draft-wenger-avt-avpf-ccm-00.txt

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Codec Control Commands

- What are Codec Control Commands?
  - A request by a receiver for a mandatory action (or strong recommendation for an action) by a sender related to a codec.
    - Full Intra Request – Send the next picture as Intra picture (mandatory).
    - Video Temporal to Spatial Trade-Off (strong recommendation).
  - A request by a sender for a mandatory action (or strong recommendation for an action) by a receiver, sent out of band related to a codec.
    - Freeze Picture Request – Stop displaying the current video bitstream until a timeout or further notice.

Full Intra Request (FIR)

- FIR results in encoder generating and sending a decoder refresh point (I or IDR frame) to the decoder.
  - The encoder MUST generate the FIR based on the current coding strategy and the available network resources.
- Usage of FIR
  - Used in MCU (multipoint control unit) - new participants joining the conference, request for switching of video streams by the participants or initiated by the MCU.
  - FIR MUST not be used for error recovery. PLI should be used.
- No acknowledgement necessary
  - Decoder can easily detect Decoder Refresh Points from the bit stream
  - To increase reliability, sender can repeat the FIR request until a response is received.
- RTCP/AVPF payload type of feedback message

Temporary Max Media Bit Rate (TMMBR)

- TMMBR: receiver suggests to sender a temporary reduction in maximum media bit rate
  - In multiparty conferencing, each participant sends media to the MCU based on the bit rate it has negotiated during session setup. It has no knowledge of other participants supported bit rate.
  - The MCU sends the TMMBR message to the sender of the media with a bit rate value so as to support all the participants of the conference – applicable to multicasting scenario.
  - Transcoding can be applied at the MCU so as to support participants with low bit rates, but transcoding is an expensive operation and lowers media quality.
- TMMBR message is acknowledged with TMMBA message.
  - Not trivial to find out if the TMMBR message is received and the bit rate changed from the bit stream.
- RTCP/AVPF transport layer feedback message is defined for TMMBR.

TemporalSpatialTradeOff (TSTR)

- TSTR: suggests trade-off between spatial and temporal resolution.
  - A value of 0 indicates higher spatial resolution and value of 31 indicates higher frame rate.
  - The value does not correspond to the precise value of spatial quality or frame rate.
  - The encoder reaction may be to use a lower frame rate and higher QP (quantization parameter) or vice-versa.
- Usage of TSTR
  - A user, through GUI, requests changes according to his/her personal preference
- TSTR message is acknowledged with an TSTA message
  - TSTR message necessarily doesn’t result in bit stream which is easily identifiable at the receiver (sender of the TSTR message).
- RTCP payload type of feedback message is defined for TSTR

FreezePicture Indication (FRZ)

- FRZ message is sent by the encoder instructing the decoder to complete the decoding of the current picture and freeze the picture (stop rendering).
  - The rendering of the picture commences again once the freeze release message is received (in band in video bit stream) or after a timeout value – usually 6 seconds. Fallback of 30 sec.
- Usage of FRZ Indication message
  - In multiparty scenario, for stream switching, the MCU sends a FRZ request to the receiver before it switches to the new media source.
  - For gradual decoder refresh, where an image builds up slowly, for a good user experience a FRZ command is issued at the “begin” of the GDR.
- No acknowledgement message is required from the receiver of this message.
  - For reliability the sender could sent multiple freeze message. The RTP timestamp from which the freeze message applies should be repeated in all the freeze messages.
- RTCP payload type of feedback message is defined for FRZ.

Open Issues : General

- Is the general concept of 2 way Request/ACK in RTCP required or desirable ?
- Semantic ACK for TMMBR and TSTR
  - ACK of reception of TMMBR/TSTR message?
  - ACK including changed bitrate / tradeoff?
- Which feedback messages should not only allow specific targets but all receivers or senders?

Open Issues : TSTR

- Is ACK mechanism for TSTR required and useful ?
- Which feedback messages should not only allow specific targets but all receivers or senders?
- For the TSTA, should it be possible to indicate both positive and negative acknowledgement? OR should support from an end-point only be negotiated at session setup time?
- What should be the behavior of the encoder when it receives the TSTR message from with different values in multiparty scenario.

Open Issues: FRZ

- The video quality is severely reduced when the freeze request is delayed and delivered after the new media stream. Following options can pursued
  - Another method of video delivery be used like piggybacking it to all video packets?
  - Should this be supported at all as alternatives do exist ?
- Should Freeze request indication implemented with another protocol other than RTCP ?
- Is 30 seconds a reasonable time for freeze timeout ?

THANK YOU