Simulcast

draft-ietf-mmusic-sdp-simulcast-03

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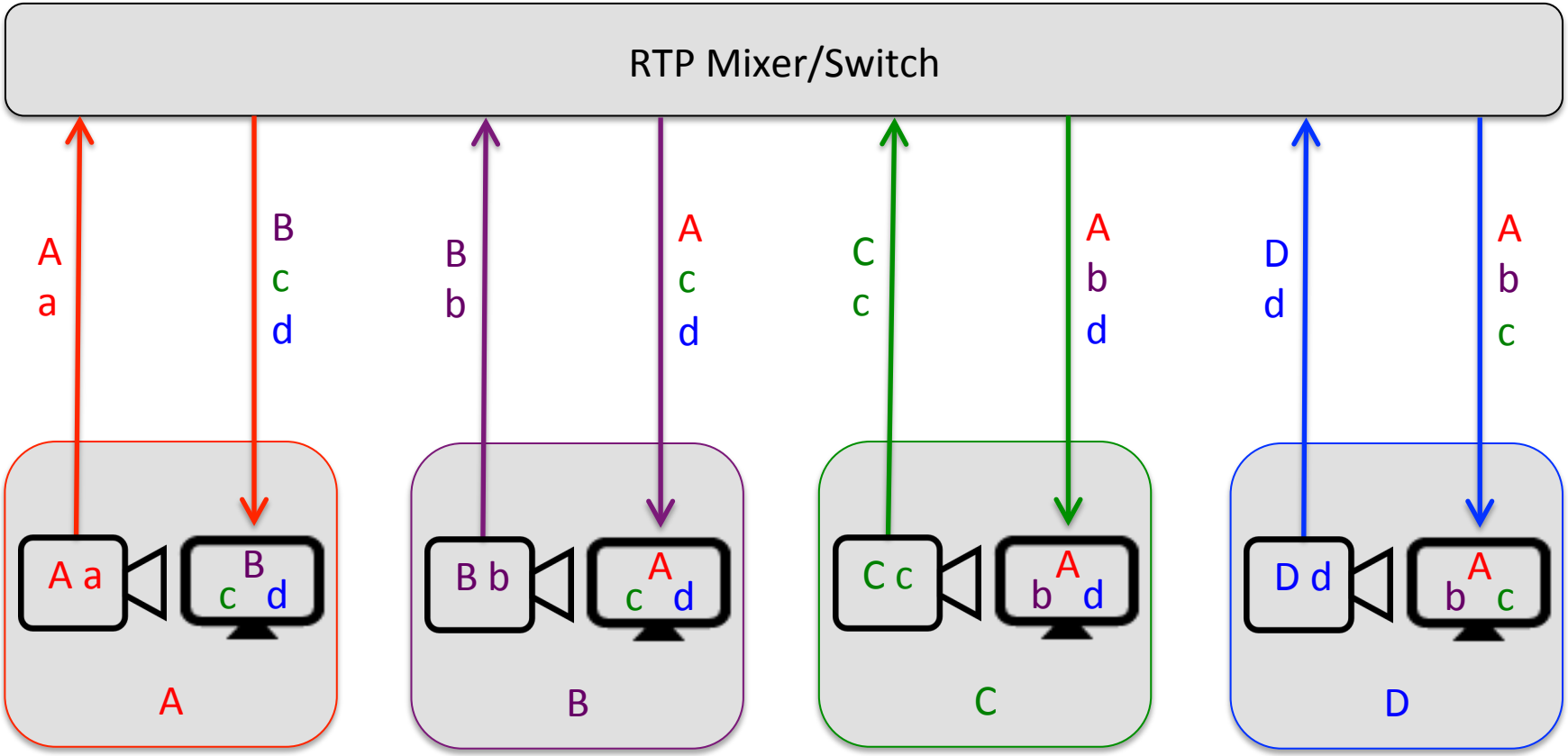
Agenda

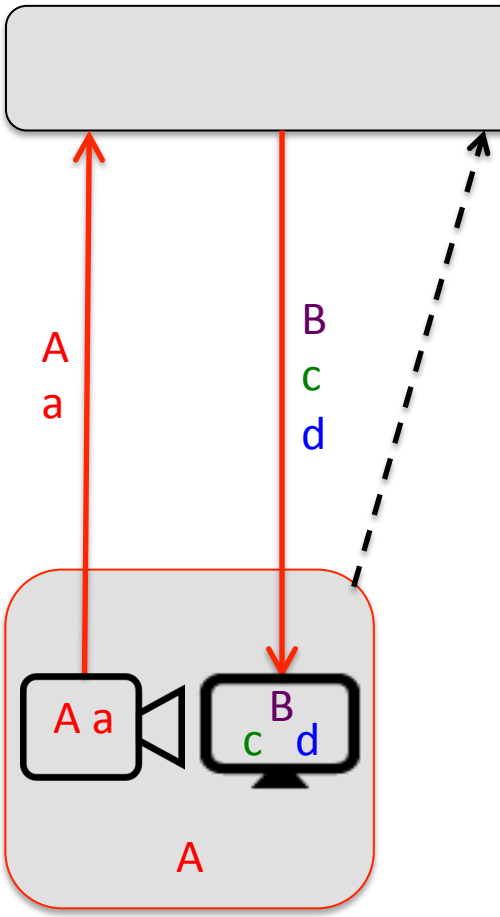
- Review common use case
- Review PT-based design in -02 draft
- Limitations of PT-based design
  - PT space exhaustion
  - Bandwidth constraints for VP8, VP9
  - ULP FEC using SSRC mux (draft-lennox-payload-ulp-ssrc-mux)
  - Initially paused streams
- New RID-based design in -03 draft
- Open issues
  - 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 fmtp 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