Simulcast

draft-ietf-mmusic-sdp-simulcast-03

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Agenda

• Review common use case
• Review PT-based design in -02 draft
• Limitations of PT-based design
  – PT space exhaustion
  – Bandwidth constraints for VP8, VP9
  – ULP FEC using SSRC mux (draft-lennox-payload-ulp-ssrc-mux)
  – Initially paused streams
• New RID-based design in -03 draft
• Open issues
  – PT/RID mandatory to implement, offer, answer?
  – Directionality: explicit not implicit, disallow sendrecv
  – ABNF syntax: delimiters, semantic rules
  – Single transport only
Review Common Use Case: Simulcast of HD + thumbnail to Mixer

A, B, C, D = Large/HD resolution stream
a, b, c, d = small/thumbnail resolution stream
Review Common Use Case: Simulcast of HD + thumbnail to Mixer

Offer from Client to Mixer:
2 simulcast send streams A,a (HD, thumbnail)
1 main receive stream B (HD)
2 recv-only thumbnail streams c,d (not simulcast)

m=video 10000 RTP/SAVPF 96 97
a=rtpmap:96 VP8/90000 (HD)
a=rtpmap:97 VP8/90000 (thumbnail)
a=fmtp:96 max-fs=3600;max-fr=30 (HD 1280x720p30)
a=fmtp:97 max-fs=240;max-fr=15 (thumbnail 320x180p15)
a=simulcast:send pt=96;97 recv pt=96
(send A HD + a thumbnail, receive B HD)
Review Simulcast-02 PT-based SDP

- Simulcast attribute expresses **concurrent** RTP streams, as a semi-colon separated list, in each direction.
- **Payload Type** fully specifies each unique encoding for each simulcast stream.

m=video 10000 RTP/SAVPF 96 97
a=rtpmap:96 VP8/90000 (HD)
a=rtpmap:97 VP8/90000 (thumbnail)
a=fmtp:96 max-fs=3600;max-fr=30 (HD 1280x720p30)
a=fmtp:97 max-fs=240;max-fr=15 (thumbnail 320x180p15)
a=simulcast:send pt=96;97 recv pt=96
(send HD + thumbnail, receive HD)
Limitations of PT-based Simulcast

• PT space exhaustion
  – Primary dynamic (safest) space is only 32 (96-127)
  – Unassigned/static space can give another 64 (0-63)

• Bandwidth constraints for VP8, VP9
  – VP8, VP9 lack max-br in fmp to limit bitrate per PT
  – Perhaps no need for this; other codecs have no issues

• ULP FEC using SSRC mux (draft-lennox-payload-ulp-ssrc-mux)
  – RFC 5576 (a=ssrc-group:FEC) needed to map FEC to simulcast stream
  – Flex FEC (draft-ietf-payload-flexible-fec-scheme) has no issues

• Initially paused streams
  – Resume by receiver requires it knows the right SSRC
  – RTCP SDES provides SSRC/MID but not PT to map each simulcast stream
New Simulcast-03 RID-based SDP

- Simulcast attribute expresses **concurrent** RTP streams, as a semi-colon separated list, in each direction.
- **RID** fully specifies each unique encoding for each simulcast stream, to avoid the limitations of PT.

```
m=video 10000 RTP/SAVPF 96
a=rtpmap:96 VP8/90000
a=fmtp:96 max-fs=3600;max-fr=30 (HD 1280x720p30)
a=rid:1 send max-fs=240;max-fps=15 (thumbnail 320x180p15)
a=rid:2 send (unconstrained)
a=rid:3 recv (unconstrained)
a=simulcast:send rid=2;1 recv rid=3
(send HD + thumbnail, receive HD)
```
RID Removes PT Limitations

- PT space exhaustion
  - PT only conveys codec (rtpmap) and key configuration (profile, etc.)
  - RID conveys common constraints, very large ID space (255 octets)

- Bandwidth constraints for VP8, VP9
  - RID conveys max-br constraints per simulcast stream

- ULP FEC using SSRC mux (draft-lennox-payload-ulp-ssrc-mux)
  - FEC streams tagged with RID of source simulcast stream

- Initially paused streams
  - RTCP SDES provides SSRC/MID/RID to map each simulcast stream
  - Receiver can resume after receiving RTCP SDES with SSRC/MID/RID
    a=simulcast:send rid=2;1 recv rid=3 paused=2
    (send HD (initially paused) + thumbnail, receive HD)
Open Issues

• PT/RID mandatory to implement, offer, answer?
  – one, both or neither mandatory?

• Directionality
  – explicit not implicit from RID or m-section direction
  – disallow sendrecv

• ABNF syntax
  – delimiters
  – semantic rules

• Single transport only
  – no spec for simulcast across multiple transports
PT/RID Mandatory to Implement

- PT mandatory, RID optional in simulcast-03
- RID authors prefer RID mandatory
- Both mandatory as potential compromise?
  - Option 1. Offer includes both, answer picks one.
  - Option 2. Offer picks one, answer must agree.
- RID always required to avoid PT limitations?
  - Option 3. Echo each PT as RID in SDP and RTCP SDES
    a=rid:96 send pt=96 (also send RID=96 in RTCP SDES)
    a=rid:96- recv pt=96 (peer sends RID=96- in RTCP SDES)
Directionality

• Explicit or implicit from RID or m-section dir?
  – RECOMMEND explicit always
  – Simulcast is often asymmetric so specifying the formats in each direction explicitly often makes the most sense.

• Disallow sendrecv?
  – RECOMMEND to disallow sendrecv
  – Confusion and complexity of sendrecv outweighs the slight syntax compaction in symmetric cases.
Syntax

• Delimiters
  – SP not WSP
  – Semicolon between streams (PTs or RIDs)
  – Comma between alternative formats (PTs or RIDs)

• Escaping
  – RID identifier is alphanumeric plus “-” and “_”
  – So escaping is unnecessary

• Semantic rules
  – Syntax does not enforce semantic rules
  – But no ABNF ever goes this far, so let’s be practical with what the syntax enforces versus what semantic rules must be followed beyond the syntax.
Single vs. Multiple Transport

- Simulcast-03 only specifies single transport cases to align with Unified Plan, which specifies that all streams from the same source appear in the same m-section

- Simulcast across multiple transport cases are out of scope
Next Steps

• Close PT/RID mandatory issue
• Update draft with PT/RID mandatory decision and any other remaining open issues
• Prepare for WG LC if no major open issues