

XRBLOCK Working Group  
Internet Draft  
Intended status: Standards Track  
Expires: May 17, 2012

Alan Clark  
Telchemy  
Martin Kastner  
Telchemy  
Geoff Hunt  
Unaffiliated  
November 14, 2011

**RTCP XR Report Block for QoE Metrics Reporting**  
**draft-clark-xrblock-rtcp-xr-qoe-00**

Abstract

This document defines an RTCP XR Report Block that allows the reporting of QoE metrics for use in voice, audio and video services.

Status of this Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <http://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on May 17, 2012.

Copyright Notice

Copyright (c) 2011 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

## **1. Introduction**

### **1.1. QoE Metrics Report Block**

This draft defines a new block types to augment those defined in [RFC3611](#) for use in reporting QoE metrics. QoE metrics consider the impact of a range of transmission and payload (content) related impairments on the quality of a service from the user viewpoint.

### **1.2. RTCP and RTCP XR Reports**

The use of RTCP for reporting is defined in [RFC3550](#) [2]. [RFC3611](#) [3] defined an extensible structure for reporting using an RTCP Extended Report (XR). This draft defines a new Extended Report block that MUST be used as defined in [RFC3550](#) and [RFC3611](#).

### **1.3 Performance Metrics Framework**

The Performance Metrics Framework [9] provides guidance on the definition and specification of performance metrics. Metrics described in this draft either reference external definitions or define metrics generally in accordance with the guidelines in [9].

### **1.4 Applicability**

This memo applies to any application of RTP for which QoE measurement algorithms are defined.

## **2. Definitions**

### **2.1 QoE Metrics**

A QoE ("Quality of Experience") metric is intended to provide a measure that is indicative of the user's view of a service. This is commonly expressed as a MOS ("Mean Opinion Score") which usually (but not always) is a 1.0-5.0 numerical scale in which a 1.0 represents "Unacceptable" and 5.0 represents "Excellent".

True MOS scores are obtained using subjective testing, and tend vary from test to test. Subjective testing is also not

suitable for measuring the quality of operational services and hence it is common practice to use objective algorithms to estimate subjective quality. During the development of such QoE algorithms, there is extensive comparison against both subjective test data and data from other "trusted" objective test tools.

Clark & Kastner

[Page 2]

RTCP XR QoE Metrics

November 2011

ITU-T Recommendation P.564 defines a methodology for verifying the performance of QoE estimation algorithms for Voice over IP services. There is standardization work underway related to

QoE metrics for video and audio. The continuous progression of work in this area means that new algorithms may be defined in the future, hence this memo does make provision for new algorithms. Implementors are advised that IPR disclosures have been made in respect of most known QoE estimation algorithms and they should check the IPR disclosure databases and policies of the relevant standards organizations (for example ITU and ETSI).

ITU-T Recommendation P.800.1 describes terminology that should be used for MOS scores used to describe Speech quality. This uses the abbreviations LQ and CQ for Listening and Conversational Quality respectively, and extends these using O for Objective, E for Estimated and S for Subjective. Hence an objectively measured listening quality MOS score would be denoted MOS-LQO.

MOS scores typically use a common scale of 1 to 5 and are scaled for comparison with subjectively measured MOS. MOS scores for narrowband speech and wideband speech, or for low resolution video and high resolution video are typically placed into the same range. This occurs because a subjective test is usually a comparative test amongst similar codecs or devices. Hence a high quality AMR-WB or G.722 wideband voice call may have a lower MOS score than a narrowband G.729 call, even though the quality is higher. Similarly, a video subjective test typically uses devices with similar resolution and hence a high definition system may have the same MOS score as a standard definition system.

ITU-T P.800.1 addressed this issue of MOS scaling through the use of an additional N or W qualifier to denote Narrowband or Wideband. So a MOS-LQON score is an objectively measured listening quality MOS for narrowband (8kHz sample rate) conditions. Some codecs are able to switch dynamically between narrowband and wideband, which is addressed by the "M" or mixed qualifier.

The issue for audio video MOS is very similar to that of speech. This is addressed by recent work in ITU-T [[11](#)] which introduced



```

+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
.....
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|Chan |      Type      |  Calc alg  |      QoE Metric      |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+

```

### 3.2 Definition of Fields in QoE Metric Report Block

block type (BT): 8 bits

A QoE Report Block is identified by the constant QOEX.

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

Clark & Kastner [Page 4]

RTCP XR QoE Metrics November 2011

Measurement Type Indication (I): 2 bits

This field is used to indicate whether the QoE Metrics are Sampled, Interval or Cumulative metrics, that is, whether the reported values applies to the most recent measurement interval

duration between successive metrics reports (I=10) (the Interval Duration), to the accumulation period characteristic of cumulative measurements (I=11) (the Cumulative Duration) or is a sampled instantaneous value (I=01).

Numerical values for interval or duration are provided in the Measurement Identifier block referenced by the tag field below.

Measurement Identifier association (tag): 6 bits

This field is used to identify the Measurement Identifier block which describes this measurement. The relevant Measurement Identifier block has the same tag value as the QoE block  
Note that there may be more than one Measurement Identifier block per RTCP packet.

Block length: 16 bits

The length of this report block in 32-bit words minus one.

Channel

The channel number of the audio or video stream to which this metric applies

## Type

0000000 - 0011111 Speech QoE Scores  
0100000 - 0111111 Audio QoE Scores  
1000000 - 1011111 Video QoE Scores  
1100000 - 1111111 Other application QoE Scores

Clark & Kastner

[Page 5]

RTCP XR QoE Metrics

November 2011

Speech QoE Scores (see ITU-T P.800.1 [\[10\]](#) for definitions)

0000000 MOS-LQON - Listening Quality MOS (Narrowband)  
0000001 MOS-LQOW - Listening Quality MOS (Wideband)  
0000010 MOS-LQOU - Listening Quality MOS (Ultra wideband)  
0000011 MOS-LQOM - Listening Quality MOS (Mixed)  
0000100-0000111 - Reserved  
  
0001000 MOS-CQON - Conversational Quality MOS (Narrowband)  
0001001 MOS-CQOW - Conversational Quality MOS (Wideband)  
0001010 MOS-CQOU - Conversational Quality MOS (Ultra wideband)  
0001011 MOS-CQOM - Conversational Quality MOS (Mixed)  
0001100 MOS-CQEN - Conversational Quality MOS (Narrowband)  
Scaled per ITU-T G.107  
0001101 MOS-CQEN-TTC - Conversational Quality MOS (Narrowband)  
Scaled per TTC JJ201.01 [\[8\]](#) (Japan)  
0001110-0001111 - Reserved  
  
0010000 MOS-TQON - Talking Quality MOS (Narrowband)  
0010001 MOS-TQOW - Talking Quality MOS (Wideband)  
0010010 MOS-TQOU - Talking Quality MOS (Ultra wideband)  
0010011 MOS-TQOM - Talking Quality MOS (Mixed)  
0010100 - 0010111 - Reserved  
  
0011000 R-LQ - R Factor - Listening Quality  
0011001 R-CQ - R Factor - Conversational Quality [\[6\]](#)  
0011010 - 0011111 - Reserved

Audio QoE Scores (see ITU-T P.??? and [\[11\]](#))

0100000 Absolute MOS-AQOA - Audio Quality MOS, absolute scaling  
0100001 Relative MOS-AQOR - Audio Quality MOS, relative scaling

Video and Multimedia QoE Scores (see ITU-T P.??? and [\[11\]](#))

1000000 Absolute MOS-VQOA - Video Quality MOS, absolute scaling  
1000001 Relative MOS-VQOR - Video Quality MOS, relative scaling  
1000100 Absolute MOS-AQOA - Audio-Video Quality MOS, absolute  
1000101 Relative MOS-AQOR - Audio-Video Quality MOS, relative

Other application QoE Scores

1100000 - 1111111 Reserved for other interactive applications  
that use RTP for communication

Clark & Kastner

[Page 6]

RTCP XR QoE Metrics

November 2011

Calculation Algorithm

0 - ITU-T P.564 Compliant Algorithm [\[5\]](#) (Voice)  
1 - G.107 [\[6\]](#) (Voice)  
2 - G.107 / ETSI TS 101 329-5 Annex E [\[6,7\]](#) (Voice)  
3 - TTC JJ201.01 [\[8\]](#) (Japan)  
4 - Reserved for ITU-T P.NAMS  
5 - Reserved for ITU-T P.NBAMS  
255 - Indicated via SDP

QoE Metric

A 8:8 integer scaled representation of the QoE metric value.  
This allows values in the range 0.0 to 255.996 to be represented.

#### **4. SDP Signaling**

[RFC3611](#) [\[3\]](#) defines the use of SDP (Session Description Protocol) [\[4\]](#) for signaling the use of XR blocks. XR blocks MAY be used without prior signaling.

This section augments the SDP [\[4\]](#) attribute "rtcp-xr" defined in [RFC3611](#) [\[3\]](#) by providing a "xr-format" to signal the use of the report block defined in this document.

rtcp-xr-attrib = "a=" "rtcp-xr" ":" [xr-format \*(SP xr-format)]  
CRLF (defined in [RFC3611](#))

```
xr-format = xr-format /
           qoe-metrics

qoe-metrics = "qoe-metrics" [EQUAL word]
DIGIT       = %x30-39
format-ext  = non-ws-string
non-ws-string = 1*(%x21-FF)
CRLF       = %d13.10
```

## **5. IANA Considerations**

This document creates a new block type within the IANA "RTCP XR Block Type Registry" called the QoE Metrics, and a new [new-xrblock] parameter within the "RTCP XR SDP Parameters Registry".

Clark & Kastner

[Page 7]

RTCP XR QoE Metrics

November 2011

## **6. Security Considerations**

RTCP reports can contain sensitive information since they can provide information about the nature and duration of a session established between two or more endpoints.

## **7. Contributors**

## **8. References**

Normative

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

[2] Schulzrinne, H., Casner, S., Frederick, R. and V. Jacobson, "RTP: A Transport Protocol for Real-Time Applications", STD 64, [RFC 3550](#), July 2003.

[3] Friedman, T., Caceres, R., and A. Clark, "RTP Control Protocol Extended Reports (RTCP XR)", [RFC 3611](#), November 2003.

[4] Handley, M. and V. Jacobson, "SDP: Session Description Protocol", [RFC 4566](#), July 2006.

[5] ITU-T Recommendation P.564, Conformance testing for narrowband Coice over IP transmission quality assessment models

[6] ITU-T Recommendation G.107, "The E Model, a computational model



for use in transmission planning"

[7] ETSI TS 101 329-5, QoS Measurement for Voice over IP

[8] TTC 201.01 (Japan) A method for speech quality assessment  
for Coice over IP

[9] Clark A., Claise B. "Guidelines for Considering New Performance  
Metrics Development", [RFC6390](#), October 2011

[10] ITU-T P.800.1 "Mean Opinion Score (MOS) terminology"

Informative

[11] ITU-T TD483 "Interpretation of MOS in different contexts",  
January 2011

Clark & Kastner

[Page 8]

RTCP XR QoE Metrics

November 2011

#### Author's Addresses

Alan Clark  
Telchemy Incorporated  
2905 Premiere Parkway, Suite 280  
Duluth, GA 30097  
USA

Email: [alan.d.clark@telchemy.com](mailto:alan.d.clark@telchemy.com)

Martin Kastner  
Telchemy Incorporated  
2905 Premiere Parkway, Suite 280  
Duluth, GA 30097  
USA

Email: [martin.kastner@telchemy.com](mailto:martin.kastner@telchemy.com)

Geoff Hunt  
Unaffiliated

Clark & Kastner

[Page 9]