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         RTP Control Protocol(RTCP) Extended Report (XR) Block for Burst/Gap
                        Discard metric Reporting
             draft-ietf-xrblock-rtcp-xr-burst-gap-discard-14.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

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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

```
     0                   1                   2                   3
     0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |    BT=NBGD    | I |   resv.   |       block length = 3         |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                       SSRC of Source                          |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |   Threshold   |       Packets Discarded in Bursts             |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |      Total Packets expected in Bursts     |     Reserved.     |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

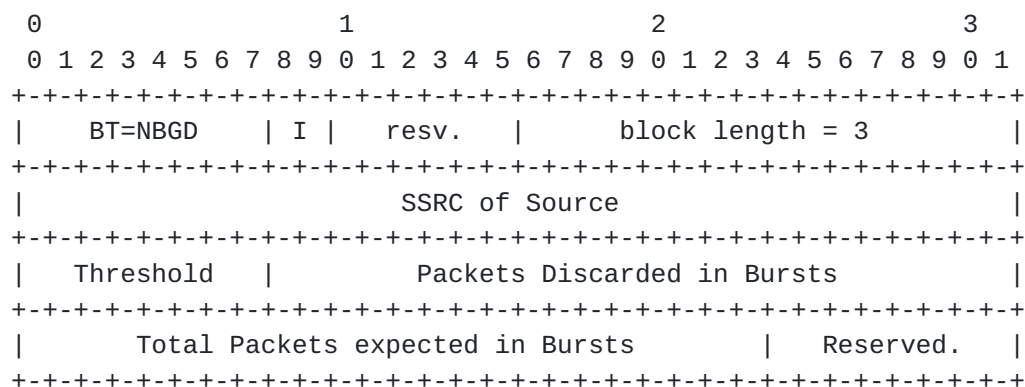   Figure 1: Report Block Structure

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 0xFFFFFF 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 0xFFFFFF 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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   Bruce Adams, Philip Arden, Amit Arora, Bob Biskner, Kevin Connor,
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   Kyzivat,Claire Bi,Stephen Farrell, Benoit Claise and Dan Romascanu.

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.

[RFC2119]   Bradner, S., "Key words for use in RFCs to Indicate
             Requirement Levels", March 1997.

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

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             Description Protocol", July 2006.

[RFC5725]   Begen, A., Hsu, D., and M. Lague, "Post-Repair Loss RLE
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[RFC6776]   Wu, Q., "Measurement Identity and information Reporting
             using SDES item and XR Block", RFC 6776, October 2012.

[SUMSTAT]   Zorn, G., "RTCP XR for Summary Statistics Metrics
             Reporting", ID draft-ietf-xrblock-rtcp-xr-summary-stat-11,
             March 2013.

10.2. Informative References

[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.

[RFC5481]   Morton, A. and B. Claise, "Packet Delay Variation
             Applicability Statement", RFC 5481, March 2009.

[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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