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G. Hunt Unaffiliated A. Clark Telchemy G. Zorn Network Zen C. Bi STTRI Q. Wu Huawei June 12, 2012

RTCP XR Report Block for Loss Concealment metric Reporting draft-ietf-xrblock-rtcp-xr-loss-conceal-00.txt

Abstract

This document defines an RTCP XR Report Block that allows the reporting of Loss Concealment metrics primarily for audio applications of RTP.

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<u>1</u>. Introduction

<u>1.1</u>. Loss Concealment Report Block

This draft defines a new block type to augment those defined in [<u>RFC3611</u>], for use in a range of RTP applications.

At any instant, the audio output at a receiver may be classified as either 'normal' or 'concealed'. 'Normal' refers to playout of audio payload received from the remote end, and also includes locally generated signals such as announcements, tones and comfort noise. Concealment refers to playout of locally-generated signals used to mask the impact of network impairments or to reduce the audibility of jitter buffer adaptations.

The new block type provides metrics for actions taken by the receiver to mitigate the effect of packet loss and packet discard. Specifically, the first metric (On-Time Playout Duration) reports the duration of normal playout of data which the receiver obtained from the sender's stream. A second metric (Loss Concealment Duration) reports the total time during which the receiver played out media data which was manufactured locally, because the sender's data for these periods was not available due to packet loss or discard. A similar metric (Buffer Adjustment Concealment Duration) reports the duration of playout of locally-manufactured data replacing data which is unavailable due to adaptation of an adaptive de-jitter buffer. Further metrics (Playout Interrupt Count and Mean Playout Interrupt Size) report the number of times normal playout was interrupted, and the mean duration of these interruptions.

Loss Concealment Duration and Buffer Adjustment Concealment Duration are reported separately because buffer adjustment is typically arranged to occur in silence periods so may have very little impact on user experience, whilst loss concealment may occur at any time.

The metric belongs to the class of transport-related terminal metrics defined in [MONARCH] (work in progress).

<u>1.2</u>. RTCP and RTCP XR Reports

The use of RTCP for reporting is defined in [RFC3550]. [RFC3611] defined an extensible structure for reporting using an RTCP Extended Report (XR). This draft defines a new Extended Report block that MUST be used as defined in [RFC3550] and [RFC3611].

1.3. Performance Metrics Framework

The Performance Metrics Framework [RFC6390] provides guidance on the definition and specification of performance metrics. The RTP Monitoring Architectures [MONARCH] provides guideline for reporting block format using RTCP XR. The Metrics Block described in this document are in accordance with the guidelines in [RFC6390] and [MONARCH].

1.4. Applicability

This metric is primarily applicable to audio applications of RTP. EDITOR'S NOTE: are there metrics for concealment of transport errors for video?

2. Loss Concealment Block

2.1. Report Block Structure

Loss Concealment metrics block

Θ 1 2 3 0 1 2 3 4 5 6 7 0 1 2 3 4 5 6 7 0 1 2 3 4 5 6 7 0 1 2 3 4 5 6 7 0 1 2 3 4 5 6 7 BT=NLC | I |plc| rsv. | block length=5 SSRC of Source On-time Playout Duration Loss Concealment Duration 1 Buffer Adjustment Concealment Duration Playout Interrupt Count | Mean Playout Interrupt Size |

Figure 1: Report Block Structure

2.2. Definition of Fields in Loss Concealment Report Block

Block type (BT): 8 bits

A Loss Concealment Metrics Report Block is identified by the constant NLC.

[Note to RFC Editor: please replace NLC with the IANA provided RTCP XR block type for this block.]

Interval Metric flag (I): 2 bit

This field is used to indicate whether the Delay metrics are Sampled, Interval or Cumulative metrics, that is, whether the reported values applies to the most recent measurement interval duration between successive metrics reports (I=10) (the Interval Duration) or to the accumulation period characteristic of cumulative measurements (I=11) (the Cumulative Duration) or is a sampled instantaneous value (I=01) (Sampled Value).

Packet Loss Concealment Method (plc): 2 bits

This field is used to identify the packet loss concealment method in use at the receiver, according to the following code:

bits 014-015

0 = silence insertion 1 = simple replay, no attenuation 2 = simple replay, with attenuation 3 = enhanced Other values reserved

Reserved (resv): 4 bits

These bits are reserved. They SHOULD be set to zero by senders and MUST be ignored by receivers.

block length: 16 bits

The length of this report block in 32-bit words, minus one. For the Delay block, the block length is equal to 5.

SSRC of source: 32 bits

As defined in <u>Section 4.1 of [RFC3611]</u>.

On-time Playout Duration (ms): 32 bits

'On-time' playout is the uninterrupted, in-sequence playout of valid decoded audio information originating from the remote endpoint. This includes comfort noise during periods of remote talker silence, if VAD is used, and locally generated or regenerated tones and announcements.

An equivalent definition is that on-time playout is playout of any signal other than those used for concealment.

On-time playout duration MUST include both speech and silence intervals, whether VAD is used or not. This duration is reported

in millisecond units.

If the measured value exceeds 0xFFFFFFD, the value 0xFFFFFFE SHOULD be reported to indicate an over-range measurement. If the measurement is unavailable, the value 0xFFFFFFF SHOULD be reported.

Loss Concealment Duration (ms): 32 bits

The duration, in milliseconds, of audio playout corresponding to Loss-type concealment.

Loss-type concealment is reactive insertion or deletion of samples in the audio playout stream due to effective frame loss at the audio decoder. "Effective frame loss" is the event in which a frame of coded audio is simply not present at the audio decoder when required. In this case, substitute audio samples are generally formed, at the decoder or elsewhere, to reduce audible impairment.

If the measured value exceeds 0xFFFFFFD, the value 0xFFFFFFE SHOULD be reported to indicate an over-range measurement. If the measurement is unavailable, the value 0xFFFFFFF SHOULD be reported.

Buffer Adjustment Concealment Duration (ms): 32 bits

The duration, in milliseconds, of audio playout corresponding to Buffer Adjustment-type concealment, if known.

If the measured value exceeds 0xFFFFFFD, the value 0xFFFFFFE SHOULD be reported to indicate an over-range measurement. If the measurement is unavailable, the value 0xFFFFFFF SHOULD be reported.

Buffer Adjustment-type concealment is proactive or controlled insertion or deletion of samples in the audio playout stream due to jitter buffer adaptation, re-sizing or re-centering decisions within the endpoint.

Because this insertion is controlled, rather than occurring randomly in response to losses, it is typically less audible than loss-type concealment. For example, jitter buffer adaptation events may be constrained to occur during periods of talker silence, in which case only silence duration is affected, or sophisticated time-stretching methods for insertion/deletion

during favorable periods in active speech may be employed.

Concealment events which cannot be classified as Buffer Adjustment- type MUST be classified as Loss-type.

Playout Interrupt Count: 16 bits

The number of interruptions to normal playout which occurred during the reporting period.

If the measured value exceeds 0xFFFD, the value 0xFFFE SHOULD be reported to indicate an over-range measurement. If the measurement is unavailable, the value 0xFFFF SHOULD be reported.

Mean Playout Interrupt Size (ms): 16 bits

The mean duration, in ms, of interruptions to normal playout which occurred during the reporting period.

If the measured value exceeds 0xFFFD, the value 0xFFFE SHOULD be reported to indicate an over-range measurement. If the measurement is unavailable, the value 0xFFFF SHOULD be reported.

<u>3</u>. SDP Signaling

[RFC3611] defines the use of SDP (Session Description Protocol) [RFC4566] for signaling the use of XR blocks. XR blocks MAY be used without prior signaling.

This section augments the SDP [<u>RFC4566</u>] attribute "rtcp-xr" defined in [<u>RFC3611</u>] by providing an additional value of "xr-format" to signal the use of the report block defined in this document.

rtcp-xr-attrib = "a=" "rtcp-xr" ":" [xr-format *(SP xr-format)] CRLF

(defined in [<u>RFC3611</u>])

xr-format =/ xr-conceal-block

xr-conceal-block = "loss-conceal"

RTCP XR Loss Concealment

4. IANA Considerations

New block types for RTCP XR are subject to IANA registration. For general guidelines on IANA considerations for RTCP XR, refer to [RFC3611].

4.1. New RTCP XR Block Type value

This document assigns the block type value NJB in the IANA "RTCP XR Block Type Registry" to the "Loss Concealment Metrics Block".

[Note to RFC Editor: please replace NLC with the IANA provided RTCP XR block type for this block.]

4.2. New RTCP XR SDP Parameter

This document also registers a new parameter "loss-conceal" in the "RTCP XR SDP Parameters Registry".

<u>4.3</u>. Contact information for registrations

The contact information for the registrations is:

Alan Clark (alan.d.clark@telchemy.com)

2905 Premiere Parkway, Suite 280 Duluth, GA 30097 USA

5. Security Considerations

It is believed that this proposed RTCP XR report block introduces no new security considerations beyond those described in [RFC3611]. This block does not provide per-packet statistics so the risk to confidentiality documented in <u>Section 7</u>, paragraph 3 of [<u>RFC3611</u>] does not apply.

6. Acknowledgements

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7. References

7.1. Normative References

- [RFC3550] Schulzrinne, H., "RTP: A Transport Protocol for Real-Time Applications", <u>RFC 3550</u>, July 2003.
- [RFC3611] Friedman, T., Caceres, R., and A. Clark, "RTP Control Protocol Extended Reports (RTCP XR)", November 2003.
- [RFC4566] Handley, M., Jacobson, V., and C. Perkins, "SDP: Session Description Protocol", July 2006.

<u>7.2</u>. Informative References

- [MONARCH] Hunt, G., "Monitoring Architectures for RTP", ID <u>draft-ietf-avtcore-monarch-04</u>, August 2011.
- [RFC6390] Clark, A. and B. Claise, "Framework for Performance Metric Development", <u>RFC 6390</u>, October 2011.

Appendix A. Change Log

Note to the RFC-Editor: please remove this section prior to publication as an RFC.

A.1. draft-ietf-xrblock-rtcp-xr-loss-conceal-00

The following are the major changes to previous version :

- o Changed BNF for SDP following Christian Groves' and Tom Taylor's comments (4th and 5th May 2009).
- o Updated references.

Authors' Addresses

Geoff Hunt Unaffiliated Email: r.geoff.hunt@gmail.com Alan Clark Telchemy Incorporated 2905 Premiere Parkway, Suite 280 Duluth, GA 30097 USA Email: alan.d.clark@telchemy.com Glen Zorn Network Zen 77/440 Soi Phoomjit, Rama IV Road Phra Khanong, Khlong Toie Bangkok 10110 Thailand Phone: +66 (0) 87 502 4274 Email: gwz@net-zen.net Claire Bi Shanghai Research Institure of China Telecom Corporation Limited No.1835, South Pudong Road Shanghai 200122 China Email: bijy@sttri.com.cn Qin Wu Huawei 101 Software Avenue, Yuhua District Nanjing, Jiangsu 210012 China Email: sunseawq@huawei.com