

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” maybe 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 a 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