ECN for RTP over UDP/IP

draft-ietf-avt-ecn-for-rtp-02

Magnus Westerlund
Ingemar Johansson
Colin Perkins
Piers O’Hanlon
Ken Carlberg
Changes Since -01

- Clarified that congestion response can be sender or receiver based, and that application awareness of ECN is expected.
- Expanded use of RFC 2119 language.
- Updated Section 6 on processing of RTCP ECN Feedback in RTP Translators and Mixers:
  - Congestion-unaware fragmentation and reassembly
  - Media transcoders
  - Mixers
- Various editorial clarifications
Fragmentation and Reassembly

• Translators may fragment or reassemble packets, unaware of network congestion state
  • E.g., combine two VoIP packets into one

• Handling of ECN bits for RTP packets follows RFC 3168
  • Split → copy ECN marks
  • Combine → pick worst ECN mark

• Need to specify how RTCP is processed in the translator
**Fragmentation and Reassembly: RTCP**

- Determine the sequence number range for post translation packets
- Derive pre-translation sequence number range
- Calculate ratio of packets across translator:
  \[ R = \frac{\text{numTrans}}{\text{numOrig}} \]
- Rewrite extended RTP sequence number and scale counters by \( R \), to match translation

- Rounding may be needed if scaling leads to non-integer counter values
  - Try to ensure sum of counters matches \( \text{numOrig} \) after scaling
  - Try to ensure no non-zero counter is rounded to zero – avoid losing events
  - If these goals conflict, avoiding rounding to zero more important

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

| +++++++++++++++++++++++++| | +++++++++++++++++++++++  |
| | Extended Highest Sequence Number | Lost packets counter |
| +++++++++++++++++++++++++| | +++++++++++++++++++++++  |
| | CE Counter | not-ECT Counter |
| +++++++++++++++++++++++++| | +++++++++++++++++++++++  |
| | ECT (0) Counter | ECT (1) Counter |
| +++++++++++++++++++++++++| | +++++++++++++++++++++++  |

| +++++++++++++++++++++++++| | +++++++++++++++++++++++  |
| |             |             |
| |             |             |
| |             |             |
| |             |             |
| |             |             |
Fragmentation and Reassembly: RTCP

Questions and open issues:

- Is this scaling meaningful?
  - Believe so, if the level of congestion in the network is primarily driven by the number of packets sent. We assume this is the case where such translators are deployed
- ECN nonce reports are not translated
  - But they’re not meaningful, since they relate to particular RTP packets that don’t exist on the other side of the RTP translator
ECN Processing in Media Transcoders

- Transcoders are RTP translators
  - No SSRC; invisible to other RTP-layer entities
- Interpose into the RTCP session
  - Generate RTCP ECN feedback to the sender, as if it were the media receiver
  - Process RTCP ECN feedback received from the receiver, as if it were the media sender
  - Two separate congestion control loops run:
    - Between sender and transcoder
    - Between transcoder and receiver
    - MUST NOT forward RTCP ECN feedback across the transcoder, since the ECN feedback for one control loop is not relevant to the other
ECN Processing in Mixers

- An RTP mixer acts as an endpoint for ECN purposes
  - Treats all paths independently
  - For each path:
    - Negotiate capability and check path support
    - Generate RTCP ECN feedback for outgoing stream
    - Respond to ECN feedback from receiver, run congestion control loop
  - Possible that some paths support ECN, others don’t

- MUST NOT forward RTCP ECN feedback across the mixer, since the ECN feedback for one path is not relevant to the other paths
Open Issues and Next Steps

• Feedback on RTCP ECN feedback handling from the group

• To do in next version:
  • Clarify how ECN is used in layered sessions
  • IANA considerations and assign parameters
  • Add SDP signalling example

• Aiming to be ready for WG last call by IETF 79