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**RTP Control Protocol (RTCP) Extended Report (XR) Block for MPEG2
Transport Stream (TS) Program Specific Information (PSI) Independent
Decodability Statistics Metrics reporting**
draft-ietf-xrblock-rtcp-xr-decodability-11

Abstract

   An MPEG2 Transport Stream (TS) is a standard container format used in
   the transmission and storage of multimedia data. Unicast/Multicast
   MPEG2 TS over RTP is widely deployed in IPTV systems. This document
   defines an RTP Control Protocol (RTCP) Extended Report (XR) Block
   that allows the reporting of MPEG2 TS decodability statistics metrics
   related to transmissions of MPEG2 TS over RTP. The metrics specified
   in the RTCP XR Block are not dependent on Program specific
   information carried in MPEG TS.

Status of this Memo

   This Internet-Draft is submitted in full conformance with the
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1. Introduction

1.1. MPEG2 Transport Stream Decodability Metrics

The European Telecommunications Standards Institute (ETSI) has
defined a set of syntax and information consistency tests and
corresponding indicators [ETSI] that are recommended for the
monitoring of MPEG2 Transport Streams [ISO-IEC.13818-1.2007]. The
tests and corresponding indicators are grouped according to priority:

o First priority - Necessary for decodability (basic monitoring)
o Second priority - Recommended for continuous or periodic
   monitoring
o Third priority - Recommended for application-dependent monitoring

This memo is based on information consistency tests and resulting
indicators defined by ETSI [ETSI] and defines a new block type to
augment those defined in [RFC3611] for use with MPEG2 Transport
Stream (TS) [ISO-IEC.13818-1.2007]. The new block type supports
reporting of the number of occurrences of each Program Specific
Information (PSI) Independent indicator in the first and second
priorities; third priority indicators are not supported.

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 new report block described in this
memo is in compliance with the monitoring architecture specified in
[RFC6792] and the Performance Metrics Framework [RFC6390].

1.4. Applicability

This block type allows a counts of MPEG Transport Stream quality
metrics that are measured in accordance with ETSI TR 101290 [ETSI] to
be reported by an endpoint. These metrics are useful for identifying
bitstream packetization and transport stream encoding problems that
may affect the user's perception of a video service delivered over
RTP.

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].

3. MPEG2 TS PSI Independent Decodability Statistics Metrics Block

ETSI TR 101290 [ETSI] generally defines metrics related to error
events while this document contains counts of those metrics defined
in [ETSI]. The block defined in this document reports MPEG2 TS PSI
Independent decodability statistics metrics beyond the information
carried in the standard RTCP packet format, which are measured at the
receiving end of the RTP stream. It contains counts of eight metrics
defined in ETSI TR 101290 [ETSI]. Information is reported about
basic monitoring parameters necessary to ensure that the TS can be
decoded including:

o Transport Stream Synchronization Losses
o Sync byte errors
o Continuity count errors

and continuous monitoring parameters necessary to ensure the
continuous decoding including:

o Transport errors
o Program Clock Reference (PCR) errors
o PCR repetition errors
o PCR discontinuity indicator errors
o PCR accuracy errors
o Presentation Time Stamp (PTS) errors

The other parameters are ignored since they do not apply to all MPEG2
implementations. For further information on these parameters, see
[ETSI]. Note that when the report of this block spans across more
than one measurement intervals [RFC6776], the count of the metrics
(e.g., Sync byte errors, PCR errors)defined in [ETSI] may reflect a
problem in the current or previous measurement interval.

The MPEG2 TS PSI Independent Decodability Metrics Block has the
following format:

```
       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=MTPID   |    Reserved   |         block length          |
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
      |                         SSRC of source                       |
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
      |          begin_seq             |            end_seq           |
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
      |                       TS_sync_loss_count                      |
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
      |                      Sync_byte_error_count                    |
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
      |                   Continuity_count_error_count                |
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
      |                      Transport_error_count                    |
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
      |                        PCR_error_count                        |
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
      |                    PCR_repetition_error_count                 |
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
      |               PCR_discontinuity_indicator_error_count         |
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
      |                     PCR_accuracy_error_count                  |
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
      |                        PTS_error_count                        |
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
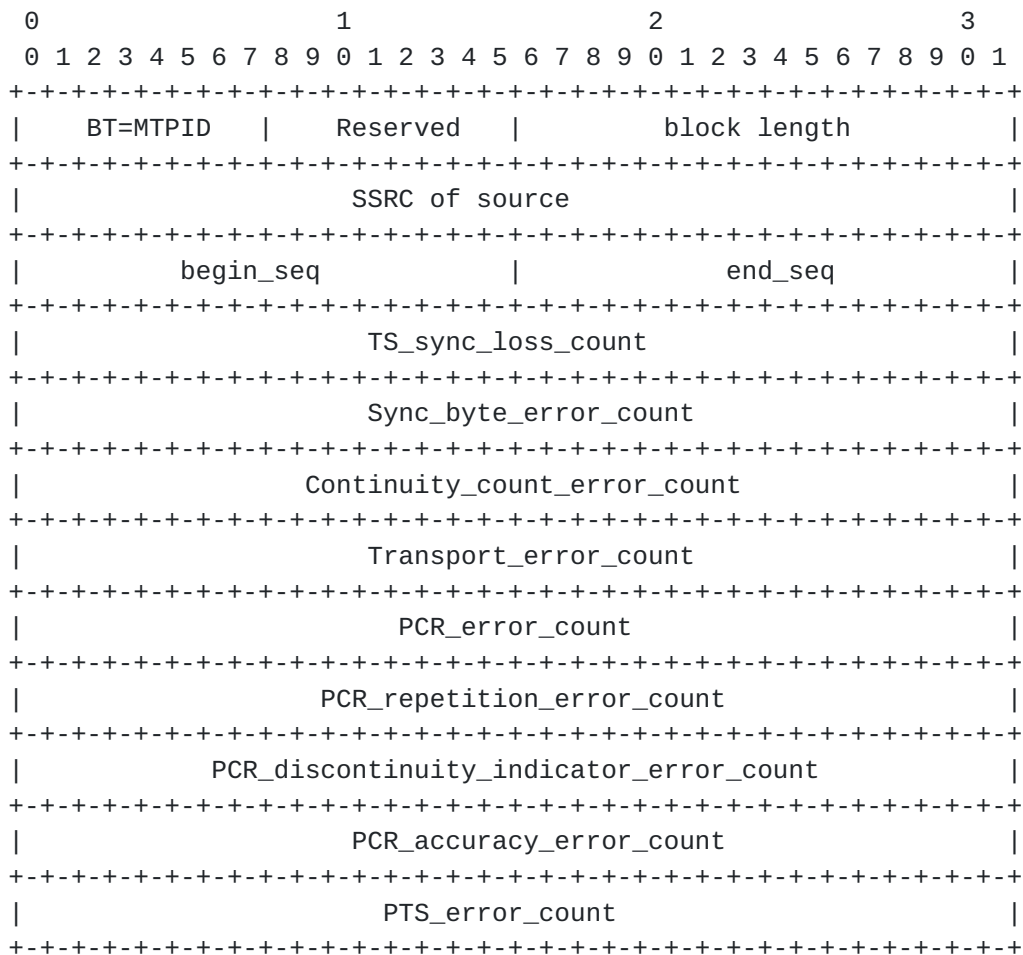
block type (BT): 8 bits

   The MPEG2 TS PSI Independent Decodability Metrics Block is
   identified by the constant <MTPID>.

Reserved: 8 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 constant 11, in accordance with the definition of this field
   in Section 3 of RFC 3611. 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 RFC 3611](#).

begin_seq: 16 bits

   The RTP sequence number corresponding to the start of the
   measurement period, as defined in [Section 4.1 of RFC 3611](#).

end_seq: 16 bits

   The RTP sequence number corresponding to the end of the
   measurement period, as defined in [Section 4.1 of RFC 3611](#).

TS_sync_loss_count: 32 bits

   A count of the number of TS_sync_loss errors that occurred in the
   above sequence number interval. A TS_sync_loss error occurs when
   there are two or more consecutive incorrect sync bytes within the
   MPEG TS stream, as defined in section 5.2.1 of [[ETSI](#)].

Sync_byte_error_count: 32 bits

   A count of the number of Sync_byte_errors that occurred in the
   above sequence number interval. A sync byte error occurs when the
   sync byte is not equal to 0x47 in any TS packet contained in the
   MPEG TS stream, as defined in section 5.2.1 of [[ETSI](#)].

Continuity_count_error_count: 32 bits

   A count of the number of Continuity_count_errors that occurred in
   the above sequence number interval. A Continuity_count_error
   occurs when any of the following faults happen within the MPEG TS
   stream - incorrect packet order, a packet occurs more than twice
   or a packet is lost,as defined in the section 5.2.1 of [[ETSI](#)].

Transport_error_count: 32 bits

   A count of the number of Transport_errors that occurred in the
   above sequence number interval. A Transport_error occurs when
   erroneous TS packet can not be corrected within the MPEG TS
   stream. as defined in the section 5.2.2 of [[ETSI](#)].

PCR_error_count: 32 bits

   A count of the number of PCR_errors that occurred in the above
   sequence number interval. A PCR_error occurs if the primary clock
   reference (PCR) is not seen for more than 100ms within the MPEG TS

stream, as defined in the section 5.2.2 of [ETSI]. The time
interval between two consecutive PCR values should be no more than
40ms.

PCR_repetition_error_count: 32 bits

A count of the number of PCR_repetition_errors that occurred in
the above sequence number interval. A PCR_repeition_error occurs
when the time interval between two consecutive PCR values is more
than 40ms within the MPEG TS stream,as defined in the section
5.2.2 of [ETSI].

PCR_discontinuity_indicator_error_count: 32 bits

A count of the number of PCR_discontinuity_indicator_errors that
occurred in the above sequence number interval. A
PCR_discontinuity_indicator_error occurs if the time interval
between two consecutive PCR values is more than 100ms within the
MPEG TS stream, as defined in the section 5.2.2 of [ETSI].

PCR_accuracy_error_count: 32 bits

A count of the Number of PCR_accuracy_errors that occurred in the
above sequence number interval. A PCR_accuracy_error occurs when
the PCR accuracy of the selected program is outside the range of
+/-500ns within the MPEG TS stream,as defined in the section 5.2.2
of [ETSI].

PTS_error_count: 32 bits

A count of the number of PTS_errors that occurred in the above
sequence number interval. A PTS_error occurs when the PTS
repetition is more than 700ms within the MPEG TS stream, as
defined in the section 5.2.2 of[ETSI]. Note that the PTS is
contained in the MPEG-2 TS stream and is used to aid the decoder
in presenting the program on time, at the correct speed and
synchronized.

4. SDP Signaling

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

4.1. SDP rtcp-xr-attrib Attribute Extension

This session augments the SDP attribute "rtcp-xr" defined in Section 5.1 of RFC 3611 by providing an additional value of "xr-format" to signal the use of the report block defined in this document.

   xr-format =/ xr-tpid-block

   xr-tpid-block = "ts-psi-indep-decodability"

4.2. Offer/Answer Usage

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

5. IANA Considerations

New report block types for RTCP XR are subject to IANA registration. For general guidelines on IANA allocations for RTCP XR, refer to Section 6.2 of RFC 3611.

5.1. New RTCP XR Block Type value

This document assigns the block type value MTPID in the IANA " RTP Control Protocol Extended Reports (RTCP XR) Block Type Registry " to the "MPEG2 Transport Stream PSI Independent Decodability Statistics Metrics Block".

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

5.2. New RTCP XR SDP Parameter

This document also registers a new parameter "ts-psi-indep-decodability" in the "RTP Control Protocol Extended Reports (RTCP XR) Session Description Protocol (SDP) Parameters Registry".

5.3. Contact information for registrations

The contact information for the registrations is:

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6. Security Considerations

This proposed RTCP XR report block introduces no new security considerations beyond those described in RFC 3611.

7. Acknowledgements

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