RTP Functionalities for RTCWEB

A combined view from the authors of

draft-cbran-rtcweb-media-00

draft-perkins-rtcweb-rtp-usage-02

Introduction

- Agreement that RTP is the protocol choice for Real-time Media Transport.

- These slides walk through the proposed set of RTP features
  - Provide a short motivation and explanation
  - The proposed requirement level for Implementation in an RTCWEB end-point for each
  - **There is no discussion of RTP multiplexing in these slides**

- Open Issues:
  - RTP Retransmissions level of requirement
  - Forward Error Correction, method and requirements level
  - Bit-rate Adaptation Solution

Core Featuers

- RTP [RFC3550] is REQUIRED
- RTCP is REQUIRED
- SAVPF RTP Profile [RFC5124] is REQUIRED
  - Secure RTP provided
  - AVPF RTCP Transmission rules
    - Timelier transmission of events
    - More efficient usage of RTCP bandwidth
- Key-management for SRTP, most talked about candidate is DTLS-SRTP [RFC 5764]

RTP Optimizations

- RTP and RTCP Multiplexing [RFC5761] is REQUIRED
  - Multiplex RTP and RTCP on one lower layer identifier
- Reduced Size RTCP [RFC5506] is REQUIRED
  - Allows one to send RTCP packets that are not compound packets as specified in RFC3550
  - Improves RTCP performance when sending feedback events
- Symmetric RTP [RFC4961] is REQUIRED
  - Send RTP and RTCP in bi-directional flows within an RTP session
- Short-term persistent RTCP CNAME Generation (method B) [RFC6222] is RECOMMEND
  - High Quality CNAME identifiers
  - Preserves privacy

Conferencing Extensions

- The extensions improves centralized conferencing
- Full Intra Request (FIR) [RFC5104] is RECOMMEND
  - Used by centrla nodes to request a new Intra to facilitate switch or when a new user joins the session.
- Picture Loss Indicator (PLI) [RFC5104] is RECOMMENDED
  - Sent by end-points that are missing packets resulting in corrupted decoder state
- Temporary Maximum Media Stream Bit Rate Request [RFC5104] is RECOMMEND
  - Allows a central node or end-point to request a temporary cap in media bit-rate from a particular source.
  - Facilitates adaptation across central nodes

RTP Header Extensions

- RTP Header Extension provides Meta Data about media stream
- If any header extension is implemented [RFC5285] is REQUIRED
  - Core specification for extensible and stackable header extensions
- Rapid RTP Synchronization [RFC6051] is RECOMMENDED
  - The header extension allows RTP synchronization information also carried in RTCP to be sent with media stream at e.g. start up or when new end-point joins a conference
- Client to Mixer Audio Level [draft-ietf-avtext-client-to-mixer-audio-level] is RECOMMEND
  - Allows a mixer to make selection decision based on this header, rather than decoding audio and measuring audio levels
- Mixer to Client Audio Level [draft-ietf-avtext-mixer-to-client-audio-level] is OPTIONAL
  - Clients receiving a mixed audio stream gets indication of level for the ones included in the mix. Thus allowing GUI indications.

Open Issue: RTP Retransmission

- RTP Retransmission [RFC4588] is an RTP packet loss repair mechanism:
  - Allows for selective retransmissions, i.e. focus on intra frames or preserving prediction chains
  - Very bandwidth efficient
  - Down side is extra delay it adds between transmission and when media decoding can start
    - Usable in interactive communciation within continents
    - Ericsson has good practical experience using it in centralized video conferencing
  - Error free media at lower base quality prefered over erronous at higher base quality
  - Targets correcting packet loss rates up to ~5%
    - Bit-rate adaptation should prevent high persistent loss rates
- What level of Implementation Requirement should it have?
  - RECOMMENDED
  - OPTIONAL

Open Issue: Forward Error Correction

- Forward Error Correction (FEC) is an alternative to retransmission (RTX)
- Possible to reduce delay compared to RTX, but has more overhead.
  - Additional delay allows for reduction in overhead
- Possible Solutions
  - Basic redundancy [RFC2198] (audio and text only), or using the retransmission format [RFC4588]
  - XOR based Block FEC [RFC5109]
  - Block FEC Schemes, e.g. Reed-Salomon [draft-galanos-fecframe-rtp-reedsolomon-03] or Raptor [draft-ietf-fecframe-rtp-raptor-04]
- Potential IPR Concerns
- What to select, if any, is an Open Issue!

Open Issue: RTP Rate Control

- A Clear Need for RTP Media Rate Control:
  - Hetrogenous paths require that, at minimum, one prevents self-induced congestion
  - Avoiding filling buffers also keeps latency low
  - Some level of resource sharing is likely good:
    - TCP Friendliness is not required
- The open issue is the lack of a standardized, implemented and tested solution
- Possible Solutions are:
  - TFRC for RTP [draft-gharai-avtcore-rtp-tfrc-00]
  - RTP over DCCP [RFC 5762] using CCID=3 (TFRC) [RFC 5762] or CCID=4 (TFRC-SP) [RFC 5622]
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