A Practical Assessment Approach of the Interplay Between WebRTC and QUIC

David Baldassin\textsuperscript{a,b}, Ludovic Roux \textsuperscript{b}, Guillaume Urvoy-Keller\textsuperscript{a} and Dino Martín Lopez-Pacheco\textsuperscript{a}

\textsuperscript{a} Université Côte d’Azur, CNRS, I3S, France
\textsuperscript{b} CoSMoSoftware, Singapore

Motivation

- Objective: efficiently combine QUIC and WebRTC
- Contribution: a flexible container-based testbed featuring
  - WebRTC with Legacy QUIC
  - WebRTC over unreliable datagram extension of QUIC
- Open questions:
  - Which QUIC implementation?
  - Which congestion control (CC) algorithm at the QUIC and WebRTC level?
  - Interplay between QUIC and WebRTC level CC

Related Work

- Work by J.Ott and M.Engelbart
  - QUIC unreliable extension [IETF draft] \[3\]
  - RTP over QUIC experiments [1]
- Related Work
  - Work by J.Ott and M.Engelbart
  - QUIC unreliable extension (IETF draft) \[3\]
  - RTP over QUIC experiments [1]

A QUIC tunnel-based tested for WebRTC

- No native QUIC support in WebRTC → interconnect two WebRTC peers through a light QUIC tunnel
- Signaling: replace ICE candidate ports with QUIC tunnel listening port
- Media: listen for RTP packets and forward them in the QUIC tunnel

Related Work

- Work by J.Ott and M.Engelbart
  - QUIC unreliable extension [IETF draft] \[3\]
  - RTP over QUIC experiments [1]

First experiments

- Results [1]:
  - Two CC algorithms: one for RTP (SCReAM) and one for QUIC (QUIC NewReno)
  - The bitrate collapses when mixing two CC algorithms

A QUIC tunnel-based tested for WebRTC

- No native QUIC support in WebRTC → interconnect two WebRTC peers through a light QUIC tunnel
- Signaling: replace ICE candidate ports with QUIC tunnel listening port
- Media: listen for RTP packets and forward them in the QUIC tunnel

Related Work

- Work by J.Ott and M.Engelbart
  - QUIC unreliable extension [IETF draft] \[3\]
  - RTP over QUIC experiments [1]

A QUIC tunnel-based tested for WebRTC

- No native QUIC support in WebRTC → interconnect two WebRTC peers through a light QUIC tunnel
- Signaling: replace ICE candidate ports with QUIC tunnel listening port
- Media: listen for RTP packets and forward them in the QUIC tunnel

Ongoing Work

- Flexible testbed with mvfst and quic-go implementations . . . to be released as open source
- Initial tests: upper (WebRTC level) CC algorithm dominates
- Next steps
  - Investigate other network scenarios, e.g. random losses, to further test CC interactions
  - Add other QUIC implementations, e.g. Google or Microsoft
  - Test interoperability
  - Add video quality indicators (SSIM, VMAF)

References

\[1\] M. Engelbart and J. Ott.
Congestion control for real-time media over QUIC.

\[2\] S. G. Murillo.
Medooze media server.

\[3\] J. Ott and M. Engelbart.
RTP over QUIC.
Internet-Draft draft-ietf-avtcore-rtp-over-quic-00, Internet Engineering Task Force, July 2022.

October 23, 2022