Ack Frequency

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

QUIC WG, Yokohama, March 2023

Current Frame Formats

```
ACK_FREQUENCY Frame {
    Type (i) = 0xaf,
    Sequence Number (i),
    Ack-Eliciting Threshold (i),
    Request Max Ack Delay (i),
    Reordering Threshold (8)
}
```

```
IMMEDIATE_ACK Frame {
    Type (i) = 0xac
}
```

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

Reordering Threshold: An 8-bit field representing an unsigned integer that indicates how out of order packets can arrive before eliciting an immediate ACK. 0 indicates the peer should ignore reordering.

Resolved Issues

Reordering Threshold (#96)

In London, we decided to change Ignore Order to Reordering Threshold

- Proposal (#100) and clarifications (#152) merged.
- #155 Adds examples, #172 fixes formatting

MUST -> SHOULD (#144, #151)

Changed some unenforceable MUSTs to SHOULDs

  These were SHOULDs in RFC9000 Section 13.2.2

```
Ack-Eliciting Threshold: … A receiving endpoint SHOULD
send at least one ACK frame when more than this number
of ack-eliciting packets have been received.

An endpoint that receives an ACK_FREQUENCY frame with
a Reordering Threshold value other than 0x00, SHOULD
immediately send an ACK frame…
```

Musts for Multiple Ack Frequency frames ([#149](#))

One Normative Change:

   No longer require Sequence Number to start at 0

```
A sending endpoint MUST send monotonically
increasing values in the Sequence Number
field
```

Smaller Changes

- Add Security Considerations ([#139](), [#125]()) added.
- Add IANA Considerations ([#130]())
- Remove an unnecessary MUST about bursts ([#157]())
  - Ack Frequency doesn't change burst behavior from RFC9002
- Clarify the default Reordering Threshold ([#145]())
- Rev the Transport Param codepoint ([#173]())
- Remove an unnecessary MUST ([#174]())

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Open Issue

Is One ACK per RTT enough? ([#168](#))

Current text:
```
… a sender SHOULD cause a receiver to send an
acknowledgement at least once per RTT if there are
unacknowledged ack-eliciting packets in flight.
```

- If `min_ack_delay` > RTT, this can be tricky
- Proposal is to change it to 2, but 3 or 4 are typically better

Options: Do nothing, update to 2, drop normative text, add a RECOMMENDED value of 4, ?