Reminder

- Splitting an RTP session across multiple paths for load balancing and/or robustness
- Seemed to be an ok idea as per feedback from previous IETFs
Basic MPRTP Operation

• Learn about additional paths/interfaces
• Advertise interface
• Subflow have own identifier and sequence #
• Subflow RTCP for reporting path characteristics

• RTP and RTCP are multiplexed on single port
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

mprtpt-interface = "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:mprtp
a=rtcp-mux
a=mprtpt interface:1 195.148.127.42:49170
a=mprtpt interface:2 130.233.154.105:51372
Clarify states of a path

- a=sendonly
- a=recvonly
- a=sendrecv
- a=inactive
  - These remain the same for the media level
  - A subflow cannot be sendonly and then receive media data
  - Corner case if something is sendrecv, then one flow could send and the other receive if n=2 paths
Subflow Announcements

• Fallback
  – Use \{active\} and \{inactive\} sets
  – Inactive MUST be used for fallback? By default?

• Error resilience
  – Preference to use one network for sending redundant packets
  – Advertiser uses local policy for making the decision

• Throughput
  – Each Interface defines its max-allowed,
    \textbf{Sum\{all\} \geq max\_media\_rate}
MPRTP using ICE

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?
  – RTSP usage in another document
  – What about ICE etc?
Next Steps?