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RTP Control Protocol (RTCP) Extended Report (XR) for Post-Repair
Non-Run Length Encoding (RLE) Loss Count Metrics
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Abstract

This document defines an RTP Control Protocol (RTCP) Extended Report (XR) Block that allows reporting of post-repair loss count metrics for a range of RTP applications.

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1 Introduction

RTCP SR/RR [RFC3550] contains some rough statistics about the data received from the particular source indicated in that block. One of them is the cumulative number of packet lost, which is called pre-repair loss metric in this document. This metric conveys information regarding the total number of RTP data packets that have been lost since the beginning of the RTP session. However, this metric is measured on media stream before any loss repair mechanism, e.g., retransmission [RFC4588] and Forward Error Correction (FEC) [RFC5109], is applied. Using a repair mechanism usually results in recovering some or all of the lost packets. Therefore, by observing the change in fraction lost and the cumulative loss, the sending endpoint cannot assess the performance of the repair mechanism. Consequently, [RFC5725] specifies a post-repair loss RLE XR report block to address this issue. The sending endpoint is able to infer which packets were repaired from the RLE report block, but at the cost of higher overhead. When applications use multiple XR blocks, the endpoints require more concise reporting to save bandwidth.

This document defines a new XR block type to augment those defined in [RFC3611] and complement the report block defined in [RFC5725] for use in a range of RTP applications. This new block type reports the number of RTP packets on the primary source stream that are still lost after applying one or more loss repair mechanisms. When comparing this metric with pre-repair loss metric of RTCP SR/RR, it may bring ambiguity as noted in [RFC5725]: Some packets will not be repaired in current RTCP interval. So in [RFC5725] it is suggested to delay report block to wait for packets to be repaired. However, it is not wise to delay this report block arbitrarily until those packets have been fully repaired. Thus it is RECOMMENDED that this report block should be generated for those source packets that have no further chance of being repaired. But a potential ambiguity may result from sequence number range inconsistent. To address this issue, another metric, loss repaired count, is also introduced in this report block. So, the metrics in this report block are RECOMMENDED NOT to be compared with the pre-repair loss metric.

The metrics defined in this document belongs to the class of transport-related metrics defined in [RFC6792]. And it is in accordance with the guidelines in [RFC6390] and [RFC6792]. These metrics are applicable to any RTP applications, especially those that use loss repair mechanisms.

2 Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this

document are to be interpreted as described in [RFC 2119](#) [[RFC2119](#)].

3 Post-Repair Loss Count Metrics Report Block

This block describes the residual number of packets lost after applying repair mechanisms. The report block is complementary to the RTCP XR metrics defined in [[RFC5725](#)], because it uses a non-RLE format. Note that when the reporting of this block spans across more than one measurement interval [[RFC6776](#)], the metrics may contain the count of the packets in the current or previous measurement interval.

The post-repair loss count metrics report block has the following format:

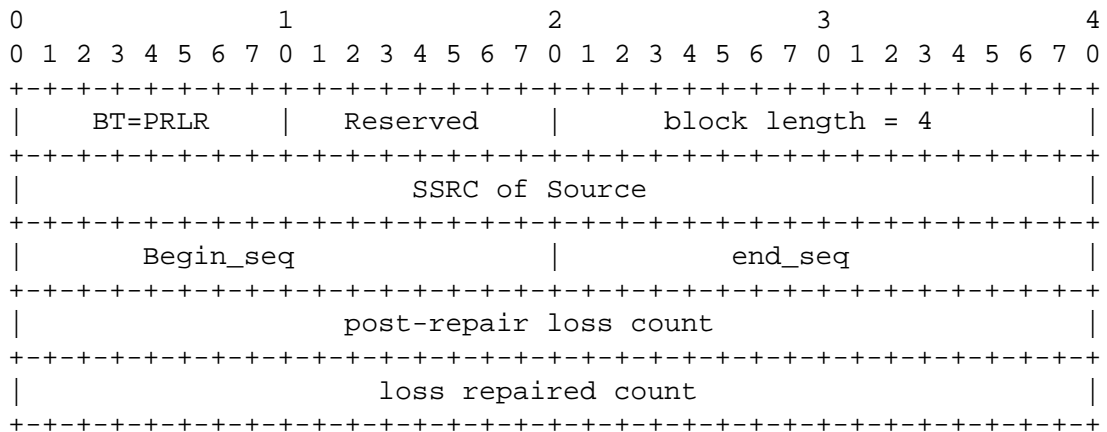


Figure 1: Format for the Post-Repair Loss Count Metrics Report Block

Block Type (BT): 8 bits

A Post-Repair Loss Count Metrics Report Block is identified by the constant PRLR.

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

Reserved: 8 bits

These bits are reserved for future use. They MUST be set to zero by senders and ignored by receivers (see [[RFC6709](#)], [Section 4.2](#)).

block length: 16 bits

This field is in accordance with the definition in [RFC3611]. In this report block, it MUST be set to 4. The block MUST be discarded if the block length is set to a different value.

SSRC of source: 32 bits

As defined in Section 4.1 of [RFC3611].

begin_seq: 16 bits

The sequence number of the first packet in the session or the sequence number of the first packet fully repaired that this block reports on.

end_seq: 16 bits

The sequence number of the last packet fully repaired that this block reports on plus one.

post-repair loss count: 32 bits

Total number of packets finally lost after one or more loss-repair methods, e.g., FEC and/or retransmission, during this interval. Note that this metric must be measured in the primary source stream.

loss repaired count: 32 bits

Total number of packets fully repaired after one or more loss-repair methods, e.g., FEC and/or retransmission, during this interval. Note that this metric must be measured in the primary source stream.

4 SDP Signaling

[RFC3611] defines the use of SDP (Session Description Protocol) for signaling the use of RTCP XR blocks. However XR blocks MAY be used without prior signaling (see [section 5 of \[RFC3611\]](#)).

4.1 SDP rtcp-xr-attr Attribute Extension

This session augments the SDP attribute "rtcp-xr" defined in [Section 5.1 of \[RFC3611\]](#) by providing an additional value of "xr-format" to signal the use of the report block defined in this document.

```
xr-format =/ xr-prlr-block
```

```
xr-prlr-block = "post-repair-loss-count"
```

4.2 Offer/Answer Usage

When SDP is used in offer-answer context, the SDP Offer/Answer usage defined in [\[RFC3611\]](#) for unilateral "rtcp-xr" attribute parameters applies. For detailed usage of Offer/Answer for unilateral parameter, refer to [section 5.2 of \[RFC3611\]](#).

5 Security Considerations

It is believed that this RTCP XR block introduces no new security considerations beyond those described in [\[RFC3611\]](#). This block does not provide per-packet statistics, so the risk to confidentially documented in [Section 7, paragraph 3 of \[RFC3611\]](#) does not apply.

An attacker may put incorrect information in the Post-Repair Loss Count reports, which will be affect the performance of loss repair mechanisms. Implementers should consider the guidance in [\[I-D.ietf-avtcore-srtp-not-mandatory\]](#) for using appropriate security mechanisms, i.e., where security is a concern, the implementation should apply encryption and authentication to the report block. For example, this can be achieved by using the AVPF profile together with the Secure RTP profile as defined in [\[RFC3711\]](#); an appropriate combination of the two profiles (an "SAVPF") is specified in [\[RFC5124\]](#). However, other mechanisms also exist (documented in [\[I-D.ietf-avtcore-rtp-security-options\]](#)) and might be more suitable.

6 IANA Considerations

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

6.1 New RTCP XR Block Type value

This document assigns the block type value PRLR in the IANA "RTP Control Protocol Extended Reports (RTCP XR) Block Type Registry" to the "Post-Repair Loss Count Metrics Report Block".

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

6.2 New RTCP XR SDP Parameter

This document also registers a new parameter "post-repair-loss-count" in the "RTP Control Protocol Extended Reports (RTCP XR) Session Description Protocol (SDP) Parameters Registry".

6.3 Contact Information for registrations

The following contact information is provided for all registrations in this document:

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7 Acknowledgments

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8 References

8.1 Normative References

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[RFC3550] Schulzrinne, H., Casner, S., Frederick, R., and V. Jacobson, "RTP: A Transport Protocol for Real-Time Applications", STD 64, [RFC 3550](#), July 2003.

[RFC3611] Friedman, T., Ed., Caceres, R., Ed., and A. Clark, Ed., "RTP Control Protocol Extended Reports (RTCP XR)", [RFC 3611](#), November 2003.

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- [RFC4566] Handley, M., Jacobson, V., and C. Perkins, "SDP: Session Description Protocol", [RFC 4566](#), July 2006.

8.2 Informative References

- [RFC6390] Clark, A. and B. Claise, "Guidelines for Considering New Performance Metric Development", [BCP 170](#), [RFC 6390](#), October 2011.
- [RFC6792] Wu, Q., Hunt, G., and P. Arden, "Guidelines for Use of the RTP Monitoring Framework", [RFC 6792](#), November 2012.

[Appendix A](#). Metrics Represented Using the Template from [RFC 6390](#)

a. Post-repair Loss Count Metric

- * Metric Name: Post-repair Loss Count Metric
- * Metric Description: Total number of packets still lost after loss repair methods applied
- * Method of Measurement or Calculation: It must be measured in the primary source stream. It must be measured for the packets that have no further chance of being repaired.
- * Units of Measurement: See [section 3](#), post-repair loss count definition.
- * Measurement Point(s) with Potential Measurement Domain: See [section 3](#), 1st paragraph.
- * Measurement Timing: See [Section 4](#) for measurement timing.
- * Use and Applications: See [Section 1](#)
- * Reporting Model: See [RFC3611](#).

b. Loss Repaired Count Metric

- * Metric Name: Loss Repaired Count Metric

* Metric Description: The number of packets lost but repaired after loss repair methods.

* Method of Measurement or Calculation: It must be measured in the primary source stream.

* Units of Measurement: See [section 3](#), loss repaired count definition.

* Measurement Point(s) with Potential Measurement Domain: See [section 3](#), 1st paragraph.

* Measurement Timing: See [Section 4](#) for measurement timing.

* Use and Applications: See [Section 1](#)

* Reporting Model: See [RFC3611](#).

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