Rapid Synchronisation of RTP flows
draft-perkins-avt-rapid-rtp-sync-00.txt

Colin Perkins
Synchronisation of RTP flows

- RTP senders transmit periodic compound RTCP packets
  - The SR packet in the compound maps the media clock to a common NTP-format clock
  - The SDES packet in the compound contains a CNAME item, used to associate flows across RTP sessions
- Receivers can synchronise flows once they have received an RTCP packet for each
How fast does RTP synchronise flows?

• **Unicast flows:**
  
  • RFC 3550 allows you to send the initial RTCP packet immediately a unicast session is joined
  
  • In the absence of packet loss, the receiver can synchronise flows *immediately*
    
    • Any NAT traversal and/or security keying will have concluded before the first RTCP packet is sent
    
    • The first RTCP packet *shouldn’t* have a higher loss probability than any other packet
How fast does RTP synchronise flows?

- **SSM flows:**
  
  Synchronisation delay depends on number of receivers and session bandwidth:

<table>
<thead>
<tr>
<th>Session</th>
<th>Number of receivers (single sender assumed):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bandwidth</td>
<td>2</td>
</tr>
<tr>
<td>8 kbps</td>
<td>2.73</td>
</tr>
<tr>
<td>16 kbps</td>
<td>2.50</td>
</tr>
<tr>
<td>32 kbps</td>
<td>2.50</td>
</tr>
<tr>
<td>64 kbps</td>
<td>2.50</td>
</tr>
<tr>
<td>128 kbps</td>
<td>1.41</td>
</tr>
<tr>
<td>256 kbps</td>
<td>0.70</td>
</tr>
<tr>
<td>512 kbps</td>
<td>0.35</td>
</tr>
<tr>
<td>1 Mbps</td>
<td>0.18</td>
</tr>
<tr>
<td>2 Mbps</td>
<td>0.09</td>
</tr>
<tr>
<td>4 Mbps</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Synchronisation delay (seconds)

Less than one frame
Faster synchronisation: SSM sessions

• RTCP timing rules were designed to avoid congestion under flash crowds
  • This can’t happen on the forward path of an SSM session (it \textit{can} on the unicast reverse path)
  • Implies SSM senders don’t need the delay before sending their initial RTCP
    • Propose updating RFC 3550 to that effect; allowing immediate synchronisation between flows in SSM sessions
    • Doesn’t need to be signalled; will not affect un-updated receivers, except to speed up synchronisation
Faster synchronisation: packet loss

• Loss of initial RTCP delays synchronisation for one reporting interval

• Also an issue for late joiners, video switching, etc.

• Propose: new AVPF transport layer feedback message “send me an RTCP SR” to recover
Summary

• RTCP SR-based synchronisation works and is widely implemented

• Two simple extensions speed it up for SSM sessions or if the initial RTCP packet is lost
  • Backwards compatible, with graceful fallback to slower mechanisms