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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**
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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.

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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 defines a new block type for use with MPEG2 Transport Stream (TS) [[ISO-IEC.13818-1.2007](#)], to augment those defined in [[RFC3611](#)]. The new block type supports reporting of the number of occurrences of each Program Specific Information (PSI) indicator in the first and second priorities listed by [[ETSI](#)] sections [5.2.1](#) and [5.2.2](#) respectively. Third priority indicators are not supported. The metrics defined here supplement information from the PSI-independent Decodability Statistics Metrics Block [[RFC6990](#)].

[1.2.](#) RTCP and RTCP XR Reports

The use of RTCP for reporting is defined in [[RFC3550](#)]. [[RFC3611](#)] defines 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 guidelines for RTCP XR reporting block formats. 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 indicators related to error events, while the XR block defined in this document contains counts of occurrences of the [[ETSI](#)] indicators. 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 seven 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

In these parameters, PAT 2 errors and PMT 2 errors are actually replacements for and improvements on PAT errors and PMT errors respectively and are therefore preferred in future implementations. In addition, measurement results for some of these parameters (e.g., PAT errors or PMT errors) may be different based on whether scrambling is employed. The other parameters defined in [[ETSI](#)] [Section 5](#) are ignored since they do not apply to all MPEG2 implementations. For further detailed information on these parameters, see [[ETSI](#)].

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

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: (1) a packet with PID 0x0000 does not occur at least every 0.5 seconds, or (2) a packet with PID 0x0000 does not contain a table_id 0x00 (i.e., a PAT), or (3) Scrambling_control_field in the TS packet header is not 00 for a packet with PID 0x0000. See 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. As indicated in the NOTE 1 of the table in the [section 5.2.1](#) of TR101.290, TR 101.290 recommends using PAT_error_2_count. Upon reception, If PAT_error_2_count is available (that is, other than 0xFFFF), then receivers MUST ignore PAT_error_count.

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: (1) a packet with PID 0x0000 containing table_id 0x00 does not occur at least every 0.5 seconds, or (2) a packet with PID 0x0000 contains a table with table_id other than 0x00, or (3) Scrambling_control_field in the TS packet header is not 00 for a packet with PID 0x0000. See section 5.2.1 of [ETSI].

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

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: (1) a packet containing a table with table_id 0x02 (i.e., a PMT) does not occur at least every 0.5s on the PID that is referred to in the PAT, or (2) Scrambling_control_field in the TS packet header is not 00 for all packets with PID containing a table with table_id 0x02 (i.e. a PMT). See the section 5.2.1 of [ETSI].

The measured value is unsigned value. If the measurement is unavailable, the value 0xFFFF MUST be reported. As indicated in the NOTE 2 of table in the [section 5.2.1](#) of TR101.290, TR 101.290 recommends using PMT_error_2_count. Upon reception, If PMT_error_2_count is available (that is, other than 0xFFFF), then receivers MUST ignore PMT_error_count.

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: (1) a packet containing table_id 0x02 (i.e., a PMT) does not occur at least every 0.5s on each program_map_PID which is referred to in the PAT, or (2) Scrambling_control_field in the TS packet header is not 00 for all packets containing a table with table_id 0x02 (i.e. a PMT) on each program_map_PID which is referred to in the PAT. See [section 5.2.1](#) of [\[ETSI\]](#).

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

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 no data stream is present corresponding to a given PID. This may be caused by multiplexing or demultiplexing, then remultiplexing. See [section 5.2.1](#) 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: (1) a packet with PID 0x0001 contains a table with table_id other than 0x01 (i.e., not a CAT), or (2) A packet does not contain a table with table_id = 0x01 (i.e. a CAT) when scrambling is employed ((i.e., scrambling_control field is set as a value other than 00)). See 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-tpd-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 \[RFC3611\]](#).

4.3. Usage Outside of Offer/Answer

For usage outside of Offer/Answer, refer to [section 5.3 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:

RAI Area Directors <rai-ads@tools.ietf.org>

6. Security Considerations

This proposed RTCP XR report block introduces no new security considerations beyond those described in [[RFC3611](#)] [[RFC6990](#)].

7. References

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