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RTP Control Protocol (RTCP) Extended Report (XR) Blocks for Mean Opinion Score (MOS) Metric Reporting

Abstract

This document defines an RTP Control Protocol (RTCP) Extended Report (XR) Block including two new segment types and associated Session Description Protocol (SDP) parameters that allow the reporting of mean opinion score (MOS) Metrics for use in a range of RTP applications.

Status of This Memo

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1. Introduction

1.1. MOS Metrics Report Block

This document defines a new block type to augment those defined in [RFC3611], for use in a range of RTP applications.

The new block type provides information on media quality using one of several standard metrics (e.g., mean opinion score (MOS)).

The metrics belong to the class of application-level metrics defined in [RFC6792].

1.2. RTCP and RTCP XR Reports

The use of RTCP for reporting is defined in [RFC3550]. RFC 3611 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 document [RFC6792] provides guidelines for reporting block format using RTCP XR. The XR block type described in this document is in accordance with the guidelines in [RFC6390] and [RFC6792].

1.4. Applicability

The MOS Metrics Report Block can be used in any application of RTP for which QoE (Quality-of-Experience) measurement algorithms are defined.

The factors that affect real-time audio/video application quality can be split into two categories. The first category consists of transport-specific factors such as packet loss, delay, and jitter (which also translates into losses in the playback buffer). The factors in the second category consists of content- and codec-related factors such as codec type and loss recovery technique, coding bit rate, packetization scheme, and content characteristics

Transport-specific factors may be insufficient to infer real-time media quality as codec related parameters and the interaction between transport problems and application-layer protocols can have a substantial effect on observed media quality. Media quality may be measured using algorithms that directly compare input and output media streams, or it may be estimated using algorithms that model the interaction between media quality, protocol, and encoded content. Media quality is commonly expressed in terms of MOS; however, it is also represented by a range of indexes and other scores.

The measurement of media quality has a number of applications:

o Detecting problems with media delivery or encoding that is impacting user-perceived quality.

o Tuning the content encoder algorithm to satisfy real-time data quality requirements.

o Determining which system techniques to use in a given situation and when to switch from one technique to another as system parameters change (for example, as discussed in [G.1082]).

o Prequalifying a network to assess its ability to deliver an acceptable end-user-perceived quality level.

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].

Notable terminology used is the following.

Numeric formats X:Y

where X the number of bits prior to the decimal place and Y the number of bits after the decimal place.

Hence, 8:8 represents an unsigned number in the range 0.0 to 255.996 with a granularity of 0.0039. 0:16 represents a proper binary fraction with range 0.0 to 1 - 1/65536 = 0.9999847, though note that use of flag values at the top of the numeric range slightly reduces this upper limit. For example, if the 16-bit values 0XFFFE and 0XFFFF are used as flags for "over-range" and "unavailable" conditions, a 0:16 quantity has range 0.0 to 1 - 3/65536 = 0.9999542.

Calculation Algorithm

Calculation Algorithm is used in this document to mean the MOS or QoE estimation algorithm.

3. MOS Metrics Block

A multimedia application MOS Metric is commonly expressed as a MOS. The MOS is usually on a scale from 1 to 5, in which 5 represents excellent and 1 represents unacceptable; however, it can use other ranges (for example, 0 to 10). The term "MOS" originates from subjective testing and is used to refer to the mean of a number of individual opinion scores. Therefore, there is a well-understood relationship between MOS and user experience; hence, the industry commonly uses MOS as the scale for objective test results. Subjective tests can be used for measuring live network traffic; however, the use of objective or algorithmic measurement techniques allows much larger scale measurements to be made. Within the scope of this document, mean opinion scores are obtained using objective or estimation algorithms. ITU-T or ITU-R recommendations (e.g., [BS.1387-1], [G.107], [G.107.1], [P.862], [P.862.1], [P.862.2], [P.863], [P.564], [G.1082], [P.1201.1], [P.1201.2], [P.1202.1], [P.1202.2]) define methodologies for assessment of the performance of audio and video streams. Other international and national standards organizations such as EBU, ETSI, IEC, and IEEE also define QoE algorithms and methodologies, and the intent of this document is not to restrict its use to ITU recommendations but to suggest that ITU recommendations be used where they are defined.

This block reports the media quality in the form of a MOS range (e.g., 1-5, 0-10, or 0-100, as specified by the calculation algorithm); however, it does not report the MOS that includes parameters outside the scope of the RTP stream, for example, signaling performance, mean time to repair (MTTR), or other factors that may affect the overall user experience.

The MOS Metric reported in this block gives a numerical indication of the perceived quality of the received media stream, which is typically measured at the receiving end of the RTP stream. 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 RFC 6776, Section 4.2).

This Metrics Block relies on the measurement period in the Measurement Information block indicating the span of the report. Senders MUST send this block in the same compound RTCP packet as the Measurement Information block. Receivers MUST verify that the measurement period is received in the same compound RTCP packet as this Metrics Block. If not, this Metrics Block MUST be discarded.

3.1. Report Block Structure

The MOS 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=29     | I |  Reserved |       Block Length            |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |                        SSRC of source                         |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |                          Segment  1                           |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |                          Segment 2                            |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   ..................
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |                          Segment n                            |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

3.2. Definition of Fields in MOS Metrics Block

Block type (BT): 8 bits

The MOS Metrics Block is identified by the constant 29.

Interval Metric flag (I): 2 bits

This field is used to indicate whether the MOS Metrics are Sampled, Interval, or Cumulative [RFC6792]:

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.

I=00: Reserved

In this document, MOS Metrics MAY be reported for intervals or for the duration of the media stream (cumulative). The value I=01, indicating a sampled value, MUST NOT be sent and MUST be discarded when received.

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 RFC 6709, Section 4.2).

Block Length: 16 bits

The length of this report block in 32-bit words, minus one. For the MOS Metrics Block, the block length is variable length.

SSRC of source: 32 bits

As defined in Section 4.1 of [RFC3611].

Segment i: 32 bits

There are two segment types defined in this document: single-channel audio/video per SSRC segment and multi-channel audio per SSRC segment. Multi-channel audio per SSRC segment is used to deal with the case where multi-channel audio streams are carried in one RTP stream while a single-channel audio/video per SSRC segment is used to deal with the case where each media stream is identified by SSRC and sent in separate RTP streams. The leftmost bit of the segment determines its type. If the leftmost bit of the segment is zero, then it is a single-channel segment. If the leftmost bit is one, then it is a multi-channel audio segment. Note that two segment types cannot be present in the same metric block.

3.2.1. Single-Channel Audio/Video per SSRC Segment

```
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|S|     CAID    |    PT       |           MOS Value             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Segment Type (S): 1 bit

This field is used to identify the segment type used in this report block. A zero identifies this as a single-channel audio/video per SSRC segment. Single channel means there is only one media stream carried in one RTP stream. The single-channel audio/video per SSRC segment can be used to report the MOS value associated with the media stream identified by SSRC. If there are multiple media streams and they want to use the single-channel audio/video per SSRC segment to report the MOS value, they should be carried in the separate RTP streams with each identified by different SSRC. In this case, multiple MOS Metrics Blocks are required to report the MOS value corresponding to each media stream using single-channel audio/video per SSRC segment in the same RTCP XR packet.

Calculation Algorithm ID (CAID) : 8 bits

The 8-bit CAID is the session specific reference to the calculation algorithm and associated qualifiers indicated in SDP (see Section 4.1) and used to compute the MOS score for this segment.

Payload Type (PT): 7 bits

MOS Metrics reporting depends on the payload format in use. This field identifies the RTP payload type in use during the reporting interval. The binding between RTP payload types and RTP payload formats is configured via a signaling protocol, for example, an SDP offer/answer exchange. If the RTP payload type used is changed during an RTP session, separate reports SHOULD be sent for each RTP payload type, with corresponding measurement information blocks indicating the time period to which they relate.

Note that the use of this Report Block with MPEG Transport streams carried over RTP is undefined as each MPEG Transport stream may use distinct audio or video codecs and the indication of the encoding of these is within the MPEG Transport stream and does not use RTP payloads.

MOS Value: 16 bits

The estimated mean opinion score (MOS) for multimedia application performance is estimated using an algorithm that includes the impact of delay, loss, jitter and other impairments that affect media quality. This is an unsigned fixed-point 7:9 value representing the MOS, allowing the MOS score up to 127 in the integer part. MOS ranges are defined as part of the specification of the MOS estimation algorithm (Calculation Algorithm in this document), and are normally ranges like 1-5, 0-10, or 0-100. Two values are reserved: a value of 0xFFFE indicates that the measurement is out of range and a value of 0xFFFF indicates that the measurement is unavailable. Values outside of the range defined by the Calculation Algorithm, other than the two reserved values, MUST NOT be sent and MUST be ignored by the receiving system.

3.2.2. Multi-Channel Audio per SSRC Segment

```
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|S|     CAID      |     PT      |CHID |        MOS Value        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Segment Type (S): 1 bit

This field is used to identify the segment type used in this report block. A one identifies this as a multi-channel audio segment.

Calculation Algorithm ID (CAID) : 8 bits

The 8-bit CAID is the session specific reference to the calculation algorithm and associated qualifiers indicated in SDP (see Section 4.1) and used to compute the MOS score for this segment.

Payload Type (PT): 7 bits

As defined in Section 3.2.1 of this document

Channel Identifier (CHID): 3 bits

If multiple channels of audio are carried in one RTP stream, each channel of audio will be viewed as an independent channel (e.g., left channel audio, right channel audio). This field is used to identify each channel carried in the same media stream. The default channel mapping follows static ordering rule described in Section 4.1 of [RFC3551]. However, there are some payload formats that use different channel mappings, e.g., AC-3 audio over RTP [RFC4184] only follow AC-3 channel order scheme defined in [ATSC]. Enhanced AC-3 audio over RTP [RFC4598] uses a dynamic channel transform mechanism. In order for the appropriate channel mapping to be determined, MOS metrics reports need to be tied to an RTP payload format. The reports should include the payload type of the reported media according to [RFC6792], so that it can be used to determine the appropriate channel mapping.

MOS Value: 13 bits

The estimated MOS for multimedia application performance is defined as including the effects of delay, loss, discard, jitter and other effects that would affect media quality. This is an unsigned fixed-point 7:6 value representing the MOS, allowing the MOS score up to 127 in the integer part. MOS ranges are defined as part of the specification of the MOS estimation algorithm

(Calculation Algorithm in this document), and are normally ranges like 1-5, 0-10, or 0-100. Two values are reserved: a value of 0x1FFE indicates out of range and a value of 0x1FFF indicates that the measurement is unavailable. Values outside of the range defined by the Calculation Algorithm, other than the two reserved values, MUST NOT be sent and MUST be ignored by the receiving system.

4. SDP Signaling

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

4.1. SDP "rtcp-xr-attrib" Attribute Extension

This section augments the SDP [RFC4566] attribute "rtcp-xr" defined in [RFC3611] by providing an additional value of "xr-format" to signal the use of the report block defined in this document. Within the "xr-format", the syntax element "calgextmap" is an attribute as defined in [RFC4566] and used to signal the mapping of the local identifier (CAID) in the segment extension defined in Section 3.2 to the calculation algorithm. Specific extension attributes are defined by the specification that defines a specific extension name: there might be several. The ABNF [RFC5234] syntax is as follows.

```
xr-format =/ xr-mos-block
xr-mos-block = "mos-metric" ["=" calgextmap *("," calgextmap)]
calgextmap =  mapentry "=" extensionname [SP extentionattributes]
direction = "sendonly" / "recvonly" / "sendrecv" / "inactive"
mapentry = "calg:" 1*3DIGIT [ "/" direction ]
                       ; Values in the range 1-255 are valid
                       ; if needed, 0 can be used to indicate that
                       ; an algorithm is rejected
extensionname = "P564";ITU-T P.564 Compliant Algorithm [P.564]
              / "G107";ITU-T G.107 [G.107]
              / "G107_1";ITU-T G.107.1 [G.107.1]
              / "TS101_329";ETSI TS 101 329-5 Annex E [ ETSI]
              /"JJ201_1 ";TTC JJ201.1 [TTC]
              /"P1201_1";ITU-T P.1201.2 [P.1201.1]
              /"P1201_2";ITU-T P.1201.2 [P.1201.2]
              /"P1202_1";ITU-T P.1202.1 [P.1202.1]
              /"P1202_2";ITU-T P.1202.2 [P.1202.2]
              /"P.862.2";ITU-T P.862.2 [P.862.2]
              /"P.863"; ITU-T P.863 [P.863]
              / non-ws-string
extensionattributes = mosref
                    /attributes-ext
mosref =  "mosref=" ("l"; lower resolution
                     /"m"; middle resolution
                     / "h";higher resolution
                    / non-ws-string)
attributes-ext = non-ws-string
SP = <Defined in RFC 5234>
non-ws-string  = 1*(%x21-FF)
```

Each local identifier (CAID) of calculation algorithm used in the segment defined in Section 3.2 is mapped to a string using an attribute of the form:

a=calg:<value> ["/"<direction>] <name> [<extensionattributes>]

where <name> is a calculation algorithm name, as above, <value> is the local identifier (CAID) of the calculation algorithm associated with the segment defined in this document and is an integer in the valid range, inclusive.

Example:
a=rtcp-xr:mos-metric=calg:1=G107,calg:2=P1202_1

A usable mapping MUST use IDs in the valid range, and each ID in this range MUST be unique and used only once for each stream or each channel in the stream.

The mapping MUST be provided per media stream (in the media-level section(s) of SDP, i.e., after an "m=" line).

The syntax element "mosref" is referred to the media resolution relative reference and has three values 'l','m','h'. (e.g., narrowband (3.4 kHz) speech and Standard Definition (SD) or lower resolution video have 'l' resolution, super-wideband (>14 kHz) speech or higher and High Definition (HD) or higher resolution video have 'h' resolution, wideband speech (7 kHz) and video with resolution between SD and HD has 'm' resolution). The MOS reported in the MOS metrics block might vary with the MOS reference; for example, MOS values for narrowband, wideband, super-wideband codecs occupy the same range but SHOULD be reported in different value. For video application, MOS scores for SD resolution, HD resolution video also occupy the same ranges and SHOULD be reported in different value.

4.2. Offer/Answer Usage

When SDP is used in offer/answer context, the SDP Offer/Answer usage defined in [RFC3611] applies. In the offer/answer context, the signaling described above might be used in three ways:

- o asymmetric behavior (segment extensions sent in only one direction),

- o the offer of mutually exclusive alternatives, or

- o the offer of more segments than can be sent in a single session.

A direction attribute MAY be included in a "calgextmap"; without it, the direction implicitly inherits, of course, from the RTCP stream direction.

Segment extensions, with their directions, MAY be signaled for an "inactive" stream. An extension direction MUST be compatible with the stream direction. If a segment extension in the SDP offer is marked as "sendonly" and the answerer desires to receive it, the extension MUST be marked as "recvonly" in the SDP answer. An answerer that has no desire to receive the extension or does not understand the extension SHOULD NOT include it in the SDP answer.

If a segment extension is marked as "recvonly" in the SDP offer and the answerer desires to send it, the extension MUST be marked as "sendonly" in the SDP answer. An answerer that has no desire to, or is unable to, send the extension SHOULD NOT include it in the SDP answer.

If a segment extension is offered as "sendrecv", explicitly or implicitly, and asymmetric behavior is desired, the SDP MAY be modified to modify or add direction qualifiers for that segment extension.

A "mosref" attribute and "MOS Type" attribute MAY be included in a calgextmap; if not present, the "mosref" and "MOS Type" MUST be as defined in the QoE estimation algorithm referenced by the name attribute (e.g., P.1201.1 [P.1201.1] indicates lower resolution used while P.1201.2 [P.1201.2] indicates higher resolution used) or payload type carried in the segment extension (e.g., EVRC-WB [RFC5188] indicates using Wideband Codec). However, not all payload types or MOS algorithm names indicate resolution to be used and MOS type to be used. If an answerer receives an offer with a "mosref" attribute value it doesn't support (e.g.,the answerer only supports "l" and receives "h" from offerer), the answer SHOULD reject the mosref attribute value offered by the offerer.

If the answerer wishes to reject a "mosref" attribute offered by the offerer, it sets identifiers associated with segment extensions in the answer to the value in the range 4096-4351. The rejected answer MUST contain a "mosref" attribute whose value is the value of the SDP offer.

Local identifiers in the valid range (inclusive) in an offer or answer must not be used more than once per media section. A session update MAY change the direction qualifiers of segment extensions under use. A session update MAY add or remove segment extension(s). Identifier values in the valid range MUST NOT be altered (remapped).

If a party wishes to offer mutually exclusive alternatives, then multiple segment extensions with the same identifier in the (unusable) range 4096-4351 MAY be offered; the answerer SHOULD select at most one of the offered extensions with the same identifier, and remap it to a free identifier in the valid range for that extension to be usable. Note that the two segment types defined in Section 3 are also exclusive alternatives.

If more segment extensions are offered in the valid range, the answerer SHOULD choose those that are desired and place the offered identifier value "as is" in the SDP answer.

Similarly, if more segment extensions are offered than can be fit in the valid range, identifiers in the range 4096-4351 MAY be offered; the answerer SHOULD choose those that are desired and remap them to a free identifier in the valid range.

Note that the range 4096-4351 for these negotiation identifiers is deliberately restricted to allow expansion of the range of valid identifiers in the future. Segment extensions with an identifier outside the valid range cannot, of course, be used.

Example:

Note - port numbers, RTP profiles, payload IDs and rtpmaps, etc., have all been omitted for brevity.

The offer:

```
a=rtcp-xr:mos-metric=calg:4906=P1201_l,calg:4906=P1202_l, calg:
4907=G107
```

The answerer is interested in transmission P.1202.1 on a lower resolution application, but it doesn't support P.1201.1 on a lower resolution application at all. It is interested in transmission G.107. Therefore, it adjusts the declarations:

```
a=rtcp-xr:mos-metric=calg:1=P1202_l,calg:2=G107
```

5. IANA Considerations

New block types for RTCP XR are subject to IANA registration. For general guidelines on IANA considerations for RTCP XR, refer to [RFC3611].

5.1. New RTCP XR Block Type Value

This document assigns the block type value 29 in the IANA "RTP Control Protocol Extended Reports (RTCP XR) Block Type Registry" to the "MOS Metrics Block".

5.2. New RTCP XR SDP Parameter

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

5.3. The SDP "calgextmap" Attribute

This section contains the information required by [RFC4566] for an SDP attribute.

- contact name, email address: RAI Area Directors <rai-ads@tools.ietf.org>

- o attribute name (as it will appear in SDP): calgextmap

- o long-form attribute name in English: calculation algorithm map definition

- o type of attribute (session level, media level, or both): both

- o whether the attribute value is subject to the charset attribute: not subject to the charset attribute

- o a one-paragraph explanation of the purpose of the attribute: This attribute defines the mapping from the local identifier (CAID) in the segment extension defined in Section 3.2 into the calculation algorithm name as documented in specifications and appropriately registered.

- o a specification of appropriate attribute values for this attribute: see RFC 7266.

5.4. New Registry of Calculation Algorithms

This document creates a new registry called "RTCP XR MOS Metric block - multimedia application Calculation Algorithm" as a subregistry of the "RTP Control Protocol Extended Reports (RTCP XR) Block Type Registry". This registry applies to the multimedia session where each type of medium is sent in a separate RTP stream and also applies to the session where multi-channel audios are carried in one RTP stream. Policies for this new registry are as follows:

- o The information required to support this assignment is an unambiguous definition of the new metric, covering the base measurements and how they are processed to generate the reported metric.

- o The review process for the registry is "Specification Required" as described in Section 4.1 of [RFC5226].

- o Entries in the registry are identified by entry name and mapped to the local identifier (CAID) in the segment extension defined in Section 3.2.

- o Registration Template

  The following information must be provided with each registration:

  * Name: A string uniquely and unambiguously identifying the calculation algorithm for use in protocols.

* Name Description: A valid Description of the calculation algorithm Name.

* Reference: The reference that defines the calculation algorithm corresponding to the Name and Name Description.

* Type: The media type to which the calculation algorithm is applied

o Initial assignments are as follows:

Name	Name Description	Reference	Type
P564	ITU-T P.564 Compliant Algorithm	[P.564]	voice
G107	ITU-T G.107	[G.107]	voice
TS101_329	ETSI TS 101 329-5 Annex E	[ETSI]	voice
JJ201_1	TTC JJ201.1	[TTC]	voice
G107_1	ITU-T G.107.1	[G.107.1]	voice
P862	ITU-T P.862	[P.862]	voice
P862_2	ITU-T P.862.2	[P.862.2]	voice
P863	ITU-T P.863	[P.863]	voice
P1201_1	ITU-T P.1201.1	[P.1201.1]	multimedia
P1201_2	ITU-T P.1201.2	[P.1201.2]	multimedia
P1202_1	ITU-T P.1202.1	[P.1202.1]	video
P1202_2	ITU-T P.1202.2	[P.1202.2]	video

6. Security Considerations

The new RTCP XR blocks proposed in this document introduce no new security considerations beyond those described in [RFC3611].

7. Contributors

This document merges ideas from two documents addressing the MOS Metric Reporting issue. The authors of these documents are listed below (in alphabetical order):

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Appendix A. Metrics Represented Using the Template from RFC 6390

a. MOS Value Metric

* Metric Name: MOS in RTP

* Metric Description: The estimated mean opinion score for multimedia application performance of the RTP stream is defined as including the effects of delay, loss, discard, jitter, and others on audio or video quality.

* Method of Measurement or Calculation: See Section 3.2.1, MOS value definition.

* Units of Measurement: See Section 3.2.1, MOS value definition.

* Measurement Point(s) with Potential Measurement Domain: See Section 3, second paragraph.

* Measurement Timing: See Section 3, third paragraph for measurement timing and Section 3.1 for Interval Metric flag.

* Use and applications: See Section 1.4.

* Reporting model: See RFC 3611.

b. Segment Type Metric

* Metric Name: Segment Type in RTP

* Metric Description: It is used to identify the segment type of RTP stream used in this report block. For more details, see Section 3.2.1, Segment type definition.

* Method of Measurement or Calculation: See Section 3.2.1, Segment Type definition.

* Units of Measurement: See Section 3.2.1, Segment Type definition.

* Measurement Point(s) with Potential Measurement Domain: See Section 3, second paragraph.

* Measurement Timing: See Section 3, third paragraph for measurement timing and Section 3.1 for Interval Metric flag.

* Use and applications: See Section 1.4.

* Reporting model: See RFC 3611.

c. Calculation Algorithm Identifier Metric

* Metric Name: RTP Stream Calculation Algorithm Identifier

* Metric Description: It is the local identifier of RTP Stream calculation Algorithm associated with this segment in the range 1-255 (inclusive).

* Method of Measurement or Calculation: See Section 3.2.1, Calculation Algorithm ID definition.

* Units of Measurement: See Section 3.2.1, Calg Algorithm ID definition.

* Measurement Point(s) with Potential Measurement Domain: See Section 3, second paragraph.

* Measurement Timing: See Section 3, third paragraph for measurement timing and Section 3.1 for Interval Metric flag.

* Use and applications: See Section 1.4.

* Reporting model: See RFC 3611.

d. Payload Type Metric

* Metric Name: RTP Payload Type

* Metric Description: It is used to identify the format of the RTP payload. For more details, see Section 3.2.1, payload type definition.

* Method of Measurement or Calculation: See Section 3.2.1, Payload type definition.

* Units of Measurement: See Section 3.2.1, Payload type definition.

* Measurement Point(s) with Potential Measurement Domain: See Section 3, second paragraph.

* Measurement Timing: See Section 3, third paragraph for measurement timing and Section 3.1 for Interval Metric flag.

* Use and applications: See Section 1.4.

   * Reporting model: See RFC 3611.

e. Channel Identifier Metric

   * Metric Name: Audio Channel Identifier in RTP

   * Metric Description: It is used to identify each audio channel carried in the same RTP stream. For more details, see Section 3.2.2, channel identifier definition.

   * Method of Measurement or Calculation: See Section 3.2.2, Channel Identifier definition.

   * Units of Measurement: See Section 3.2.2, Channel Identifier definition.

   * Measurement Point(s) with Potential Measurement Domain: See Section 3, second paragraph.

   * Measurement Timing: See Section 3, third paragraph for measurement timing and Section 3.1 for Interval Metric flag.

   * Use and applications: See Section 1.4.

   * Reporting model: See RFC 3611.

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