Explicit Congestion Notification (ECN) for RTP over UDP
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Outline

› Important Changes

› Open Issues
  1. Saturation of the packet loss counters
  2. Initiation Optimization for Multi-SSRC per host sessions
  3. Congestion reporting in bytes or packets?
  4. ECN setting capability direction

› Next Step
Important Changes since AVT-03 version

› Restructured the sections around signalling
  – Attempted to clarify use of “a=ecn-capable-rtp” SDP attribute at media and/or session level – further updates needed; no reason to disallow at session level
  – Added signalling parameters for the Feedback and RTCP XR packets
  – Requiring the “a=ice-options:rtp+ecn” when using ICE initiation
  – Added examples for the signalling using SDP

› Included the proposal to give more flexibility for congestion control algorithms on how to interpret CE marks
  – e.g., to support some authorised emergency responder scenarios

› Added section on Interoperability

› Clarified the roles of sender and receiver in regards to the ECN solution

› Clarified “all known receivers”
  – i.e., all SSRC’s that aren’t local to the sending SSRC
  – Also forbid the usage of ECN and Sampling of Group Membership [RFC2762]

› Clarified how to handle non ECT end-points, both aware and non-aware of the ECN signalling
Issue: Saturation in Packet loss counter

› RTCP RR and ECN feedback use packet loss counters that are signed integers
  – RTCP RR/SR report block: 24 bits; ECN Feedback format: 12-bit
  – Positive values indicate loss, negative values duplication
  – Counters clamp if they reach their maximum value, and do not wrap

› How is the 12-bit lost packet counter in ECN feedback packets derived?
  – Copy lower 11-bits of RTCP RR lost packet counter + plus the 24th sign bit into the
    12-bit ECN feedback lost packet counter?
    › That way one can handle both 0 transitions and wrapping by using the long
      RTCP RR/SR report block counter as base value for extending it.
    › Works unless cumulative change between previous report is more than 1024
      losses or duplication, in which case uncertainty may occur
  – Replace with an unsigned counter of lost packets, that wraps on overflow?

› How to deal with saturation of the lost packet counters?
  – If the saturating format is used, saturation implies that packet loss can no longer be
    reported – may need to change SSRC to report further loss?
    › Also can issue with standard RFC 3550 RTCP SR/RR packets
  – Might be appropriate to use an unsigned packet loss counter?
Issue: Initiation of multi-SSRC per host sessions

Draft contains an optimisation for unicast sessions:
- “As an optimisation, if an RTP sender is initiating ECN usage towards a unicast address, then it MAY treat the ECN initiation as provisionally successful if it receives a single RTCP ECN feedback report indicating successful receipt of the ECT-marked packets, with no negative indications, from a single RTP receiver.”

The restriction on “single RTP receiver” may be unnecessary strict:
- Some uses of RTP use multiple SSRCs per host and so may be interpreted as being more than one receiver (e.g., SSRC multiplexed RTP retransmission [RFC4588])

Should we relax this restriction?
- Rephrase as “from a single destination host”?  
  - Fails if the destination is a star topology packet-relay translator
- Allow successful ECN initiation for one SSRC to imply success for other SSRCs with the same CNAME?  
  - Fails for cases where multiple hosts collude to form an RTP endpoint
- Ignore the issue – further optimisation is not worth the complexity  
  - Everything works, but ECN initiation is slow

- Preference: ignore this for now, can optimise later if it becomes a real problem
Issue: Report congestion in bytes or packets?

› RTCP reports congestion in terms of packets lost

› For ECN feedback, we can report the number of packets marked, or the number of bytes marked
  – The two options can give different behaviour, especially when considering translators that fragment and reassemble packet
  – ECN community would prefer byte marking

› Inconsistency with RTCP report problematic, though
  – Loss reported in packets, ECN marks reported in bytes

› We propose to report ECN marks in packets
Issue: ECN setting capability direction

› No point negotiating ECN if no-one can actually set the ECT bits

› This appears to not be an significant issue
  – In SSM usages, the sender will know of its capability prior to creating any SDP
  – For ASM with centralized O/A signalling with Application server
    › The server can determine if no participant is capable and re-invite without ECN if desired
  – For ASM with declarative SDP
    › In this case there is no way to determine that no senders supports ECN

› Not a significant issue, remove the issue
Next Steps

› Resolve Open Issues

› Submit an update
  – Open issue resolutions
  – Editorial pass
  – Addressing your comments

› Aim at WG last call ready with next version