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RTP Control Protocol (RTCP) Extended Report (XR) Block for MPEG2
Transport Stream (TS) Program Specific Information (PSI) Decodability
                    Statistics Metrics reporting
              draft-ietf-xrblock-rtcp-xr-psi-decodability-01

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 related to Program specific information
   carried in MPEG TS.

Status of this Memo

   This Internet-Draft is submitted in full conformance with the
   provisions of BCP 78 and BCP 79.

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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 Freidman, et al. [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) indicator in the first and second
priorities that supplements information from PSI independent
Decodability Statistics Metrics Block [RFC6990]; 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

These metrics are applicable to any type of RTP application that uses
the MPEG2 TS standard format for multimedia data; for example, MPEG4
over MPEG2 TS over RTP. This new block type can be useful for
measuring content stream or TS quality by checking TS header
information [ETSI] and identifying the existence, and characterizing

the severity, of bitstream packetization problems which may affect
users' perception of a service delivered over RTP; it may also be
useful for verifying the continued correct operation of an existing
system management tool.

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 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
decodability statistics metrics beyond the information carried in the
standard RTCP packet format and PSI independent Decodability Metrics
Block [RFC6990], which are measured at the receiving end of the RTP
stream. It contains counts of six 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 Program Association Table(PAT) errors
o PAT 2 errors
o Program Map Table(PMT) errors
o PMT 2 errors
o Packet Identifier(PID) errors
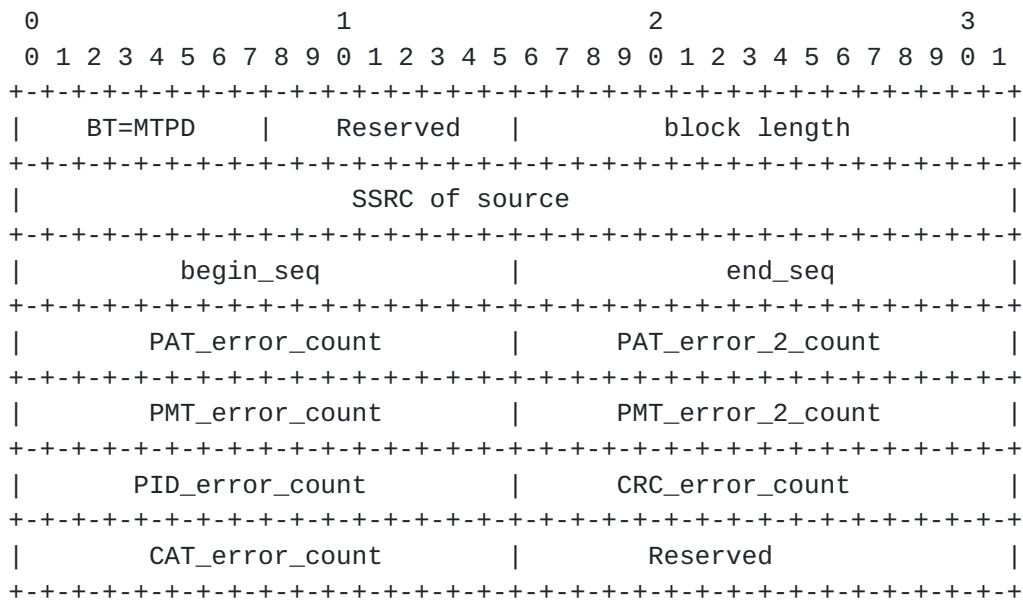
and continuous monitoring parameters necessary to ensure the
continuous decoding including:

o Cyclic Redundancy Check (CRC) errors
o Conditional Access Table (CAT) errors

The other parameters are ignored since they do not apply to all MPEG2
implementations. For further information on these parameters, see
[ETSI].

The MPEG2 TS PSI 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=MTPD    |    Reserved   |          block length          |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |                        SSRC of source                         |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |          begin_seq            |            end_seq            |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |         PAT_error_count       |       PAT_error_2_count       |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |         PMT_error_count       |       PMT_error_2_count       |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |         PID_error_count       |        CRC_error_count        |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |         CAT_error_count       |           Reserved            |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

block type (BT): 8 bits

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

Reserved: 8 bits

   These bits are reserved. They MUST be set to zero by senders
   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

   As defined in Section 4.1 of RFC 3611.

end_seq: 16 bits

   As defined in Section 4.1 of RFC 3611.

PAT_error_count: 16 bits

   A count of the number of PAT errors that occurred in the above
   sequence number interval. The program association table (PAT) is
   the only packet with packet ID (PID) 0x 0000. A PAT error occurs
   when it does not occur at least every 0.5s or the table has an ID
   other than 0x 00, as defined in section 5.2.1 of [ETSI]. Every
   program within the MPEG TS stream is listed in the PAT; if it is
   missing, then no programs can be decoded.

   The measured value is unsigned value. If the measurement is
   unavailable, the value 0xFFFF MUST be reported. Note that
   PAT_error_count and PAT_error_2_count MUST NOT be reported at the
   same time in the same metric block. If PAT_error_count is
   reported, PAT_error_2_count MUST be set to 0xFFFF.

PAT_error_2_count: 16 bits

   A count of the number of PAT2 errors that occurred in the above
   sequence number interval. A PAT2 error occurs when it does not
   occur at least every 0.5s or the table has an ID other than 0x 00
   or there is more than one table ID 0x 00 inside the packet with
   the PAT PID, as defined in section 5.2.1 of [ETSI].

   The measured value is unsigned value. If the measurement is
   unavailable, the value 0xFFFF MUST be reported. Note that
   PAT_error_count and PAT_error_2_count MUST NOT be reported at the
   same time in the same metric block. If PAT_error_2_count is
   reported, PAT_error_count MUST be set to 0xFFFF.

PMT_error_count: 16 bits

   A count of the number of PMT_errors that occurred in the above
   sequence number interval. A PMT_error occurs when the program map
   table (PMT) does not come up at least every 0.5s on the PID that
   is referred to in the PAT, as defined in the section 5.2.1 of
   [ETSI].

   The measured value is unsigned value. If the measurement is
   unavailable, the value 0xFFFF MUST be reported. Note that
   PMT_error_count and PMT_error_2_count MUST NOT be reported at the
   same time in the same metric block. If PMT_error_count is
   reported, PMT_error_2_count MUST be set to 0xFFFF.

PMT_error_2_count: 16 bits

   A count of the number of PMT2 errors that occurred in the above
   sequence number interval. A PMT2_error occurs when the program
   map table (PMT) does not come up at least every 0.5s on the PID
   that is referred to in the PAT, as defined in the section 5.2.1 of
   [ETSI].

   The measured value is unsigned value. If the measurement is
   unavailable, the value 0xFFFF MUST be reported. Note that
   PMT_error_count and PMT_error_2_count MUST NOT be reported at the
   same time in the same metric block. If PMT_error_2_count is
   reported, PMT_error_count MUST be set to 0xFFFF.

PID_error_count: 16 bits

   A count of the number of PID_errors that occurred in the above
   sequence number interval. A PID_error occurs when MPEG TS streams
   are remultiplexed and any PID doesn't refer to an actual data
   stream, as defined in the section 5.2.2 of [ETSI].

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

CRC_error_count: 16 bits

   A count of the number of CRC_errors that occurred in the above
   sequence number interval. A CRC_error occurs if data corruption
   occurred in any of the following tables -- CAT, PAT, PMT, Network
   Information Table (NIT), Event Information Table (EIT), Bouquet
   Association Table (BAT), Service Description Table (SDT) or Time
   Offset Table (TOT), as defined in the section 5.2.2 of [ETSI].

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

CAT_error_count: 16 bits

   A count of the number of CAT_errors that occurred in the above
   sequence number interval. A CAT_error occurs when the table has
   an ID other than 0x 01,as defined in the section 5.2.2 of [ETSI].

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

Reserved: 16 bits

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

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-tpd-block

xr-tpdd-block = "ts-psi-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 MTPD in the IANA " RTP
Control Protocol Extended Reports (RTCP XR) Block Type Registry " to
the "MPEG2 Transport Stream PSI Decodability Statistics Metrics
Block".

[Note to RFC Editor: please replace MTPD 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-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. References

7.1. Normative References

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