

# SIMULCAST SIGNALING

[draft-westerlund-avtcore-rtp-simulcast-03](#)

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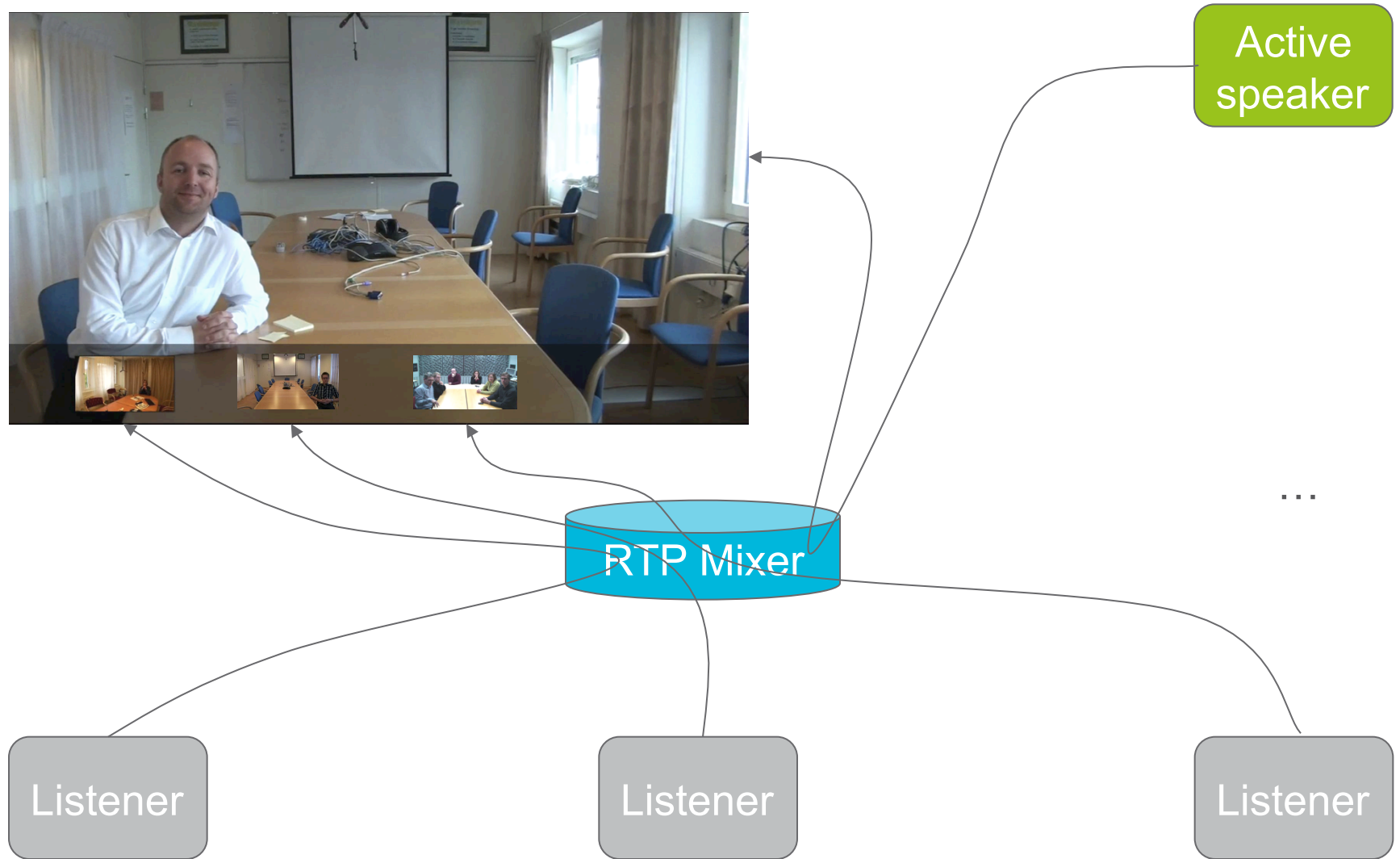
# OVERVIEW

- › IPR Disclosures
- › What is Simulcast
- › Design Goals
- › Solution Overview
  - Walk through of Unified example
  - Brief look on Multiple Transport
- › Going Forward

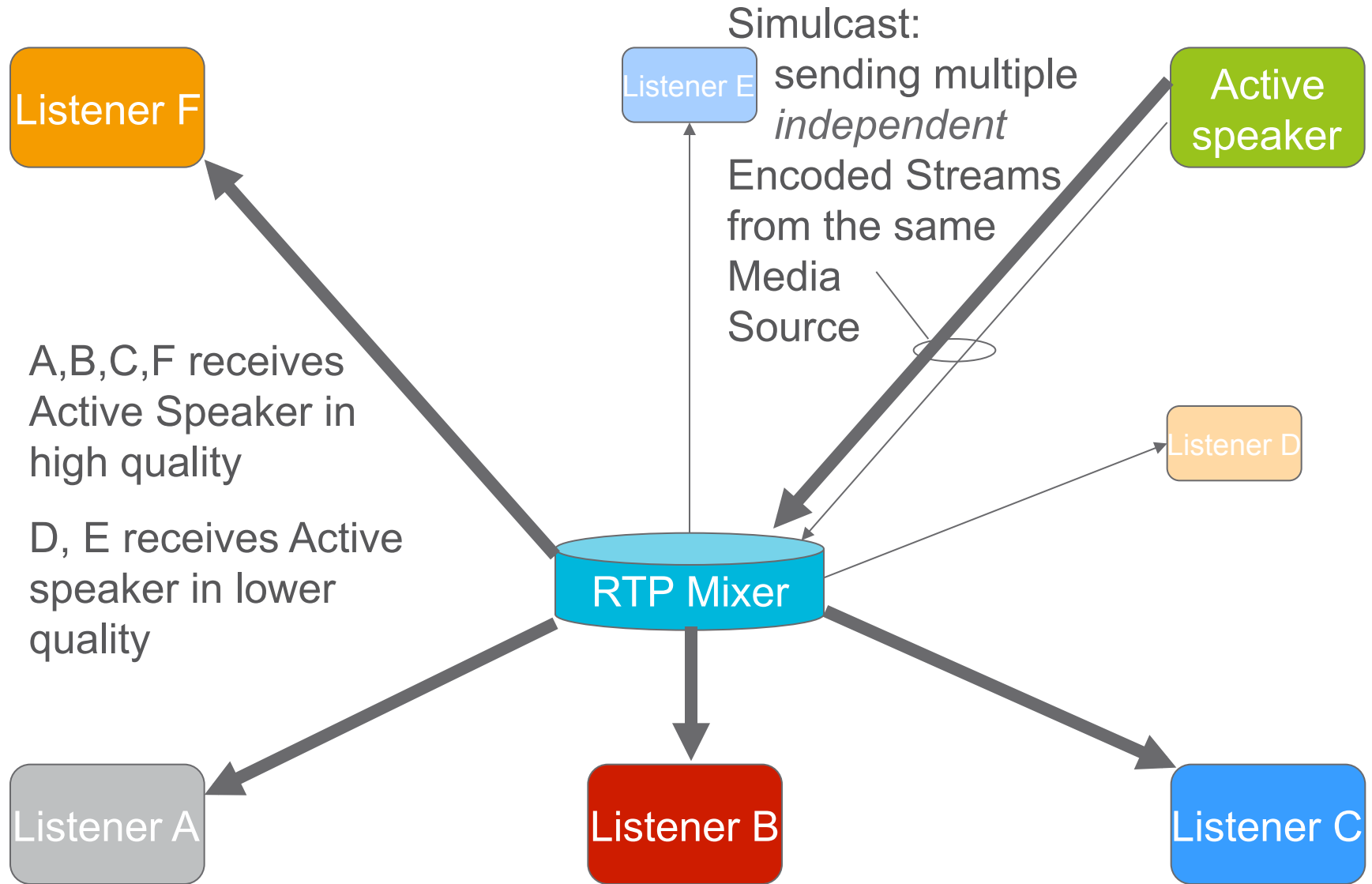
# IPR Disclosures

- › Telefonaktiebolaget LM Ericsson (publ)'s has made a Statement about IPR related to this draft in <https://datatracker.ietf.org/ipr/1592/>
- › Microsoft Corporation has made a statement about IPR related to this draft in <https://datatracker.ietf.org/ipr/2157/>

# A Target Scenario



# Simulcast



# DESIGN GOALS

- › Enable negotiation of simulcast per direction
- › Determine each peer's capabilities and preferences for Simulcast dimensions
  - Video Resolution
  - Frame-rate
  - Codec
  - Bit-rate variations
  - Extensible
- › Arrive at media codec configurations to use
  - Including number of Encoded Streams
- › Usable in both
  - Unified, i.e. all Encoded Streams per Media Source (m=)
  - Across multiple m= lines
- › Negotiate simulcast support but keep particular Encoded Stream inactive
  - Re-enable on request
- › Establish boundaries for Encoded Streams using regular SDP media description mechanisms
- › Enabling association between Source Packet Streams, Media Source and Encoded Streams

# SOLUTION BASICS

## SIMULCAST RECEIVER OFFER UNIFIED PLAN

b=AS:2345

a=sim-recv-cap:imageattr=1.0 framerate=0.8

m=audio 49200 RTP/AVP 96

b=AS:145

a=rtpmap:96 G719/48000/2

m=video 49300 RTP/AVP 97

b=AS:2200

a=rtpmap:97 H264/90000

a=fmtp:97 profile-level-id=42c01e

a=config-id:a recv pt=97 imageattr=[x=640,y=360],[x=1280,y=720]

framerate=25-60 b=AS:500-2500

a=config-id:b recv pt=97 imageattr=[x=320,y=180],[x=640,y=360]

framerate=25-60 b=AS:150-500

a=config-id:c recv pt=97 imageattr=[x=256,y=144],[x=320,y=180]

framerate=10-30 b=AS:100-250

a=sim-recv:a b c

# SOLUTION BASICS

## SIMULCAST RECEIVER OFFER UNIFIED PLAN

b=AS:2345

a=sim-recv-cap:imageattr=1.0 framerate=0.8

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framerate=25-60 b=AS:150-500

a=config-id:c recv pt=97 imageattr=[x=256,y=144],[x=320,y=180]  
framerate=10-30 b=AS:100-250

a=sim-recv:a b c



Offerer can do simulcast

Likes to receive

Not capable or interested to send (No a=sim-send-cap)

Offerer prefers resolution variations

Also interested in frame-rate changes

Bitrate variations are implicit



# SOLUTION BASICS

## SIMULCAST RECEIVER OFFER UNIFIED PLAN

b=AS:2345

a=sim-recv-cap:imageattr=1.0 fra

m=audio 49200 RTP/AVP 96

b=AS:145

a=rtpmap:96 G719/48000/2

m=video 49300 RTP/AVP 97

b=AS:2200

a=rtpmap:97 H264/90000

a=fmtp:97 profile-level-id=42c01e

**a=config-id:a recv pt=97 imageattr=[x=640,y=360],[x=1280,y=720]**

**framerate=25-60 b=AS:500-2500**

a=config-id:b recv pt=97 imageattr=[x=320,y=180],[x=640,y=360]

framerate=25-60 b=AS:150-500

a=config-id:c recv pt=97 imageattr=[x=256,y=144],[x=320,y=180]

framerate=10-30 b=AS:100-250

a=sim-recv:a b c

### Proposed Media Configuration a

- Configuration IDs (a) has Global Scope
- Want to receive (recv)
- Use Payload Type 97 (pt=97)
- Desired Alternative Resolutions (imageattr)
  - 640x360 or 1280x720
- Frame rate in 25-60 Hz range
- Bandwidth in 500-2500 kbps range



# SOLUTION BASICS

## SIMULCAST RECEIVER OFFER UNIFIED PLAN

b=AS:2345

a=sim-recv-cap:imageattr=1.0

m=audio 49200 RTP/AVP 96

b=AS:145

a=rtpmap:96 G719/48000/2

m=video 49300 RTP/AVP 97

b=AS:2200

a=rtpmap:97 H264/90000

a=fmtp:97 profile-level-id=42c01e

a=config-id:a recv pt=97 imageattr=[x=640,y=360],[x=320,y=180],[x=280,y=720]

framerate=25-60 b=AS:500-2500

**a=config-id:b recv pt=97 imageattr=[x=320,y=180],[x=640,y=360]**

**framerate=25-60 b=AS:150-500**

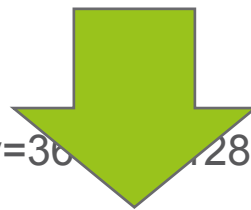
a=config-id:c recv pt=97 imageattr=[x=256,y=144],[x=320,y=180]

framerate=10-30 b=AS:100-250

a=sim-recv:a b c

### Proposed Media Configuration b

- Want to receive (recv)
- Use Payload Type 97 (pt=97)
- Desired Alternative Resolutions (imageattr)
  - 320x180 or 640x360
- Frame rate in 25-60 Hz range
- Bandwidth in 150-500 kbps range



# SOLUTION BASICS

## SIMULCAST RECEIVER OFFER UNIFIED PLAN

b=AS:2345

a=sim-recv-cap:imageattr=1.0

m=audio 49200 RTP/AVP 96

b=AS:145

a=rtpmap:96 G719/48000/2

m=video 49300 RTP/AVP 97

b=AS:2200

a=rtpmap:97 H264/90000

a=fmtp:97 profile-level-id=42c01e

a=config-id:a recv pt=97 imageattr=[x=640,y=360],[x=280,y=720]

framerate=25-60 b=AS:500-2500

a=config-id:b recv pt=97 imageattr=[x=320,y=180],[x=160,y=360]

framerate=25-60 b=AS:150-500

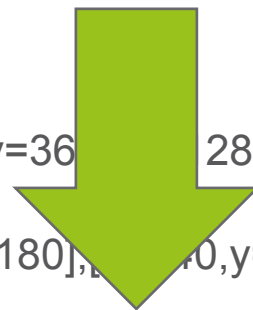
**a=config-id:c recv pt=97 imageattr=[x=256,y=144],[x=320,y=180]**

**framerate=10-30 b=AS:100-250**

a=sim-recv:a b c

### Proposed Media Configuration c

- Want to receive (recv)
- Use Payload Type 97 (pt=97)
- Desired Alternative Resolutions (imageattr)
  - 256x144 or 320x180
- Frame rate in 10-30 Hz range
- Bandwidth in 100-250 kbps range



# SOLUTION BASICS

## SIMULCAST RECEIVER OFFER UNIFIED PLAN

b=AS:2345

a=sim-recv-cap:imageattr=1.0 framerate=0.8

m=audio 49200 RTP/AVP 96

b=AS:145

a=rtpmap:96 G719/48000/2

m=video 49300 RTP/AVP 97

**b=AS:2200**

a=rtpmap:97 H264/90000

a=fmtp:97 profile-level-id=42c01e

a=config-id:a recv pt=97 imageattr=[x=640,y=360],[x=1280,y=720]

framerate=25-60 b=AS:500-2500

a=config-id:b recv pt=97 imageattr=[x=640,y=360],[x=1280,y=720]

framerate=25-60 b=AS:150

a=config-id:c recv pt=97 imageattr=[x=640,y=360],[x=1280,y=720]

framerate=10-30 b=AS:100

**a=sim-recv:a b c**

### Simulcast of Video must

- Keep within total bit-rate maximum 2200 kbps

### This Media Source (m=)

- Requests to receive simulcast
- Requests to use all three defined configurations (a b c) concurrently

# SOLUTION BASICS

## SIMULCAST SENDER ANSWER UNIFIED PLAN

b=AS:825

a=sim-send-cap:imageattr framerate

m=audio 49200 RTP/AVP 96

b=AS:145

a=rtpmap:96 G719/48000/2

m=video 49300 RTP/AVP 97

b=AS:520

a=rtpmap:97 H264/90000

a=fmtp:97 profile-level-id=42c01e

a=config-id:b send pt=97 imageattr=[x=640,y=360]

framerate=25-30 b=AS:150-400

a=config-id:c send pt=97 imageattr=[x=320,y=180]

framerate=10-12.5 b=AS:100-150

a=sim-send:b c:inactive

a=ssrc:31053821 cname=SDIe93850aQFid9P srcname=1.b

a=ssrc:43298172 cname=SDIe93850aQFid9P srcname=1.c

a=imageattr:97 send [x=640,y=360] [x=320,y=180]

recv [x=640,y=360] [x=320,y=180]

# SOLUTION BASICS

## SIMULCAST SENDER ANSWER UNIFIED PLAN

b=AS:825

**a=sim-send-cap:imageattr framerate**

m=audio 49200 RTP/AVP 96

b=AS:145

a=rtpmap:96 G719/48000/2

m=video 49300 RTP/AVP 97

b=AS:520

a=rtpmap:97 H264/90000

a=fmtp:97 profile-level-id=42c01e

a=config-id:b send pt=97 imageattr=[x=640,y=360]  
framerate=25-30 b=AS:150-400

a=config-id:c send pt=97 imageattr=[x=320,y=180]  
framerate=10-12.5 b=AS:100-150

a=sim-send:b c:inactive

a=ssrc:31053821 cname=SDIe93850aQFid9P srcname=1.b

a=ssrc:43298172 cname=SDIe93850aQFid9P srcname=1.c

a=imageattr:97 send [x=640,y=360] [x=320,y=180]  
recv [x=640,y=360] [x=320,y=180]

### Answerer

- Is capable to send simulcast
- Supports media configuration differences in
  - video resolution
  - frame rate
- Offerer didn't include a=sim-send-cap
  - Answerer can't request simulcast reception

# SOLUTION

## SIMULCAST SE

b=AS:825  
a=sim-send-cap:imageattr  
m=audio 49200 RTP/AV  
b=AS:145  
a=rtpmap:96 G719/4800  
m=video 49300 RTP/AV  
b=AS:520

a=rtpmap:97 H264/90000

a=fmtp:97 profile-level-id=42c01e

**a=config-id:b send pt=97 imageattr=[x=640,y=360]  
framerate=25-30 b=AS:150-400**

a=config-id:c send pt=97 imageattr=[x=320,y=180]  
framerate=10-12.5 b=AS:100-150

a=sim-send:b c:inactive

a=ssrc:31053821 cname=SDIe93850aQFid9P srcname=1.b

a=ssrc:43298172 cname=SDIe93850aQFid9P srcname=1.c

a=imageattr:97 send [x=640,y=360] [x=320,y=180]  
recv [x=640,y=360] [x=320,y=180]

### Answerer

- Has rejected media configuration a
  - Removed it from answer
- Media Configuration b
  - Direction send
  - Confirms usage of Payload Type 97
  - Resolution configuration narrowed to:
    - 640x360 only
  - Frame rate 25 to 30 Hz
  - Bitrate range reduced to 150-400 kbps



# SOLUTION BASICS

## SIMULCAST SENDER ANSWER UNIFIED PLAN

b=AS:825

a=sim-send-cap:imageattr

m=audio 49200 RTP/AV

b=AS:145

a=rtpmap:96 G719/4800

m=video 49300 RTP/AV

b=AS:520

a=rtpmap:97 H264/9000

a=fmtp:97 profile-level-id=42001c

a=config-id:b send pt=97 imageattr=[x=640,y=360]

framerate=25-30 b=AS:150-400

**a=config-id:c send pt=97 imageattr=[x=320,y=180]**

**framerate=10-12.5 b=AS:100-150**

a=sim-send:b c:inactive

a=ssrc:31053821 cname=SDIe93850aQFid9P srcname=1.b

a=ssrc:43298172 cname=SDIe93850aQFid9P srcname=1.c

a=imageattr:97 send [x=640,y=360] [x=320,y=180]

recv [x=640,y=360] [x=320,y=180]

### Media Configuration c

- Direction send
- Confirms usage of payload type 97
- Resolution configuration narrowed to:
  - 320x180 only
- Frame rate range reduced to 10-12.5 Hz
- Bitrate range reduced to 100-150 kbps



# SOLUTION BASICS

SIMULCAST SENDER ANSWER UNIFIED PLAN

Answerer states:

- Capable of simulcasting media configurations B and C concurrently
- Simulcasting of configuration c is currently inactive
  - On stand by
  - Enabled by:
    - SDP O/A signaling
    - Other mechanisms e.g.
      - [draft-westerlund-avtext-rtp-stream-pause-04](#)

a=config-id:b send pt=97 imageattr=[x=640,y=360]

frame=0 b=AS:150-400

a=conf b=AS:150-400 pt=97 imageattr=[x=320,y=180]

frame=0-12.5 b=AS:100-150

**a=sim-send:b c:inactive**

a=ssrc:31053821 cname=SDIe93850aQFid9P srcname=1.b

a=ssrc:43298172 cname=SDIe93850aQFid9P srcname=1.c

a=imageattr:97 send [x=640,y=360] [x=320,y=180]

recv [x=640,y=360] [x=320,y=180]

# SOLUTION BASICS

## SIMULCAST SENDER ANSWER UNIFIED PLAN

b=AS:825

a=sim-send-cap:imageattr framerate

m=audio 49200 RTP/AVP 96

b=AS:145

a=rtpmap:96 G719/48000/2

m=video 49300 RTP/AVP 97

b=AS:520

a=rtpmap:97 H264/90000

a=fmtp:97 profile-level-id=42c01e

a=config-id:b send pt=97 imageattr=[x=640,y=360] [x=320,y=180]  
framerate=25-30 b=AS:150-400

a=config-id:c send pt=97 imageattr=[x=640,y=360] [x=320,y=180]  
framerate=10-12.5 b=AS:100-150

a=sim-send:b c:inactive

**a=ssrc:31053821 cname=SDIe93850aQFid9P srcname=1.b**

**a=ssrc:43298172 cname=SDIe93850aQFid9P srcname=1.c**

a=imageattr:97 send [x=640,y=360] [x=320,y=180]  
recv [x=640,y=360] [x=320,y=180]

- Optional to use in SDP!
- Provide in Signaling information from RTP/RTCP SDES Items:
  - SRCNAME - [draft-westerlund-avtext-rtcp-sdes-srcname-03](#)
  - CNAME
- Identifies SSRCs that contains:
  - Media source (SDIe93850aQFid9P:1)

• Encodings b and c



# MULTIPLE M= SIMULCAST

## ANSWER FROM RECEIVER

```
b=AS:795
a=sim-recv-cap:imageattr framerate
a=sim-recv:x y
m=audio 49200 RTP/AVP 96
b=AS:145
a=rtpmap:96 G719/48000/2
m=video 49300 RTP/AVP 118
b=AS:500
a=rtpmap:118 H264/90000
a=fmtp:118 profile-level-id=42c01e
a=config-id:x recv pt=118
    imageattr=[x=640,y=360]
    framerate=25-50 b=AS:350-500
a=imageattr:118 send [x=640,y=360]
    [x=320,y=180] recv [x=640,y=360]
    [x=320,y=180]
```

```
m=video 49400 RTP/AVP 119
b=AS:150
a=rtpmap:119 H264/90000
a=fmtp:119 profile-level-id=42c01e
a=config-id:y recv pt=119
    imageattr=[x=256,y=144]
    framerate=12.5-25 b=AS:120-150
a=imageattr:119 recv [x=320,y=180]
    [x=256,y=144]
a=recvonly
```

# RELATED PROPOSALS

- › Relying on SRCNAME to make RTP side work:
  - [draft-westerlund-avtext-rtcp-sdes-srcname-03](#)
  - Provides ID/Relation for each received SSRCs
    - › Media Source (Scoped by CNAME)
    - › Particular Encoding Configuration
    - › Example: 1.B
  - Ensures that receiver knows which media source it contains
  - Ensures that receiver knows which representation it is
    - › Separate between multiple received configurations

# RELATED PROPOSALS

- › RTP Header Extension for SDES items
  - [draft-westerlund-avtext-sdes-hdr-ext-01](#)
  - For new SSRCs or new Session Participants
    - › Speed up delivery, by including from first/early packets received
    - › Fate sharing with Media by being in RTP header
  - Enables both SRCNAME and CNAME to be timely delivered
  - Optional improvement
- › Was Discussed in AVTEXT on Tuesday
  - Discussion will continue on mailing list

# GOING FORWARD

- › Simulcast in WebRTC has significant interest
- › Core of WebRTC will try to finish up next year
- › To ensure WebRTC and SIP/SDP Interoperability
  - Need to develop solution that works and interoperate
  - Provide it in a timely fashion
- › Is this good enough starting point for WG Item?