Framework for Real-time Media Congestion Avoidance Techniques

draft-zhu-rmcat-framework-00

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Motivation and Scope

• Motivation:

• A viable real-time media congestion control solution needs more than network congestion control (i.e., estimating available bandwidth on the path) to interact with live encoder, or to support multiple media streams sharing the same sender.

• Outline *common functionality modules* needed in such a solution

• Provide *a consistent set of terminologies* for individual solution drafts

• Scope:

• Describe required/recommended functional modules

• Describe *example configurations* of basic functional modules
Common Functional Modules (1/2)

• Network congestion controller
  • In charge of congestion detection and available bandwidth estimation based on receiver feedback
  • For multiple streams sharing the same sender, calculates aggregate estimated available bandwidth

• Transmission queue
  • Absorbs instantaneous mismatch between video encoder output and regulated sending rate
  • Reports on current occupancy level to aid Rate Control decisions
Common Functional Modules (2/2)

• Rate controller

• Holistically determines *video target rate*, *sending rate*, and *probing rate* based on estimated available bandwidth and transmission queue occupancy level

• Multiple streams sharing the sender: distributes aggregate estimated bandwidth across all streams

• Network probe generator — for generating probing packets (e.g., dummy padding or FEC packets) as dictated by the rate controller, e.g., during initial ramp-up phase

• Shared states — for storage and exchange of congestion control states amongst multiple streams sharing a common sender
Example Configuration for Single Stream

Live Video Encoder

Network Probe Generator

Video Target Rate

Probing Rate

Rate Controller

Occupancy Level

Sending Rate

Estimated Available Bandwidth

RTCP Feedback Reports

Network Congestion Controller

Transmission Queue

Encoded Video Packets

Probing Packets

Outgoing Packets

Encoded Video Packets

Probing Rate

Video Target Rate

Probing Packets
Example Configuration for Multiple Streams

- Live Video Encoder 1
- Live Video Encoder N
- Encoded Video Packets
- Transmission Queue
- Outgoing Packets
- RTCP Feedback Reports
- Estimated Aggregate Available Bandwidth
- Shared States
- Sending Rate
- Occupancy Level
- Video Target Rates
- Rate Controller
- Network Congestion Controller
- Encoded Video Packets
Next Steps

- Needing further input:
  - General WG feedback: is this useful? does this match to what WG had in mind?
  - More detailed description of Shared States
  - Compatibility w.r.t. individual solution drafts
  - Should we merge or stay separate w.r.t. app-interaction and cc-codec-interaction drafts?

- Call for action:
  - Adoption as WG draft
  - General review comments