# RMCAT Feedback Requirements design team

RMCAT WG

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# Introduction

- RMCAT congestion control candidate algorithms provided requirements on their feedback message.
- A design team will analysis the requirements and will find a generic format.

Please join the design team

# Feedback Requirements of NADA

- Information needed in NADA feedback:
  - Recommended rate adaptation mode (rmode)
  - Aggregated congestion signal (x_curr)
  - Recently measured receiving rate (r_recv)
- Recommended feedback interval: 100ms

# GCC – What we need

- Start-up phase:
  - Send time, arrival time and size of each packet to estimate bandwidth.
  - Congestion controller knowledge about the sender's intent is useful (e.g., if packets are sent in a pattern on purpose, etc.). This is easier to achieve at the sender.
- Congestion control phase:
  - Ability to determine packet groups based on both send time and arrival time of packets.
  - Send time, arrival time and size of each group to compute inter-group delay variations.
  - Packet loss.
- One instance operates on all BUNDLEd streams.
  - Need to identify and compare packets from these streams.

# GCC – Suggested feedback

- Per-packet feedback from receiver to sender:
  - Packet identifier (e.g., new sequence number or {ssrc, rtp seq num} tuple).
  - Packet send time.
  - Packet arrival time.
  - Packet size.
- More frequent is better.
  - Current choice is to send feedback every 50 ms.
  - Increasing to 100 ms would be possible, the cost would be delayed actuation, possibly leading to increased queuing.
  - Cost of high feedback frequency results in fewer ACKs per RTCP, leading to (assuming) :
    - Reduced ability to compress the feedback.
    - More packet overhead per ACK (limited by RFC 5506).

# SCReAM feedback format

- Required for SCReAM functionality:
  - Arrival timestamp : Arrival timestamp of highest received RTP sequence number
    - 32 bits, timestamp clock equal to RTP media timestamp clock
  - List of received RTP packets
- Optional , can enhance QoE:
  - ECN counter : ECN-CE counter value
  - Source quench bit, used to force sender to reduce sending rate

# SCReAM Conclusions

- SCReAM feedback can be realized with RFC3611 for basic functionality
  - RFC6679 for ECN
- A future feedback format can however be useful
- Signaling interval ranges from 100-200ms at low media rates to 10-20ms at high bitrates
- Reduced size RTCP (RFC5506) is highly recommended.
  - Full compound RTCP transmission controlled by trr-int.
- RFC4585 regular mode is OK,

# SBD Feedback Requirements

- The mechanism needs to:
  a) Compute summary statistics based on accurate and precise per packet relative One Way Delay (OWD) measurements.
  b) Determine shared bottlenecks based on summary statistics.
- Three scenarios:
  1. Summary statistic calculations and SBD performed on senders.
  2. Summary statistic calculations performed on receivers, SBD on senders.
  3. Calculations and SBD performed on both senders and receivers (beyond current scope—allows cooperative detection of bottlenecks).

# Feedback Requirements – Summary

| Algorithm | Feedback |
|---|---|
| NADA | Recommended rate adaptation mode (rmode) |
| NADA | Aggregated congestion signal (x_curr) |
| NADA | Recently measured receiving rate (r_recv) |
| GCC | Packet identifier → **Packet loss** |
| GCC | Packet arrival time |
| SCReAM | Arrival timestamp of highest received RTP sequence number |
| SCReAM | List of received RTP packets → **Packet loss** |
| SCReAM | ECN counter (optional) |
| SCReAM | Source quench bit (optional) |
| SBD (S1) | OWD measurements for every packet → **Or packet send and arrival time?** |
| SBD (S2, S3) | Summary statistics, initialization of summary statistics to be collected |
| SBD (S3) | Bottleneck determinations |

**Could be calculated from info**

**arrival time**

# Feedback Interval – Summary

- Tradeoff between overhead and responsiveness

| Algorithm | Indicated Range | Recommended / used |
|---|---|---|
| NADA | 20 ms – 400 ms | 100 ms |
| GCC | 50 ms – 100 ms | 50 ms |
| SCReAM | 100-200 ms (low bitrates)<br>10-20 ms (high bitrates) | |
| SBD | | 350 ms |