



University  
of Glasgow

# 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:

Session Bandwidth	Number of receivers (single sender assumed):							
	2	3	4	5	10	100	1000	10000
8 kbps	2.73	4.10	5.47	5.47	5.47	5.47	5.47	5.47
16 kbps	2.50	2.50	2.73	2.73	2.73	2.73	2.73	2.73
32 kbps	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
64 kbps	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
128 kbps	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41
256 kbps	0.70	0.07	0.07	0.07	0.07	0.07	0.07	0.07
512 kbps	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
1 Mbps	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
2 Mbps	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
4 Mbps	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04

↓ 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 *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

```

      0          1          2          3
      0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+++++
|V=2|P|  FMT=5 | PT=RTPFB=205 |          length = 2          |
+++++
|                               SSRC of packet sender          |
+++++
|                               SSRC of media source           |
+++++
```

## 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