GENERIC CONGESTION FEEDBACK MESSAGE

RMCAT Design Team

Status report

Presenter

Zaheduzzaman Sarker
Ericsson Research

Status summery

- Produced a draft with a proposal for Congestion Control Feedback Message
  - *Presented at IETF97*
  - *Includes necessary feedback information and packet format*
- Worked on optimization
  - *Two proposals presented at IETF97*
  - *Needed to analyze the gain vs complexity*
    - Compared to overhead of compound RTCP the optimization is not worthwhile
  - *Since IETF97*
    - Discussed need to optimization
    - Tried to produce data to justify the gain with optimization
- Aiming to finish the work before IETF99

Proposed congestion feedback - a recap

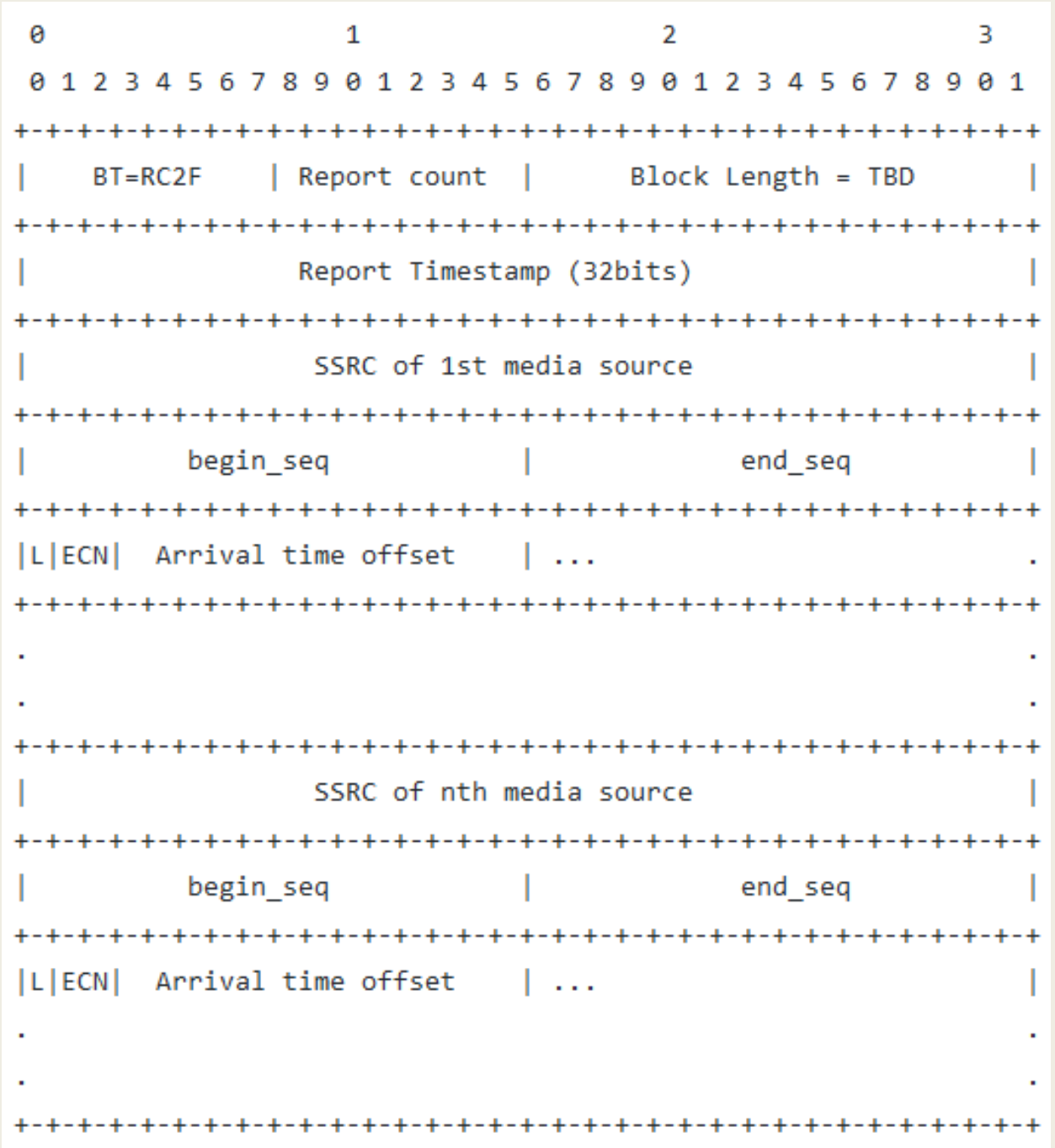
- Feedback contains information about
  - *Packet identifier*
    - RTP sequence number
  - *Packet Arrival Time*
    - Arrival time stamp at the receiver of the media
  - *Packet Explicit Congestion Notification (ECN) marking*
    - If ECN [RFC3168] is used, it is necessary to report on the 2-bit ECN mark in received packets, indicating for each packet whether it is marked not-ECT, ECT(0), ECT(1), or ECN-CE.

Read at : https://datatracker.ietf.org/doc/draft-dt-rmcat-feedback-message/

Packet format

As XR block.

Sent as a part of regular feedback

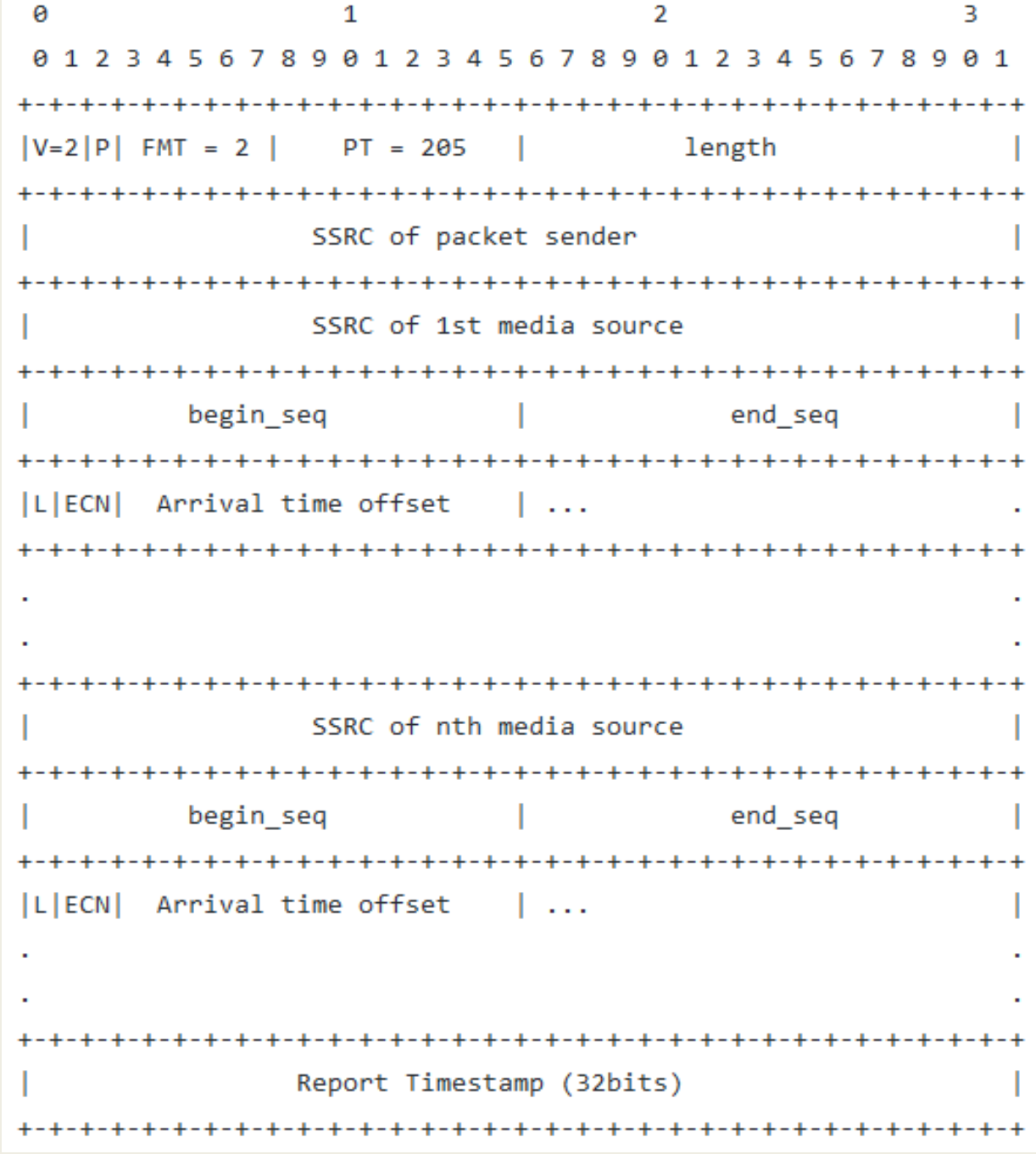


Read at : https://datatracker.ietf.org/doc/draft-dt-rmcat-feedback-message/

Packet format

As RTCP/AVPF transport layer feedback.

Needed if want to sent as early feedback



Read at : https://datatracker.ietf.org/doc/draft-dt-rmcat-feedback-message/

Is this the right information to report?

- Yes. The information has been discussed with implementers and Congestion control algorithm proponents. We have not find any more information that is required to be send as feedback.

Is encoding this using RTCP XR and transport layer feedback appropriate?

- Yes.

Which format to select?

- Sending a XR block is a cleaner fit architecturally
- Sending as transport layer feedback saves couple of bites
- Stick to the framework in the draft

*Pictur courtesy: Colin Perkins, https://www.ietf.org/proceedings/97/slides/slides-97-rmcat-rtcp-feedback-for-congestion-control-00.pdf

Optimization

- Colin Perkins presented some analysis at IETF97
  - *RTCP overhead can be minimum of 80 octets per report*
  - *“Optimizing XR block likely not worthwhile”*
  - *Use of reduced sized RTCP makes a difference in overhead*
- Two proposal was presented
  - *RLE for loss*
    - Might make a difference on a lossy channel
  - *Separate ECN blocks when ECN is enabled on the path*
  - *Action point was to evaluate the gain vs complexity*
    - Compared to RTCP overhead
- Optimization could also be done for ease of parsing

What to optimize for?

- Decision was to work with the scenarios discussed in the mailing list
  - *low bitrate cases are more interesting*

Low bitrate audio
- Uplink: 20 kbps
- Downlink: 20 kbps
- Audio packet rate: 50 packets/second

Low bitrate audio and video
- Uplink: 70-100 kbps
- Downlink: 70-100 kbps
- Audio packet rate: 50 packets/second
- Video framerate: 7-30 fps

High bitrate audio and video
- Uplink: 500 kbps
- Downlink: 8000 kbps
- Audio packet rate: 50 packets/second
- Video framerate: 30 fps

Data for optimization

- We got some data from Google's deployed WebRTC solution in Chrome browser.
- 1 audio and 1 video stream in the session
- Send-side CC uses draft-holmer-rmcat-transport-wide-cc-extensions-01
- Receive-side CC uses draft-alvestrand-rmcat-remb-03
- Every other reduced size, every other compound

Audio at 6 kbps payload bitrate, 20 ms frames:

- Average RTCP bitrate with send-side CC: **688 bps**
- Average RTCP bitrate **without** CC: **112 bps**
- Reduced size: ~72 bytes on average, 1Hz
- Compound: 32-40 bytes, 1Hz

Video and audio at 60 kbps payload bitrate:

- Average RTCP bitrate with send-side CC: **2344 bps**
- Average RTCP bitrate with recv-side CC : **2424 bps**
- Reduced size: ~64 bytes on average, 5 Hz
- Compound: 64 bytes, 2 Hz

Video and audio at 600 kbps payload bitrate:

- Average RTCP bitrate with send-side CC: **5632 bps**
- Average RTCP bitrate with recv-side CC :**2792 bps**
- Reduced size: ~28 bytes on average, 20Hz
- Compound: 64 bytes, 3Hz

Video and audio at 2000 kbps payload bitrate:

- Average RTCP bitrate with send-side CC: **7920 bps**
- Average RTCP bitrate with recv-side CC: **4256 bps**
- Reduced size: ~32 bytes on average, 20Hz
- Compound: 64 bytes, 4 Hz

Gives an deployable limit on RTCP bandwidth

- Place holder for comparison results
  - *With current proposed packet format*
  - *With optimized packet format*

- Place holder for loss stat from callstat.io

Adaptive Feedback

- Adaptive feedback based on available bandwidth
  - *Impacts how much history to put into the feedback*
  - *Need some guidance*
  - *However, this is a general issue*

  - *RMCAT should have*
    - Feedback message
    - Necessary changes to RTCP reporting
    - Separate draft on how to use feedback message

Conclusions

- The current proposal contains required information
- Send XR block in regular report and as transport layer feedback in the reduce-sized report
- Need to judge the gain of optimizing the packet format compared RTCP overhead for compound packet
- The design team feedback message proposal should stick to defining feedback information and packet format

Is there any other issues?