Ack Frequency

draft-ietf-quic-ack-frequency
https://github.com/quicwg/ack-frequency

QUIC WG, Philadelphia, July 2022
Current Frame Formats

ACK_FREQUENCY Frame {
    Type (i) = 0xaf,
    Sequence Number (i),
    Ack-Eliciting Threshold (i),
    Request Max Ack Delay (i),
    Reserved (6),
    Ignore CE (1),
    Ignore Order (1)
}

Sequence Number: Allows receivers to ignore obsolete frames after reordering.

Ack-Eliciting Threshold: The maximum number of ack-eliciting packets the recipient of this frame can receive before sending an acknowledgment.

Request Max Ack Delay: The value to which the endpoint requests the peer update its max_ack_delay

Ignore CE: This field is set to true by an endpoint that does not wish to receive an immediate acknowledgement when the peer receives CE-marked packets.

Ignore Order: This field is set to true by an endpoint that does not wish to receive an immediate acknowledgement when the peer receives a packet out of order.

IMMEDIATE_ACK Frame {
    Type (i) = 0xac
}

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IMMEDIATE_ACK 1 byte frame type? (#119)

**Issue:** Currently its 0xac. It’s likely to be sent quite often, should we switch to a 1 byte codepoint? Particularly given we may want to bundle IMMEDIATE_ACK with PTO packets.

**Question:** Should we switch to 1 byte?
Is Ignore CE Useful? (#118)

**Issue:** Unclear if Ignore CE is really useful, and a number of concerns were expressed on #87 and #107.

PR #116 added: “Ignore-CE bit SHOULD NOT be set if the sender sets ECT(1) in its outgoing packets, such as with L4S”

**Question:** Is Ignore CE worth keeping?
Examples or Suggestions of use? (#53)

Status Quo: PR #115 Attempts to update the Congestion Control section, but isn’t proscriptive and doesn’t have examples.

Questions:

Should examples of use be included?

If so, what?

Should there be suggestions of use?

Particularly for Reno/Cubic?
Latency to detect packet loss? (#96)

**Issue:** One ACK is sent immediately upon a missing packet. But after that, the next ACK will not be sent until there are more missing packets or the Ack-Eliciting Threshold or max_ack_delay are hit.

**Result:** Loss detection delayed when Ack-Eliciting Threshold is larger than the Packet Threshold.

  Can’t detect loss immediately with the immediate ACK

Loss detection latency is worse than QUIC v1 when Ack-Eliciting Threshold > 2
Latency to detect packet loss? (#96)

Proposal (#100):

Communicate Reordering Threshold to receiver instead of Ignore Order

Receiver immediately ACKs when missing packets in:

\[ \text{largest\_acknowledged\_sent} - \text{Reordering Threshold}, \]
\[ \text{largest\_acknowledged} - \text{Reordering Threshold} \]

Result: Receiver reduces ACKs when packets received out of order while improving loss detection latency over QUIC v1