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RTP Control Protocol (RTCP) Extended Report (XR) Block for MPEG Transport Stream Decodability Statistics Metric reporting draft-ietf-xrblock-rtcp-xr-decodability-03

Abstract

An MPEG Transport Stream (TS) is a standard container format used in the transmission and storage of multimedia data. Unicast/Multicast/Broadcast MPEG-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 MPEG Transport Stream decodability statistics metrics related to transmissions of MPEG-TS over RTP.

Status of this Memo

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1. Introduction

1.1. MPEG 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 MPEG-2 Transport Streams [ISO-IEC.13818-1.2007]. The tests and corresponding indicators are grouped according to priority:

- First priority - Necessary for de-codability (basic monitoring)
- Second priority - Recommended for continuous or periodic monitoring
- Third priority - Recommended for application-dependant 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 Transport Stream (TS) [ISO-IEC.13818-1.2007]. The new block type supports reporting of the number of occurrences of each 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

These metrics are applicable to any type of RTP application that uses the MPEG-TS standard format for multimedia data; for example, MPEG4 TS content 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. MPEG Transport Stream Decodability Statistics Metric Report Block

This block reports MPEG transport stream 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 defines eight metrics based on ETSI TR 101 290. Information is reported about basic monitoring parameters necessary to ensure that the TS can be decoded including:

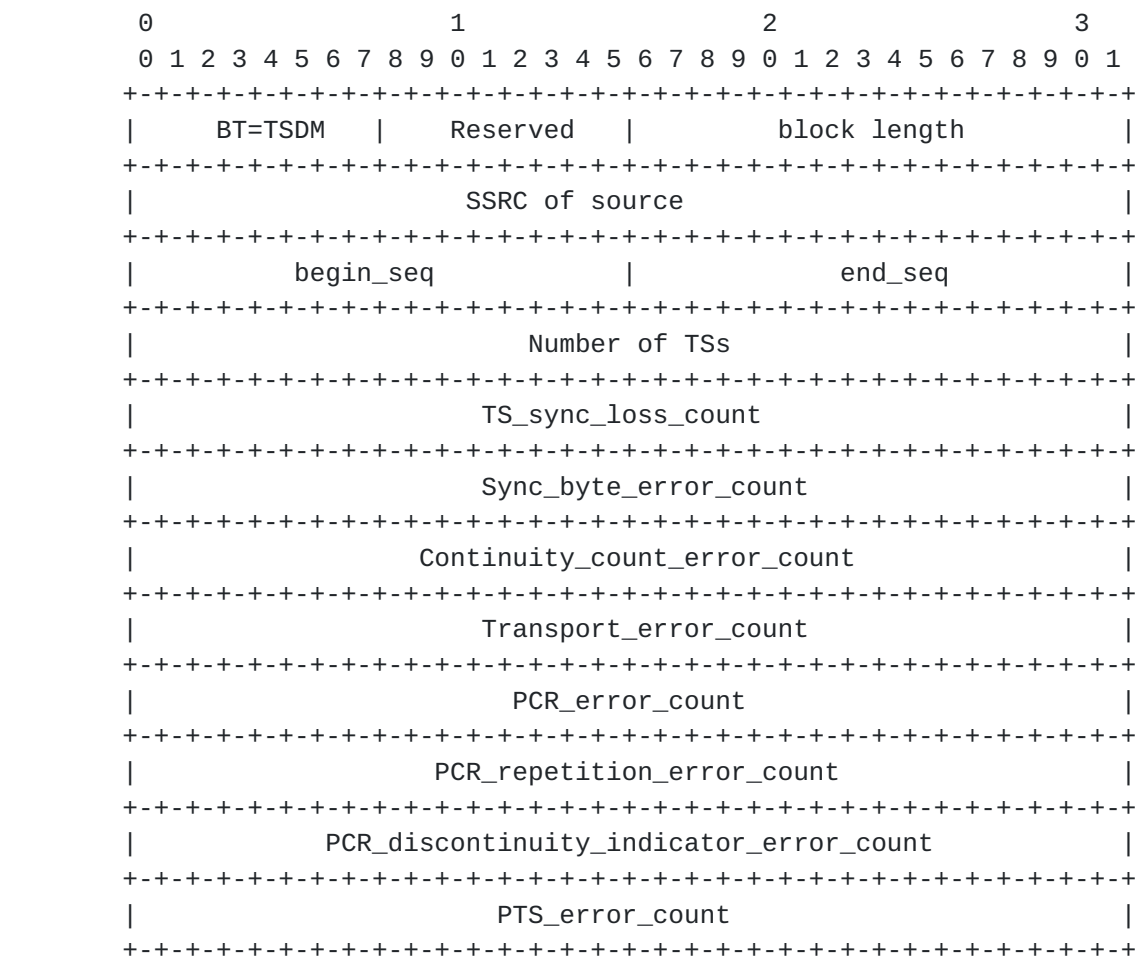
- Transport Stream Synchronization Losses
- Sync byte errors
- Continuity count errors

and continuous monitoring parameters including:

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

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

The MPEG-TS Decodability Metrics Block has the following format:



block type (BT): 8 bits

A TR 101 290 MPEG-TS decodability metrics report block is identified by the constant <TSDM>.

Reserved: 8 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 SHOULD be ignored by the receiver.

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.

Number of TSs: 32 bits

Number of TS in the above sequence number interval.

TS_sync_loss_count: 32 bits

Number of TS_sync_loss errors in the above sequence number interval. It is calculated based on the occurrence of errors for "TS_sync_loss"parameter defined in the table 5.2.1 of ETSI TR 101 290 (See section 5.5.1 of ETSI TR 101 290).

Sync_byte_error_count: 32 bits

Number of sync_byte_errors in the above sequence number interval. It is calculated in the same way as TS_sync_loss_count, i.e.,based on the occurrence of errors for "Sync_byte_error"parameter defined in the table 5.2.1 of ETSI TR 101 290.

Continuity_count_error_count: 32 bits

Number of Continuity_count_errors in the above sequence number interval. Simiarly, it is calculated based on the occurrence of errors for "Continuity_count_error"parameter defined in the table 5.2.1 of ETSI TR 101 290.

Transport_error_count: 32 bits

Number of Transport_errors in the above sequence number interval. Simiarly, it is calculated based on the occurrence of errors for "Transport_error" parameter defined in the table 5.2.2 of ETSI TR 101 290.

PCR_error_count: 32 bits

Number of PCR_errors in the above sequence number interval. Simiarly, it is calculated based on the occurrence of errors for "PCR_error"parameter defined in the table 5.2.2 of ETSI TR 101 290.

PCR_repetition_error_count: 32 bits

Number of PCR_repetition_errors in the above sequence number interval. Simiarly, it is calculated based on the occurrence of errors for "PCR_repetition_error"parameter defined in the table 5.2.2 of ETSI TR 101 290.

PCR_discontinuity_indicator_error_count: 32 bits

Number of PCR_discontinuity_indicator_errors in the above sequence number interval. Simiarly, it is calculated based on the occurrence of errors for "PCR_discontinuity_indicator_error"parameter defined in the table 5.2.2 of ETSI TR 101 290.

PTS_error_count: 32 bits

Number of PTS_errors in the above sequence number interval. Simiarly, it is calculated based on the occurrence of errors for "PTS_error"parameter defined in the table 5.2.2 of ETSI TR 101 290.

4. SDP Signaling

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

4.1. SDP rtcp-xr-attrib Atrribute 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 =/ ts-decodability-metrics

ts-decodability-metrics = "ts-decodability-metrics"

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 in 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 ofRFC 3611.

This document assigns one new block type value in the RTCP XR Block Type Registry:

Name: TSDM
Long Name: TR 101 290 MPEG Transport Stream Decodability Metrics
Value <TSDM>
Reference: Section 3

This document also registers one SDP [RFC4566] parameters for the "rtcp-xr" attribute in the RTCP XR SDP Parameter Registry:

* "ts-decodability-metrics"

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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8. References

8.1. Normative References

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[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

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[RFC4566] Handley, M., Jacobson, V., and C. Perkins, "SDP: Session Description Protocol", RFC 4566, July 2006.

8.2. Informative References

[ISO-IEC.13818-1.2007] International Organization for Standardization, "Information technology - Generic coding of moving pictures and associated audio information: Systems", ISO International Standard 13818-1, October 2007.

[RFC6390] Clark, A. and B. Claise, "Guidelines for Considering New Performance Metric Development", BCP 170, RFC 6390, October 2011.

[RFC6792] Wu, Q., Hunt, G., and P. Arden, "Guidelines for Use of the RTP Monitoring Framework", RFC 6792, November 2012.

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