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**RTP Control Protocol(RTCP) Extended Report (XR) Block for Burst/Gap
Discard metric Reporting
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Abstract

This document defines an RTP Control Protocol(RTCP) Extended Report (XR) Block that allows the reporting of Burst and Gap Discard metrics for use in a range of RTP applications.

Status of this Memo

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1. Introduction

1.1. Burst and Gap Discard Report Block

This document defines a new block type to augment those defined in [\[RFC3611\]](#) for use in a range of RTP applications. The new block type supports the reporting of the proportion of packets discarded by the jitter buffer at the receiver, using packet discard logic according to the jitter buffer algorithms. The discards during discard bursts are reported, together with the number of bursts. This block is intended to be used in conjunction with [\[DISCARD\]](#) which provides the total packets discarded, and on which this block therefore depends. However the metric in [\[DISCARD\]](#) may be used independently of the metrics in this block.

This block provides information on transient IP problems. Burst/Gap metrics are typically used in cumulative reports, however they also may be used in interval reports (see the Interval Metric flag in [section 3.2](#)). The burstiness of packet discard affects user experience, may influence any sender strategies to mitigate the problem, and may also have diagnostic value.

The metric belongs to the class of transport-related end system metrics defined in [\[RFC6792\]](#).

The definitions of Burst, Gap, Loss and Discard are consistent with definitions in [\[RFC3611\]](#). To accommodate the range of jitter buffer algorithms and packet discard logic that may be used by implementors, the method used to distinguish between bursts and gaps shall use an equivalent method to that defined in the [section 4.7.2 of \[RFC3611\]](#). Note that Reporting the specific jitter buffer algorithms and/or packet discard logic is out of scope of this document.

1.2. 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 document defines a new Extended Report block for use with [\[RFC3550\]](#) 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 [\[RFC6792\]](#) 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 [\[RFC6792\]](#).

1.4. Applicability

These metrics are applicable to a range of RTP applications which contain de-jitter buffers [[RFC5481](#)] at the receiving end to smooth variation in packet arriving time and don't use stream repair means, e.g., Forward Error Correction (FEC) [[RFC5109](#)] and/or retransmission [[RFC4588](#)].

2. Terminology

2.1. Standards Language

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](#)].

In addition, the following terms are defined:

Received, Lost and Discarded

A packet shall be regarded as lost if it fails to arrive within an implementation-specific time window. A packet that arrives within this time window but is either too early to be played out or too late to be played out or thrown away before playout due to packet duplication or redundancy shall be regarded as discarded. A packet shall not be regarded as discarded if it arrives within this time window but is dropped during decoding by some higher layer decoder, e.g., due to a decoding error. A packet shall be classified as one of received (or OK), discarded or lost. The metric "cumulative number of packets lost" defined in [[RFC3550](#)] reports a count of packets lost from the media stream (single SSRC within single RTP session). Similarly the metric "number of packets discarded" defined in [[DISCARD](#)] reports a count of packets discarded from the media stream (single SSRC within single RTP session) arriving at the receiver. Another metric defined in [[RFC5725](#)] is available to report on packets which are not recovered by any repair techniques which may be in use. Note that the term discard defined here build on the Discard definition [[RFC3611](#)], but extend the concept to take into account the packet duplication, and report different types of discard counts [[DISCARD](#)].

Bursts and Gaps

The terms Burst and Gap are used in a manner consistent with that of RTCP XR [[RFC3611](#)]. RTCP XR views a RTP stream as being divided into bursts, which are periods during which the discard rate is high enough to cause noticeable quality degradation (generally over 5 percent discard rate), and gaps, which are periods during which discarded packets are infrequent and hence quality is generally acceptable.

3. Burst/Gap Discard Block

Metrics in this block report on Burst/Gap Discard in the stream arriving at the RTP system. The measurement of these metrics are made at the receiving end of the RTP stream. Instances of this metrics block refer by Synchronization source (SSRC) to the separate auxiliary Measurement Information Block [RFC6776] which describes measurement periods in use (see RFC6776 section 4.2).

This metrics block relies on the measurement period in the Measurement Information Block indicating the span of the report. Senders MUST send this block in the same compound RTCP packet as the Measurement Information Block. Receivers MUST verify that the measurement period is received in the same compound RTCP packet as this metrics block. If not, this metrics block MUST be discarded.

3.1. Report Block Structure

Burst/Gap Discard Metrics Block

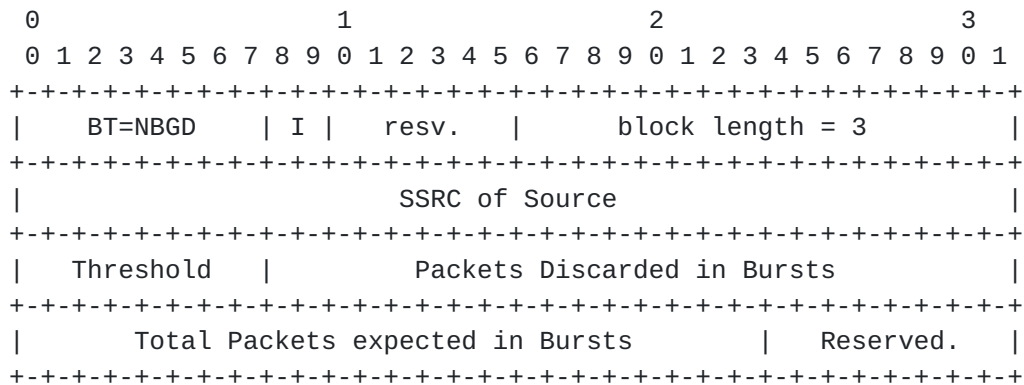


Figure 1: Report Block Structure

3.2. Definition of Fields in Burst/Gap Discard Report Block

Block type (BT): 8 bits

A Burst/Gap Discard Report Block is identified by the constant NBGD.

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

Interval Metric flag (I): 2 bits

This field is used to indicate whether the Burst/Gap Discard metrics are Sampled, Interval or Cumulative metrics [[RFC6792](#)]:

I=10: Interval Duration - the reported value applies to the most recent measurement interval duration between successive metrics reports.

I=11: Cumulative Duration - the reported value applies to the accumulation period characteristic of cumulative measurements.

I=01: Sampled Value - the reported value is a sampled instantaneous value.

In this document, Burst/Gap Discard Metrics can only be measured over definite intervals, and cannot be sampled. Also, the value I=00 is reserved for future use. Senders MUST NOT use the values I=00 or I=01. If a block is received with I=00 or I=01, the receiver MUST discard the block.

Reserved (resv): 6 bits

These bits are reserved. They MUST be set to zero by senders and ignored by receivers (See [RFC6709 section 4.2](#)).

block length: 16 bits

The length of this report block in 32-bit words, minus one. For the Burst/Gap discard block, the block length is equal to 3. 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 \[RFC3611\]](#).

Threshold: 8 bits

The Threshold is equivalent to Gmin in [[RFC3611](#)], i.e. the number of successive packets that must not be discarded prior to and following a discard packet in order for this discarded packet to be regarded as part of a gap. Note that the threshold is set in accordance with Gmin Calculation defined in [section 4.7.2](#) of

[RFC3611](#).

Packets discarded in bursts: 24 bits

The total number of packets discarded during discard bursts.

The measured value is unsigned value. If the measured value exceeds 0xFFFFFD, the value 0xFFFFFE MUST be reported to indicate an over-range measurement. If the measurement is unavailable, the value 0xFFFFF MUST be reported.

Total packets expected in bursts: 24 bits

The total number of packets expected during discarded bursts (that is, the sum of received packets and lost packets).

The measured value is unsigned value. If the measured value exceeds 0xFFFFFD, the value 0xFFFFFE MUST be reported to indicate an over-range measurement. If the measurement is unavailable, the value 0xFFFFF MUST be reported.

Reserved (resv): 8 bits

These bits are reserved. They MUST be set to zero by senders and ignored by receivers (See [RFC6709 section 4.2](#)).

[3.3](#). Derived metrics based on reported metrics

The metrics described here are intended to be used in conjunction with information from the Measurement Information Block [[RFC6776](#)] and also with the metric "number of packets discarded" provided in the RTCP XR Discard Count Block [[DISCARD](#)].

These metrics provide the following information relevant to statistical parameters, including:

- o The fraction of packets discarded during bursts (burst discard rate in [[SUMSTAT](#)]), which can be calculated using the metric "Packets Discarded in Bursts" and the metric "Total Packets expected in Bursts" provided in the Burst/Gap Discard Metrics Block.
- o The fraction of packets discarded during gaps (gap discard rate in [[SUMSTAT](#)]), which can be calculated using the metric "Packets

Discarded in Bursts " and the metric " Total Packets expected in Bursts " provided in the Burst/Gap Discard Metrics Block.

The details on calculation these parameters in the metrics are described in [[SUMSTAT](#)].

4. Considerations for Voice-over-IP applications

This metrics block is applicable to a broad range of RTP applications. Where the metric is used with a Voice over IP (VoIP) application and the stream repair means is not available, the following considerations apply.

RTCP XR views a call as being divided into bursts, which are periods during which the discard rate is high enough to cause noticeable call quality degradation (generally over 5 percent discard rate), and gaps, which are periods during which discarded packets are infrequent and hence call quality is generally acceptable.

If voice activity detection is used, the Burst and Gap Duration shall be determined as if silence packets had been sent, i.e. a period of silence in excess of Gmin packets will terminate a burst condition.

The recommended value for the threshold Gmin in [[RFC3611](#)] results in a Burst being a period of time during which the call quality is degraded to a similar extent to a typical pulse-code modulation(PCM) severely errored second.

5. 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.

5.1. SDP rtcp-xr-attrib Attribute Extension

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

xr-format =/ xr-bgd-block

xr-bgd-block = "burst-gap-discard"

5.2. 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 in Offer/Answer for unilateral parameter, refer to [section 5.2 of \[RFC3611\]](#).

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 NBGD in the IANA " RTP Control Protocol Extended Reports (RTCP XR) Block Type Registry " to the "Burst/Gap Discard Metrics Block".

[Note to RFC Editor: please replace NBGD 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 "burst-gap-discard" in the "RTP Control Protocol Extended Reports (RTCP XR) Session Description Protocol (SDP) Parameters Registry".

6.3. Contact information for registrations

The contact information for the registrations is:

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7. 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 [Section 7](#), paragraph 3 of [[RFC3611](#)] does not apply.

8. Contributors

Geoff Hunt wrote the initial draft of this document.

9. Acknowledgments

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10. References

10.1. Normative References

- [DISCARD] Wu, Q., "RTCP XR Report Block for Discard Count metric Reporting", ID [draft-ietf-xrblock-rtcp-xr-discard-11](#), December 2012.
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- [RFC6390] Clark, A. and B. Claise, "Framework for Performance Metric Development", [RFC 6390](#), October 2011.
- [RFC6709] Carpenter, B., Aboba, B., and S. Cheshire, "Design Considerations for Protocol Extensions", [RFC 6709](#), September 2012.

[RFC6792] Hunt, G., "Monitoring Architectures for RTP", [RFC 6792](#),
November 2012.

[Appendix A](#). Metrics represented using [RFC6390](#) Template

RFC EDITOR NOTE: please change XXXX in [RFCXXXX] by the new RFC number, when assigned.

a. Threshold Metric

- * Metric Name: Threshold in RTP

- * Metric Description: The Threshold is equivalent to Gmin in [RFC3611](#), i.e. the number of successive packets that must not be discarded prior to and following a discard packet in order for this discarded packet to be regarded as part of a gap.

- * Method of Measurement or Calculation: See [section 3.2](#), Threshold definition [RFCXXXX].

- * Units of Measurement: See [section 3.2](#), Threshold definition [RFCXXXX].

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

- * Measurement Timing: See [section 3](#), 2nd paragraph [RFCXXXX] for measurement timing and [section 3.2](#) [RFCXXXX] for Interval Metric flag.

- * Use and applications: See [section 1.4](#) [RFCXXXX].

- * Reporting model: See [RFC3611](#).

b. Packets discarded in bursts Metric

- * Metric Name: RTP Packets discarded in bursts

- * Metric Description: The total number of RTP packets discarded during discard bursts.

- * Method of Measurement or Calculation: See [section 3.2](#), Packets discarded in bursts definition [RFCXXXX].
- * Units of Measurement: See [section 3.2](#), Packets discarded in bursts definition [RFCXXXX].
- * Measurement Point(s) with Potential Measurement Domain: See [section 3](#), 1st paragraph [RFCXXXX].
- * Measurement Timing: See [section 3](#), 2nd paragraph [RFCXXXX] for measurement timing and [section 3.2](#) [RFCXXXX] for Interval Metric flag.
- * Use and applications: See [section 1.4](#) [RFCXXXX].
- * Reporting model: See [RFC3611](#).

c. Total packets expected in bursts Metric

- * Metric Name: Total RTP packets expected in bursts
- * Metric Description: The total number of packets expected during discarded bursts (that is, the sum of received packets and lost packets).
- * Method of Measurement or Calculation: See [section 3.2](#), Total packets expected in bursts definition [RFCXXXX].
- * Units of Measurement: See [section 3.2](#), Total packets expected in bursts definition [RFCXXXX].
- * Measurement Point(s) with Potential Measurement Domain: See [section 3](#), 1st paragraph [RFCXXXX].
- * Measurement Timing: See [section 3](#), 2nd paragraph [RFCXXXX] for measurement timing and [section 3.2](#) [RFCXXXX] for Interval

Metric flag.

- * Use and applications: See [section 1.4](#) [RFCXXXX].
- * Reporting model: See [RFC3611](#).

Appendix B. Change Log

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

B.1. draft-ietf-xrblock-rtcp-xr-burst-gap-discard-14

The following are the major changes compared to previous version:

- o Editorial changes to address comments raised in IESG review and other Directorate review.

B.2. draft-ietf-xrblock-rtcp-xr-burst-gap-discard-13

The following are the major changes compared to previous version:

- o Additional editorial changes to Burst Gap discard draft to get in line with Burst Gap Loss draft.

B.3. draft-ietf-xrblock-rtcp-xr-burst-gap-discard-12

The following are the major changes compared to previous version:

- o Similar changes to Burst Gap loss draft to get in line with Burst Gap Loss draft.

B.4. draft-ietf-xrblock-rtcp-xr-burst-gap-discard-11

The following are the major changes compared to previous version:

- o Similar changes to Burst Gap loss draft to address IESG review comments apply to this document.

B.5. draft-ietf-xrblock-rtcp-xr-burst-gap-discard-10

The following are the major changes compared to previous version:

- o Move [RFC6709](#) as one informative reference.

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