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        RTP Control Protocol (RTCP) Extended Report (XR) Blocks for Summary
                       Statistics Metrics Reporting
                draft-ietf-xrblock-rtcp-xr-summary-stat-11

Abstract

   This document defines three RTP Control Protocol (RTCP) Extended
   Report (XR) Blocks that allow the reporting of loss, duplication and
   discard summary statistics metrics in a range of RTP applications.

Status of this Memo

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1. Introduction

1.1. Summary Statistics Metrics

   This draft defines three new block types to augment those defined in
   [RFC3611] for use in a range of RTP applications.

   o Burst/Gap Loss Summary Statistics Metrics Block
   o Burst/Gap Discard Summary Statistics Metrics Block
   o Frame Impairment Statistics Summary Metrics Block

   The first two block types support the reporting of burst gap loss/
   discard summary statistics including packet loss/discard proportion,
   mean and variance and belong to the class of transport-related end
   system metrics defined in [RFC6792]. These two blocks are intended
   to be used in conjunction with information from the Burst Gap Loss
   Metrics Block [BGLOSS] or Burst Gap Discard Metrics Block
   [BGDISCARD], and on which these two blocks therefore depend. The
   metrics in the Burst Gap Loss Metrics block or Burst Gap Discard
   Metrics Block are consistent with the definitions of Burst, Gap, Loss
   and Discard in RTCP XR [RFC3611].

   The third block supports the reporting of detailed video statistics
   for each frame type, including the number of frames received, lost
   and discarded of each frame type in the Group of Pictures (GOP) and
   additional data allowing the calculation of statistical parameters
   (e.g.,the proportion of each frame type impaired by packet loss and
   discard). The metrics defined in this block belong to the class of
   application layer metrics defined in [RFC6792].

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 RTP Monitoring Architectures [RFC6792] provides guideline for
   reporting block format using RTCP XR. Metrics described in this
   draft are in accordance with the guidelines in [RFC6792].

1.4. Applicability

   These metrics are applicable to a wide range of RTP applications and
   reflect transient IP problems that affect user experience. They can
   be used to form an accurate assessment of users' quality of

experience and influence sender strategies to mitigate the problem.

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:

Frame Type

   In many cases, a video frame is compressed using different
   algorithms. Frame type is used to identify different algorithms
   for video frames. Two frame Types used in the different video
   algorithms are the Key frame and Derived frames. The Key frame is
   independently coded without prediction from other pictures and
   used as a reference frame for predicting other pictures. Derived
   frames are predicatively coded and derived from a Key frame using
   a prediction algorithm If there is no video image compression, all
   frames are Key Frames.

3. Transport Related End System Metrics

3.1. Burst/Gap Loss Summary Statistics Metrics Block

This Block extends packet loss and discard metrics defined in section
4.7.1 of RFC3611. The metrics described here are intended to be used
as described in this section, in conjunction with information from
the Measurement Information block [RFC6776] (which MUST be present in
the same RTCP packet as the Burst/Gap Loss block) and also with the
metric "cumulative number of packets lost" provided in standard RTCP
[RFC3550]. 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 SHOULD 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.

The metrics carried in this Metrics Block provide information

relevant to statistical parameters, including burst loss rate, gap
loss rate, burst duration mean, burst duration variance and are
measured at the receiving end of the RTP stream using burst gap loss
metrics defined in [BGLOSS] and other information which is sent
together with this report block.

3.1.1. Report Block Structure

```
  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=BGLSS   | I | Reserved  |          block length         |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |                        SSRC of Source                         |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |        Burst Loss Rate        |         Gap Loss Rate         |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |       Burst duration Mean     |    Burst duration Variance    |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
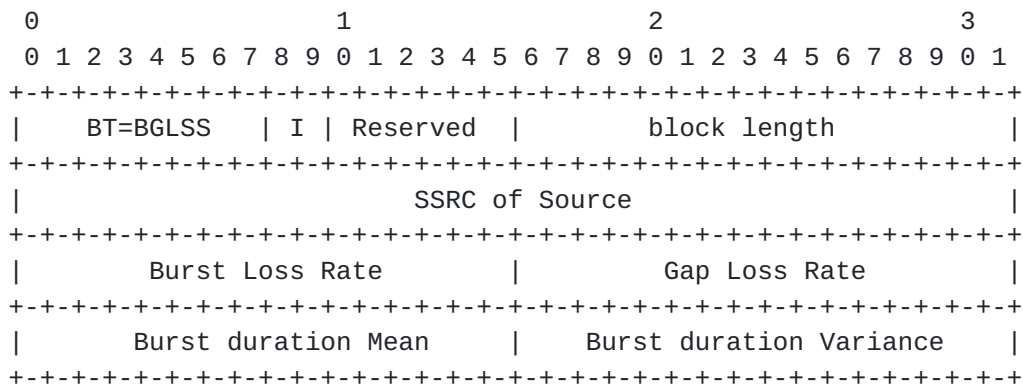
3.1.2. Definition of Fields in Loss Summary Statistics Block

Block Type (BT): 8 bits

   Burst/Gap Loss Summary Statistics Block is identified by the
   constant <BGLSS>.

Interval Metric Flag (I): 2 bits

   This field is used to indicate whether the Burst/Gap Loss Summary
   Statistics 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, the value I=00 is the reserved value and MUST
   NOT be used.

Reserved: 6 bits

   This field is reserved for future definition. In the absence of
   such a definition, the bits in this field MUST be set to zero and
   ignored by the receiver (See RFC6709 section 4.2).

Block Length: 16 bits

   The constant 3, in accordance with the definition of this field in
   Section 3 of RFC 3611 [RFC3611].

SSRC of Source: 32 bits

   As defined in Section 4.1 of RFC3611 [RFC3611].

Burst Loss Rate: 16 bits

   The fraction of packets lost during bursts since the beginning of
   reception, expressed as a fixed point number with the binary point
   immediately after the left-most bit. This value is calculated by
   dividing Packets Lost in Bursts by Total Packets Expected in
   Bursts, multiplying the result of the division by 32768
   (0x8000),and keeping only the integer part. The maximum value is
   thus 0x8000. Representing this as a formula:

   integer-part((Packets Lost in Bursts / Total Packets Expected in
   Bursts) * 0x8000)

   If the measurement is unavailable, the value 0xFFFF MUST be
   reported.

Gap Loss Rate: 16 bits

   The fraction of packets lost during gaps since the beginning of
   reception expressed as a fixed point number with the binary point
   immediately after the left-most bit. This value is calculated by
   dividing the difference between number of packets lost and Packets
   lost in Bursts by the difference between Packets Expected and
   Total Packets expected in Bursts, multiplying the result of the
   division by 32768 (0x8000),and keeping only the integer part. The
   maximum value is thus 0x8000. Representing this as a formula:

   integer-part ((number of packets lost - Packets Lost in Bursts)/
   (Packets Expected - Total Packets expected in Bursts) * 0x8000)

   where "number of packets lost" is obtained from standard RTCP
   [RFC3550] and Packets Expected is calculated as the difference
   between "extended last sequence number" and "extended first
   sequence number" (Interval or Cumulative) provided in the
   Measurement Identity and Information block [RFC6776].

   If the measurement is unavailable, the value 0xFFFF MUST be
   reported.

   Note that if the metric is to be calculated on an Interval basis,
   a difference must be taken between the current and preceding
   values of "cumulative number of packets lost" in RTCP, to obtain
   the "number of packets lost" for the reporting interval.

Burst Duration Mean:16bits

   The mean burst duration is obtained as the quotient:

   mean = Sum of Burst Durations / Number of Bursts

   where "Sum of Burst Durations" and "Number of Bursts" is obtained
   from the RTCP XR Burst/Gap Loss Block [BGLOSS].

   If the measurement is unavailable, the value 0xFFFF MUST be
   reported.

Burst Duration Variance:16bits

   The variance of the burst duration is obtained using the standard
   result:

   var = (Sum of Squares of Burst Durations - Number of Bursts *
   mean^2) / (Number of Bursts - 1)

   where "Sum of Squares of Burst Durations" and "Number of Bursts"is
   obtained from the RTCP XR Burst/Gap Loss Block [BGLOSS].

   If the measurement is unavailable, the value 0xFFFF MUST be
   reported.

3.2. Burst/Gap Discard Summary Statistics Metrics Block

   This Block extends packet loss and discard metrics defined in section
   4.7.1 of RFC3611.   The metrics described here are intended to be used
   as described in this section, in conjunction with information from
   the Measurement Identity block [RFC6776] (which MUST be present in
   the same RTCP packet as the Burst/Gap Discard Summary Statistics
   block) .

   These metrics provide information relevant to statistical parameters,
   including burst discard rate, gap discard rate and are measured at
   the receiving end of the RTP stream using burst gap discard metrics
   defined in [BGDISCARD] and other information which is sent together
   with this report block.

   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 SHOULD 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.

3.2.1. Report Block Structure

```
 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=BGDSS   | I |  Reserved |          block length          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                        SSRC of Source                          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|        Burst Discard Rate     |        Gap Discard Rate        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

3.2.2. Definition of Fields in Burst/Gap Discard Summary Statistics Block

Block Type (BT): 8 bits

   Burst/Gap Discard Summary Statistics Block is identified by the
   constant <BGDSS>.

Interval Metric Flag (I): 2 bits

   This field is used to indicate whether the Burst/Gap Discard
   Summary Statistics 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, the value I=00 is the reserved value and MUST
   NOT be used.

   Reserved: 6 bits

      This field is reserved for future definition. In the absence of
      such a definition, the bits in this field MUST be set to zero and
      ignored by the receiver (See RFC6709 section 4.2).

   Block Length: 16 bits

      The constant 2, in accordance with the definition of this field in
      Section 3 of RFC 3611 [RFC3611].

   SSRC of Source: 32 bits

      As defined in Section 4.1 of RFC3611 [RFC3611].

   Burst Discard Rate: 16 bits

      The fraction of packets discarded during bursts since the
      beginning of reception, expressed as a fixed point number with the
      binary point immediately after the left-most bit. This value is
      calculated by dividing Packets Discarded in Bursts by Total
      Packets expected in Bursts, multiplying the result of the division
      by 32768 (0x8000), and keeping only the integer part, according to
      the formula:

      integer-part((Packets Discarded in Bursts / Total Packets
      expected in Bursts) * 0x8000)

      If the measurement is unavailable, the value 0xFFFF MUST be
      reported.

   Gap Discard Rate: 16 bits

      The fraction of packets discarded during gaps since the beginning
      of reception expressed as a fixed point number with the binary
      point immediately after the left-most bit. This value is
      calculated by dividing the difference between number of packets
      discarded and Packets Discarded in Bursts by the difference
      between Packets Expected and Total Packets expected in Bursts,
      multiplying the result of the division by 32768 (0x8000), and
      keeping only the integer part. The maximum value is thus 0x8000.
      Representing this as a formula:

      integer-part((number of packets discarded - Packets Discarded in
      Bursts) /(Packets Expected - Total Packets expected in Bursts) *
      0x8000)

      where "number of packets discarded" is obtained from the RTCP XR

Discard Count Block [DISCARD] and filled with the sum of packets
discarded due to early arrival (DT=1) and packets discarded due to
late arrival(DT=2) and Packets Expected is calculated as the
difference between "extended last sequence number" and "extended
first sequence number" (Interval or Cumulative) provided in the
Measurement Information block [RFC6776]. In order for the Burst/
Gap Discard Summary Statistics Block to be meaningful, 2 instances
of the Discard Count block with DT=1 and DT=2 MUST be included in
the same RTCP XR packet as the Burst/Gap Discard Summary
Statistics Block.

If the measurement is unavailable, the value 0xFFFF MUST be
reported.

4. Application Level Metrics

4.1. Frame Impairment Statistics Summary Metrics Block

This block extends statistics summary report mechanism defined in
section 4.6 of RFC3611 and reports statistics on which frame type
were affected beyond the information carried in the Statistics
Summary Report Block RTCP packet specified in the section 4.6 of RFC
3611 [RFC3611]. Information is measured at the receiving end of the
RTP stream and recorded about the number of frames received, lost
frames, duplicated frames and lost partial frames. Such information
can be useful for network management and video quality monitoring.

4.1.1. Report Block Structure

```
 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=FISS   |T|  Reserved  |          block length           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       SSRC of Source                          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|         begin_seq         |              end_seq              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       Discarded_frames                        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                         Dup_frames                            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       Full_lost_frames                        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                      Partial_lost_frames                      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

4.1.2. Definition of Fields in Frame Impairment Summary Statistics
        Block

   Block type (BT): 8 bits

      Frame Impairment Statistics Summary Block is identified by the
      constant <FISS>.

   Frame type indicator (T): 1 bit

      This field is used to indicate the frame type to be reported. The
      bit is set to 0 if the full_lost_frames, partial_lost_frames,
      dup_frames,discarded_frames and Number of frames received fields
      contain Key frame (reference frame) counts or 1 if they contain
      Derived frame counts. Note that if both the Key frame and
      Derivation frame report are sent, they should be sent in the same
      RTCP compound packet using two Frame Impairment Summary Statistics
      Blocks.

   Reserved: 7 bits

      This field is reserved for future definition. In the absence of
      such a definition, the bits in this field MUST be set to zero and
      ignored by the receiver (See RFC6709 section 4.2).

   Block Length: 16 bits

      The constant 6, in accordance with the definition of this field in
      Section 3 of RFC 3611 [RFC3611].

   SSRC of Source: 32 bits

      As defined in Section 4.1 of RFC3611 [RFC3611].

   begin_seq: 16 bits

      As defined in Section 4.1 of RFC 3611 [RFC3611].

   end_seq: 16 bits

      As defined in Section 4.1 of RFC 3611 [RFC3611].

   Number of discarded frames (discarded_frames): 32 bits

      Number of frames discarded in the above sequence number interval.

   Number of duplicate frames (dup_frames): 32 bits

      Number of duplicate frames received in the above sequence number
      interval.

   Number of full lost frames (full_lost_frames): 32 bits

      A frame is either split across multiple packets or carried in only
      one packet.If the whole frame or all the packets of the frame is
      lost, this frame is regarded as one full_lost_frame. The
      full_lost_frames can be inferred from packet(s) that comprise the
      frame. The full_lost_ frames is equivalent to the number of full
      lost frames in the above sequence number interval.

   Number of partial lost frames (partial_lost_frames): 32 bits

      When a frame is split across multiple packets and some packets of
      the frame are lost, this frame is regarded as one
      partial_lost_frame. The partial_lost_frames can be inferred from
      packets that comprise the frame. The value of the
      partial_lost_frames field is equivalent to the number of partial
      lost frames in the above sequence number interval.

5. SDP Signaling

   RFC 3611 defines the use of SDP (Session Description Protocol)
   [RFC4566] for signaling the use of XR blocks. However XR blocks MAY
   be used without prior signaling (see section 5 of RFC3611).

5.1. SDP rtcp-xr-attrib Attribute Extension

   This section augments the SDP [RFC4566] attribute "rtcp-xr" defined
   in Section 5.1 of RFC 3611 by providing three additional values of
   "xr-format" to signal the use of the report block defined in this
   document.

   xr-format = / xr-bglss-block
             / xr-bgdss-block
             / xr-fiss-block
   xr-bglss-block= "burst-gap-loss-stat"
   xr-bgdss-block = "burst-gap-discard-stat"
   xr-fiss-block= "frame-impairment-stat"

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 of 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 RFC
   3611.

6.1. New RTCP XR Block Type values

   This document assigns three new block type value in the "RTP Control
   Protocol (RTCP) Extended Report (XR) Block Type Registry" :

         Name: BGLSS
         Long Name: Burst/Gap Loss Summary Statistics Block
         Value   <BGLSS>
         Reference: Section 3.1

         Name: BGDSS
         Long Name: Burst/Gap Discard Summary Statistics Block
         Value   <BGDSS>
         Reference: Section 3.2

         Name: FISS
         Long Name: Frame Impairment Statistics Summary
         Value   <FISS>
         Reference: Section 4.1

6.2. New RTCP XR SDP Parameters

   This document also registers three new SDP [RFC4566] parameters for
   the "rtcp-xr" attribute in the " RTP Control Protocol (RTCP) Extended
   Report (XR) SDP Parameters Registry ":

    * "burst-gap-loss-stat"
    * "burst-gap-discard-stat"
    * "frame-impairment-stat"

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

7. Security Considerations

The new RTCP XR report blocks proposed in this document introduces no
new security considerations beyond those described in RFC 3611.

8. Acknowledgements

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and Benoit Claise for their valuable comments and suggestions on this
document.

9. References

9.1. Normative References

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[BGLOSS]   Clark, A., Zhang, S., Zhao, J., and Q. Wu, "RTP Control
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   [RFC3611] Friedman, T., Caceres, R., and A. Clark, "RTP Control
              Protocol Extended Reports (RTCP XR)", RFC 3611,
              November 2003.

   [RFC4566] Handley, M., Jacobson, V., and C. Perkins, "SDP: Session
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   [RFC6776] Wu, Q., "Measurement Identity and information Reporting
              using SDES item and XR Block", RFC 6776, August 2012.

9.2. Informative References

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   [RFC6709] Carpenter, B., Aboba, B., and S. Cheshire, "Design
              Considerations for Protocol Extensions", RFC 6709,
              September 2012.

   [RFC6792] Hunt, G., Wu, Q., and P. Arden, "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. Burst Loss Rate Metric

       * Metric Name: RTP Burst Loss Rate

       * Metric Description: The fraction of packets lost during bursts
          since the beginning of reception for RTP traffic.

       * Method of Measurement or Calculation: See section 3.1.2, Burst
          Loss Rate definition [RFCXXXX].

       * Units of Measurement: See section 3.1.2, Burst Loss Rate
          definition [RFCXXXX].

* Measurement Point(s) with Potential Measurement Domain: See
  section 3.1, 2nd paragraph [RFCXXXX].

* Measurement Timing: See section 3.1, 1st paragraph [RFCXXXX]
  for measurement timing and section 3.1.2 [RFCXXXX] for
  Interval Metric flag.

* Use and applications: See section 1.4 [RFCXXXX].

* Reporting model: See RFC3611.

b. Gap Loss Rate Metric

* Metric Name: RTP Gap Loss Rate

* Metric Description: The fraction of packets lost during gaps
  since the beginning of reception for RTP traffic.

* Method of Measurement or Calculation: See section 3.1.2, Gap
  Loss Rate definition [RFCXXXX].

* Units of Measurement: See section 3.1.2, Gap Loss Rate
  definition [RFCXXXX].

* Measurement Point(s) with Potential Measurement Domain: See
  section 3.1, 2nd paragraph [RFCXXXX].

* Measurement Timing: See section 3.1, 1st paragraph [RFCXXXX]
  for measurement timing and section 3.1.2 [RFCXXXX] for
  Interval Metric flag.

* Use and applications: See section 1.4 [RFCXXXX].

* Reporting model: See RFC3611.

c. Burst duration Mean Metric

* Metric Name: RTP Burst duration Mean

* Metric Description: The mean duration of the burst periods
  that have occurred since the beginning of reception for RTP
  traffic.

* Method of Measurement or Calculation: See section 3.1.2, Burst
  Loss Rate definition [RFCXXXX].

* Units of Measurement: This metric is expressed in
  milliseconds.

* Measurement Point(s) with Potential Measurement Domain: See
  section 3.1, 2nd paragraph [RFCXXXX].

* Measurement Timing: See section 3.1, 1st paragraph [RFCXXXX]
  for measurement timing and section 3.1.2 [RFCXXXX] for
  Interval Metric flag.

* Use and applications: See section 1.4 [RFCXXXX].

* Reporting model: See RFC3611.

d. Burst duration variance Metric

   * Metric Name: RTP Burst duration variance

   * Metric Description: The variance duration of the burst periods
     that have occurred since the beginning of reception for RTP
     traffic.

   * Method of Measurement or Calculation: See section 4.1.2, Gap
     Loss Rate definition [RFCXXXX].

   * Units of Measurement: See section 3.1.2, Burst Duration
     Variance definition [RFCXXXX].

   * Measurement Point(s) with Potential Measurement Domain: See
     section 4.1, 2nd paragraph [RFCXXXX].

   * Measurement Timing: See section 4.1, 1st paragraph [RFCXXXX]
     for measurement timing and section 3.1.2 [RFCXXXX] for
     Interval Metric flag.

   * Use and applications: See section 1.4 [RFCXXXX].

   * Reporting model: See RFC3611.

e. Burst Discard metric

   * Metric Name: RTP Burst Discard Rate

   * Metric Description: The fraction of packets discarded during
     bursts since the beginning of reception for RTP traffic.

   * Method of Measurement or Calculation: See section 3.2.2, Burst
      Discard Rate definition [RFCXXXX].

   * Units of Measurement: See section 3.2.2, Burst Discard Rate
      definition [RFCXXXX].

   * Measurement Point(s) with Potential Measurement Domain: See
      section 3.2, 2nd paragraph [RFCXXXX].

   * Measurement Timing: See section 3.2, 3rd paragraph [RFCXXXX]
      for measurement timing and section 3.1.2 [RFCXXXX] for
      Interval Metric flag.

   * Use and applications: See section 1.4 [RFCXXXX].

   * Reporting model: See RFC3611.

f. Gap Discard Rate metric

   * Metric Name: RTP Gap Discard Rate

   * Metric Description: The fraction of packets discarded during
      gaps since the beginning of reception for RTP traffic.

   * Method of Measurement or Calculation: See section 3.2.2, Gap
      Discard Rate definition [RFCXXXX].

   * Units of Measurement: See section 3.2.2, Gap Discard Rate
      definition [RFCXXXX].

   * Measurement Point(s) with Potential Measurement Domain: See
      section 3.2, 2nd paragraph [RFCXXXX].

   * Measurement Timing: See section 3.2, 3rd paragraph [RFCXXXX]
      for measurement timing and section 3.1.2 [RFCXXXX] for
      Interval Metric flag.

   * Use and applications: See section 1.4 [RFCXXXX].

   * Reporting model: See RFC3611.

g. Number of discarded frames metric

   * Metric Name: Number of discarded frames in RTP

   * Metric Description: Number of frames discarded in a certain
      sequence number interval for RTP traffic.

* Method of Measurement or Calculation: See section 4.1.2,
  Number of discarded frames definition [RFCXXXX]. This metric
  is directly measured and can be inferred from packet(s) that
  comprise the frame.

* Units of Measurement: This metric is expressed as 32-bit
  unsigned integer value.

* Measurement Point(s) with Potential Measurement Domain: See
  section 4.1, 1st paragraph [RFCXXXX].

* Measurement Timing: See section 4.1 [RFCXXXX], Number of
  discarded frames definition, this metric relies on sequence
  number interval and RTCP RR packet of RFC3550 to determine
  measurement timing.

* Use and applications: See section 1.4 [RFCXXXX].

* Reporting model: See RFC3611.

h. Number of duplicate frames metric

* Metric Name: Number of duplicate frames in RTP

* Metric Description: Number of frames duplicated in a certain
  sequence number interval for RTP traffic.

* Method of Measurement or Calculation: See section 4.1.2,
  Number of discarded frames definition [RFCXXXX], This metric
  is directly measured and can be inferred from packet(s) that
  comprise the frame.

* Units of Measurement: This metric is expressed as 32-bit
  unsigned integer value.

* Measurement Point(s) with Potential Measurement Domain: See
  section 4.1, 1st paragraph [RFCXXXX].

* Measurement Timing: See section 4.1 [RFCXXXX], Number of
  duplicate frames definition, this metric relies on sequence
  number interval to determine measurement timing.

* Use and applications: See section 1.4 [RFCXXXX].

* Reporting model: See RFC3611.

i. Number of full lost frames metric

    * Metric Name: Number of full lost frames in RTP

    * Metric Description: A frame is either split across multiple
       RTP packets or carried in only one RTP packet.If the whole
       frame or all the packets of the frame is lost, this frame is
       regarded as one full_lost_frame.

    * Method of Measurement or Calculation: See section 4.1.2,
       Number of discarded frames definition [RFCXXXX].

    * Units of Measurement: This metric is expressed as 32-bit
       unsigned integer value.

    * Measurement Point(s) with Potential Measurement Domain: See
       section 4.1, 1st paragraph [RFCXXXX].

    * Measurement Timing: See section 4.1 [RFCXXXX], Number of full
       lost frames definition [RFCXXXX], this metric relies on
       sequence number interval to determine measurement timing.

    * Use and applications: See section 1.4 [RFCXXXX].

    * Reporting model: See RFC3611.

j. Number of partial lost frames metric

    * Metric Name: Number of partial lost frames in RTP

    * Metric Description: When a frame is split across multiple RTP
       packets and some RTP packets of the frame are lost, this frame
       is regarded as one partial_lost_frame.

    * Method of Measurement or Calculation: See section 4.1.2,
       Number of partial lost frames definition [RFCXXXX].

    * Units of Measurement: This metric is expressed as 32-bit
       unsigned integer value.

    * Measurement Point(s) with Potential Measurement Domain: See
       section 4.1, 1st paragraph [RFCXXXX].

    * Measurement Timing: See section 4.1 [RFCXXXX], Number of
       partial lost frames definition, this metric relies on sequence
       number interval to determine measurement timing.

   * 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-summary-stat-11

   The following are the major changes compared to 10:
   o Incorporate the last proposed change by Barry when his DISCUSS was
      cleared.

B.2. draft-ietf-xrblock-rtcp-xr-summary-stat-10

   The following are the major changes compared to 09:
   o Add appendix to apply RFC6390 template to metrics in this draft.

B.3. draft-ietf-xrblock-rtcp-xr-summary-stat-09

   The following are the major changes compared to 08:
   o Address comments in the IESG Review.

B.4. draft-ietf-xrblock-rtcp-xr-summary-stat-08

   The following are the major changes compared to 07:
   o Address comments raised in Sec-DIR review.

B.5. draft-ietf-xrblock-rtcp-xr-summary-stat-07

   The following are the major changes compared to 06:
   o Add comments raised in PM-DIR review by Al.

B.6. draft-ietf-xrblock-rtcp-xr-summary-stat-06

   The following are the major changes compared to 05:
   o Move RFC6709 to informative reference.

B.7. draft-ietf-xrblock-rtcp-xr-summary-stat-05

   The following are the major changes compared to 04:
   o Editorial changes to get in line with Delay and Burst Gap related
      drafts.

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