



University
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RTP Congestion Control Feedback

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Reporting on draft-ietf-avtcore-cc-feedback-message-03, which is co-authored with Zahed Sarker, Varun Singh, and Michael A. Ramalho

Changes since Bangkok meeting

- Implementation experience during hackathon in Bangkok – results discussed in AVTCORE and RMCAT at IETF 103
- Submitted -03 to reflect those experiences
 - Final – hopefully! – minor change to packet format
 - Several clarifications
- More implementation experience in hackathon earlier this week

Packet Format Change

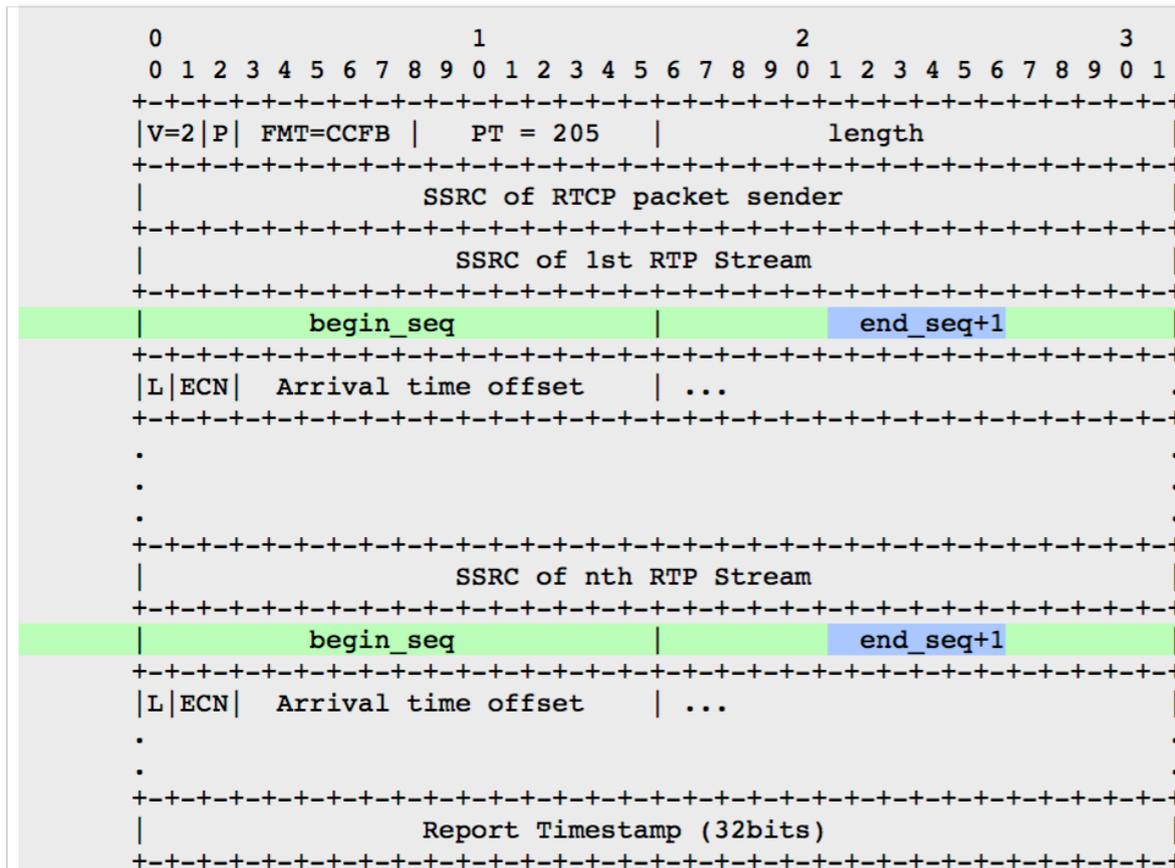


Figure 1: RTCP Congestion Control Feedback Packet Format



Figure 1: RTCP Congestion Control Feedback Packet Format

- Include num_reports rather than end sequence number
- Simplifies logic when nothing to report – discussed at Montréal IETF

Clarifications around timestamps

- Better explain the value of the ATO field:
 - An offset *before* the report timestamp, in units of 1/1024 seconds
 - Explain what to report for packets known to have arrived *after* the report timestamp
- Better explain the value of the Report Timestamp:
 - “This denotes the time instant on which this packet is reporting, and is the instant from which the arrival time offset values are calculated” – changed from “the time instant when the report packet was generated”

Clarifications around reported SSRCs

- Clarify that the receiver has to report on “every active SSRC” not “every SSRC that is being congestion controlled”
 - Sender performs congestion control
 - Receiver can't tell what congestion control is being done, so must report on all

Clarifications around reported packets

- Clarify that overlapping reports MAY be sent
 - If a packet is reported as received, it MUST also be reported as received in any overlapping reports sent later that cover its sequence number range
- Clarify reporting on duplicate packets
 - Report arrival time of first copy
 - If any copy is ECN-CE marked, report ECN-CE; else report ECN mark of first copy

Clarifications around behaviour after outages

- Don't try to explain how to recover after an outage, since recovering state in that case is a general RTCP problem and not specific to this report block

Clarifications around SDP signalling

- Clarify that wild card payload types need to be used in the SDP signalling
 - i.e., signal `a=rtcp-fb: * ccfb`
 - Don't specify particular payload type

Clarify relation to RFC 6679

6. Relation to RFC 6679

Use of Explicit Congestion Notification (ECN) with RTP is described in [RFC6679]. That specifies how to negotiate the use of ECN with RTP, and defines an RTCP ECN Feedback Packet to carry ECN feedback reports. It uses an SDP "a=ecn-capable-rtp:" attribute to negotiate use of ECN, and the "a=rtcp-fb:" attributes with the "nack" parameter "ecn" to negotiate the use of RTCP ECN Feedback Packets.

The RTCP ECN Feedback Packet is not useful when ECN is used with the RTP Congestion Control Feedback Packet defined in this memo since it provides duplicate information. Accordingly, when congestion control feedback is to be used with RTP and ECN, the SDP offer generated MUST

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include an "a=ecn-capable-rtp:" attribute to negotiate ECN support, along with an "a=rtcp-fb:" attribute with the "ack" parameter "ccfb" to indicate that the RTP Congestion Control Feedback Packet is to be used for feedback. The "a=rtcp-fb:" attribute MUST NOT include the "nack" parameter "ecn", so the RTCP ECN Feedback Packet will not be used.

Feedback from the hackathon (1/2)

- Sergio Mena, Nils Olhmeier, and Jonathan Lennox worked on this in the hackathon earlier in the week:
 - In BUNDLE, it's not clear whether it should be legitimate to negotiate CCFB on some but not all of a group of bundled media descriptions.
 - i.e., what should the bundle category of `a=rtcp-fb:* ack ccfb` be?
 - Would be useful to add an example for SDP `a=rtcp-fb:* ack ccfb`
 - Negotiation of congestion control feedback
 - Offerers will often want to offer a variety of congestion control feedback mechanisms for maximum interoperability
 - Bad things can happen if you try to use more than one at once
 - Thus, answerers should answer with only one option, and if that doesn't happen (i.e., if an answer contains more than one option) an endpoint should either pick just one it likes best, or complain/fail
 - ...

Feedback from the hackathon (2/2)

- ...
- CCFB, unlike most RTCP messages, isn't intrinsically bounded in size. When bandwidth is very asymmetric, can end up with more feedback reports than will fit in an MTU
 - Need guidance to generate multiple feedback packets in this case
 - Need guidance how to configure to avoid the problem → draft-ietf-rmcat-rtp-cc-feedback
- Add guidance on how CCFB's SSRC-and-RTP sequence feedback format can be mapped into a single sequence number space
 - Reporting sequence numbers per SSRC allows per-RTP flow congestion control
 - But need to give guidance on how to map to a single sequence for congestion control algorithms that operate on the aggregate flow
- Congestion algorithms need to understand what to do in response to lost feedback messages
 - It's generally a bad thing to treat them as media packet losses, but it's also bad to treat them as though the packets were received perfectly
 - Give general guidance, although clearly congestion control algorithm specific

Next Steps

- Resolve open issues
- Clarify relation to alternative solutions in this space, and highlight benefits and trade-offs with the approach
- Hope to be ready for WG last call by Montréal