

Audio/Video Transport Working Group
Internet-Draft
Intended status: Standards Track
Expires: October 13, 2013

A. Clark
Telchemy
R. Huang
Q. Wu, Ed.
Huawei
April 11, 2013

RTP Control Protocol(RTCP) Extended Report (XR) Block for Burst/Gap
Discard metric Reporting
draft-ietf-xrblock-rtcp-xr-burst-gap-discard-11.txt

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

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <http://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on October 13, 2013.

Copyright Notice

Copyright (c) 2013 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as

described in the Simplified BSD License.

Table of Contents

1.	Introduction	3
1.1.	Burst and Gap Discard Report Block	3
1.2.	RTCP and RTCP XR Reports	3
1.3.	Performance Metrics Framework	3
1.4.	Applicability	4
2.	Terminology	5
2.1.	Standards Language	5
3.	Burst/Gap Discard Block	6
3.1.	Report Block Structure	6
3.2.	Definition of Fields in Burst/Gap Discard Report Block . .	6
3.3.	Derived metrics based on reported metrics	8
4.	Considerations for Voice-over-IP applications	10
5.	SDP Signaling	11
5.1.	SDP rtcp-xr-attrib Attribute Extension	11
5.2.	Offer/Answer Usage	11
6.	IANA Considerations	12
6.1.	New RTCP XR Block Type value	12
6.2.	New RTCP XR SDP Parameter	12
6.3.	Contact information for registrations	12
7.	Security Considerations	13
8.	Contributors	14
9.	Acknowledgments	15
10.	References	16
10.1.	Normative References	16
10.2.	Informative References	16
Appendix A.	Metrics represented using RFC6390 Template	17
Appendix B.	Change Log	20
B.1.	draft-ietf-xrblock-rtcp-xr-burst-gap-discard-11	20
B.2.	draft-ietf-xrblock-rtcp-xr-burst-gap-discard-10	20
B.3.	draft-ietf-xrblock-rtcp-xr-burst-gap-discard-09	20
B.4.	draft-ietf-xrblock-rtcp-xr-burst-gap-discard-08	20
B.5.	draft-ietf-xrblock-rtcp-xr-burst-gap-discard-06	20
	Authors' Addresses	21

[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 receiver due to jitter. 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. 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 may be an equivalent method to that defined in [\[RFC3611\]](#).

[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](#)].

Clark, et al.

Expires October 13, 2013

[Page 3]

Internet-Draft

RTCP XR Burst/Gap Discard

April 2013

[1.4.](#) Applicability

These metrics are applicable to a range of RTP applications which contain jitter buffers 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 too early or late to be played out or thrown away before playout due to packet duplication or redundancy shall be regarded as discarded. 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.

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 and MUST be sent in the same compound RTCP packet as the measurement information block. If the measurement period is not received in the same compound RTCP packet as this Metrics Block, this Metrics Block MUST be discarded.

[3.1.](#) Report Block Structure

Burst/Gap Discard metrics block

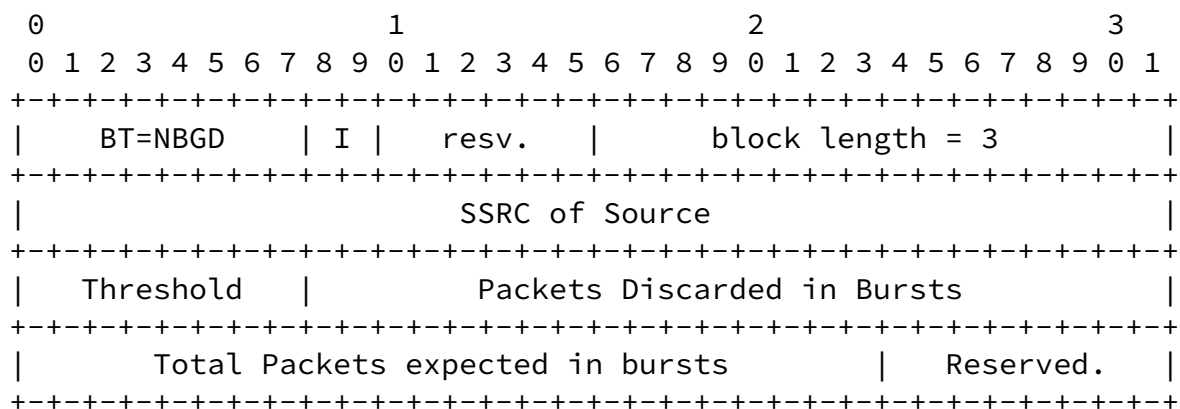


Figure 1: Report Block Structure

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:

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. Accordingly, the value I=01, indicating a sampled value, MUST NOT be sent, and MUST be discarded when received. In addition, the value I=00 is reserved and also MUST NOT be sent, and MUST be discarded when received.

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.

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 0xFFFFFFFF 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 0xFFFFFFFF 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](#)] (which must be present in the same RTCP packet as the Burst/Gap Discard block) and also with the metric "number of packets discarded" provided in the RTCP XR Discard Count Block [[DISCARD](#)]. The RTCP XR Discard Count Block should be sent if the Burst/Gap Discard block is sent, but the converse does not apply.

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 G_{min} packets must terminate a burst condition.

The recommended value for the threshold G_{min} 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-dscrd"

[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-dscrd" 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:

Qin Wu (sunseawq@huawei.com)

101 Software Avenue, Yuhua District
Nanjing, Jiangsu 210012
China

Clark, et al.

Expires October 13, 2013

[Page 12]

Internet-Draft

RTCP XR Burst/Gap Discard

April 2013

[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

The authors gratefully acknowledge reviews and feedback provided by Bruce Adams, Philip Arden, Amit Arora, Bob Biskner, Kevin Connor,

Claus Dahm, Randy Ethier, Roni Even, Jim Frauenthal, Albert Higashi, Tom Hock, Shane Holthaus, Paul Jones, Rajesh Kumar, Keith Lantz, Mohamed Mostafa, Amy Pendleton, Colin Perkins, Mike Ramalho, Ravi Raviraj, Albrecht Schwarz, Tom Taylor, Hideaki Yamada, Paul Kyzivat, Claire Bi and Dan Romascanu.

[10.](#) References

[10.1.](#) Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", March 1997.
- [RFC3550] Schulzrinne, H., "RTP: A Transport Protocol for Real-Time Applications", [RFC 3550](#), 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.
- [RFC5725] Begen, A., Hsu, D., and M. Lague, "Post-Repair Loss RLE Report Block Type for RTP Control Protocol (RTCP) Extended Reports (XRs)", [RFC 5725](#), February 2020.

[10.2.](#) Informative References

- [DISCARD] Wu, Q., "RTCP XR Report Block for Discard Count metric Reporting", ID [draft-ietf-xrblock-rtcp-xr-discard-11](#), December 2012.
- [RFC4588] Rey, J., Leon, D., , A., Varsa, V., and R. Hakenberg, "RTP Retransmission Payload Format", [RFC 4588](#), July 2006.
- [RFC5109] Li, A., "RTP Payload Format for Generic Forward Error Correction", [RFC 5109](#), December 2007.
- [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.
- [RFC6776] Wu, Q., "Measurement Identity and information Reporting using SDES item and XR Block", [RFC 6776](#), October 2012.
- [RFC6792] Hunt, G., "Monitoring Architectures for RTP", [RFC 6792](#), November 2012.
- [SUMSTAT] Zorn, G., "RTCP XR for Summary Statistics Metrics Reporting", ID [draft-ietf-xrblock-rtcp-xr-summary-stat-11](#),

March 2013.

Clark, et al.

Expires October 13, 2013

[Page 16]

Internet-Draft

RTCP XR Burst/Gap Discard

April 2013

[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](#), 1st 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.

Clark, et al.

Expires October 13, 2013

[Page 17]

Internet-Draft

RTCP XR Burst/Gap Discard

April 2013

- * 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](#), 1st 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](#), 1st paragraph [RFCXXXX] for measurement timing and [section 3.2](#) [RFCXXXX] for Interval

Clark, et al.	Expires October 13, 2013	[Page 18]
---------------	--------------------------	-----------

Internet-Draft	RTCP XR Burst/Gap Discard	April 2013
----------------	---------------------------	------------

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-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.2. 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.

[B.3. draft-ietf-xrblock-rtcp-xr-burst-gap-discard-09](#)

The following are the major changes compared to previous version:

- o Editorial changes based on comments received in WGLC.

[B.4. draft-ietf-xrblock-rtcp-xr-burst-gap-discard-08](#)

The following are the major changes compared to previous version:

- o SDP update based on SDP Directorate Review.
- o Add some texts to get consistent with [RFC6798](#) and Delay draft.

[B.5. draft-ietf-xrblock-rtcp-xr-burst-gap-discard-06](#)

The following are the major changes compared to previous version:

- o Outdated reference update.
- o Editorial changes based on comments that applied to PDV and Delay drafts.

Clark, et al.	Expires October 13, 2013	[Page 20]
---------------	--------------------------	-----------

Internet-Draft	RTCP XR Burst/Gap Discard	April 2013
----------------	---------------------------	------------

Authors' Addresses

Alan Clark
Telchemy Incorporated
2905 Premiere Parkway, Suite 280
Duluth, GA 30097
USA

Email: alan.d.clark@telchemy.com

Rachel Huang

Huawei Technologies Co., Ltd.
101 Software Avenue, Yuhua District
Nanjing, Jiangsu 210012
China

Email: Rachel@huawei.com

Qin Wu (editor)
Huawei
101 Software Avenue, Yuhua District
Nanjing, Jiangsu 210012
China

Email: sunseawq@huawei.com