draft-singh-avtcore-mprtp-04

Varun Singh, Joerg Ott
AVTCORE IETF83
Updates since -02

• Updates based on comments from MMUSIC
• MPRTP interface advertisements in SDP
  – Without ICE
  – With ICE
• Clarified in-band vs out-of-band interface advertisements (Sec 7.1.3.)
• RTSP using MPRTP
Re-cap

• Advertise Candidates
• RTP header extension for Subflow ID and Subflow sequence numbers
• Subflow RTCP for reporting path characteristics
Interface Advertisement

• Out-of-band: in SDP
• In-band: RTCP or suitable STUN extension

• Out-of-band signaling for session setup and initial interface negotiation
• In-band signaling to deal with frequent changes in interface state.

• The endpoint SHOULD always respond using the same mechanism
• If a mismatch in type of advertisements occurs then SDP MUST be used.
Interface advertisement in SDP

mp rt p-interf ace = "interface" "::" counter SP unicast-address "::" rtp_port *(SP interface-description-extension)

Example

v=0
o=alice 2890844526 2890844527 IN IP4 192.0.2.1
s=
c=IN IP4 192.0.2.1
t=0 0
m=video 49170 RTP/AVP 98
a=rtpmap:98 H264/90000
a=fmtp:98 profile-level-id=42A01E;
a=extmap:1 urn:ietf:params:rtp-hdrext:mp rt p
a=mp rtp interface:1 195.148.127.42:49170
a=mp rtp interface:2 130.233.154.105:51372
1. Advertise ICE candidates (initial offer): the endpoints run connectivity checks.


• When adding an interface in mid-session, should the endpoints also send the ICE candidates for the connections in use?

• What happens when an updated offer does not contain ICE candidates but MPRTP interfaces
ICE SDP Example

INITIAL OFFER:

m=video 49170 RTP/AVP 98
a=rtpmap:98 H264/90000
a=fmtp:98 profile-level-id=42A01E;
a=candidate:1 1 UDP 2130706431 195.148.127.42 49170 typ host
a=candidate:2 1 UDP 1694498815 130.233.154.105 51372 typ host

ANSWER:

m=video 4000 RTP/AVP 98
a=rtpmap:98 H264/90000
a=fmtp:98 profile-level-id=42A01E;
a=candidate:1 1 UDP 2130706431 195.148.127.36 4000 typ host

(after enough connectivity checks succeed)

UPDATED OFFER (with MPRTP interfaces):

a=mprtp interface:1 195.148.127.42:49170
a=mprtp interface:2 130.233.154.105:51372

ANSWER:

a=mprtp interface:1 195.148.127.36:4000
Open Issues

• In-band vs Out-of-band
  – Both or do only one?

• Keep the basic SDP but move the complex cases to another document?
Some results

**TABLE I: Single Path vs Multiple Paths**

<table>
<thead>
<tr>
<th>Path Characteristic</th>
<th>Avg. PSNR</th>
<th>$\sigma_{PSNR}$</th>
<th>PLR</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Losses on any path</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-Path</td>
<td>48.427</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>2-Path</td>
<td>48.427</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>3-Path</td>
<td>48.427</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>0.5% Loss on every paths</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-Path</td>
<td>40.887</td>
<td>0.506</td>
<td>0.49</td>
</tr>
<tr>
<td>2-Path</td>
<td>40.314</td>
<td>0.576</td>
<td>0.505</td>
</tr>
<tr>
<td>3-Path</td>
<td>40.406</td>
<td>0.849</td>
<td>0.494</td>
</tr>
<tr>
<td>1% Loss on every paths</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-Path</td>
<td>36.172</td>
<td>0.705</td>
<td>1.01</td>
</tr>
<tr>
<td>2-Path</td>
<td>36.564</td>
<td>1.006</td>
<td>0.94</td>
</tr>
<tr>
<td>3-Path</td>
<td>36.212</td>
<td>0.572</td>
<td>0.99</td>
</tr>
<tr>
<td>Dissimilar RTTs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-Path</td>
<td>48.303</td>
<td>0.278</td>
<td>0.004</td>
</tr>
</tbody>
</table>

libgstreamer, libx264, Dummynet
TABLE II: Varying Link Properties

<table>
<thead>
<tr>
<th>Variable losses per path</th>
<th>Avg. PSNR</th>
<th>( \sigma_{PSNR} )</th>
<th>PLR</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Path (0-0.5%)</td>
<td>43.4</td>
<td>1.9</td>
<td>0.24</td>
</tr>
<tr>
<td>3-Path (0-1.0%)</td>
<td>40.5</td>
<td>0.49</td>
<td>0.48</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable RTT per path</th>
<th>Avg. PSNR</th>
<th>( \sigma_{PSNR} )</th>
<th>PLR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Path</td>
<td>48.164</td>
<td>0.32</td>
<td>0.0121</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable channel capacity per path</th>
<th>Avg. PSNR</th>
<th>( \sigma_{PSNR} )</th>
<th>PLR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Path</td>
<td>42.93</td>
<td>2.23</td>
<td>0.772</td>
</tr>
</tbody>
</table>
Next Steps

• Turn this into WG item
• Add security considerations
• Double-check with MMUSIC.