SHOULD send a duplicate ACK immediately when an out-of-order segment arrives [RFC5681], regardless of the ACK rate requested by the sender.

• Also, added:
  – A TARR-option-capable receiver SHOULD send an immediate ACK when the incoming segment fills in all or part of a gap in the sequence space [RFC5681], regardless of the ACK rate requested by the sender.
Updates (III/V)

• Section 3.2: “Receiver behavior” (II/II)

• Also, added:
  – In any case, as specified in RFC 9293, the delay for an ACK MUST be less than 0.5 seconds
Updates (IV/V)

• Section 5.3: “Lower frequency of RTT samples”

• Updated (in red):
  – In order to limit this issue, when there are segments in flight, a sender needs to trigger a sufficient number of ACKs per round trip.
  – Thanks to Ian Swett!
Updates (V/V)

• Section 6: “Changing the ACK rate during the lifetime of a TCP connection”
  • The sender may notice that the ACKs it receives cover more segments than the ACK rate requested
  • Two reasons:
    – ACK decimation is occurring en route
      » The sender may reduce the ACK frequency to reduce receiver workload and network load up to the ACK decimation point
    – The receiver uses Large Receive Offload (LRO)
      » The sender may want to increase the ACK frequency to compensate for the impact of LRO
Thanks!

Questions? Comments?

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