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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Infrastructure of audiovisual services – Communication procedures

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Gateway control protocol: RTCP extended performance metrics packages

ITU-T Recommendation H.248.30

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ITU-T Recommendation H.248.30

Gateway control protocol: RTCP extended performance metrics packages

Summary

This Recommendation defines a package that provides RFC 3611's RTP Control Protocol Reporting Extensions (RTCP XR) metrics reporting capabilities for ITU-T Rec. H.248 that provide more detailed insight into call quality and causes of degradation than basic RTCP statistics.

Edition 2 adds a new package and modifies the existing package to allow the support of reporting RTCP XR statistics from both directions of a bidirectional RTP session controlled through RTCP.

Source

ITU-T Recommendation H.248.30 was approved on 13 January 2007 by ITU-T Study Group 16 (2005-2008) under the ITU-T Recommendation A.8 procedure.

FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

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Gateway control protocol: RTCP extended performance metrics packages

1 Scope

This Recommendation describes a set of Extended Performance Metrics for Voice over IP QoS reporting that provide more detailed insight into call quality and causes of degradation than basic RTCP statistics. The metrics described in this Recommendation are consistent with those described in the RTCP XR Voice over IP Metrics Payload described in IETF RFC 3611.

This edition 2 adds the capability to report this information bidirectionally. This enhancement allows for detailed insight over the entire topology of the stream in question, rather than just the outbound direction from the point of view of the termination.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

– ITU-T Recommendation G.107 (2005), *The E-Model, a computational model for use in transmission planning*.

– ITU-T Recommendation G.108 (1999), *Application of the E-model: A planning guide*.

– ITU-T Recommendation H.248.1 (2005), *Gateway control protocol: Version 3*.

– IETF RFC 3611 (2003), *RTP Control Protocol Extended Reports (RTCP XR)*.

3 Definitions

This Recommendation defines the following terms:

3.1 **burst**: A period during which a high proportion of packets are either lost or discarded due to late arrival.

3.2 **gap**: A period of low packet losses and/or discards.

4 Abbreviations

This Recommendation uses the following abbreviations:

MG	Media Gateway
MGC	Media Gateway Controller
MOSCQ	Mean Opinion Score for Conversational Quality
MOSLQ	Mean Opinion Score for Listening Quality
RTCP	RTP Control Protocol
RTCP XR	RTCP Extended Reports
RTP	Real-time Transfer Protocol

5 RTCP XR Base Package

Package Name: RTCP XR Base Package

PackageID: rtcpxr (0x0080)

Description: This package defines properties and statistics to report extended quality of service metrics generated on the near-end termination for transmission toward the far end of the RTCP session.

Version: 1

Extends: rtp version 1

5.1 Properties

5.1.1 Packet Loss Concealment Type

Property Name: Packet Loss Concealment Type

PropertyID: plc (0x0001)

Description: The type of packet loss concealment algorithm in use.

Type: Enumeration

Possible Values:		
	U (0x0001)	Unspecified
	D (0x0002)	Disabled – Silence insertion is being used.
	S (0x0003)	Standard.
	E (0x0004)	Enhanced.

Default: U

Defined in: LocalControl Descriptor

Characteristics: Read/Write

5.2 Events

None

5.3 Signals

None

5.4 Statistics

5.4.1 Network Packet Loss Rate

Statistic Name: Network Packet Loss Rate

StatisticID: nplr (0x0009)

Description: The proportion of packets lost since the start of transmission expressed as an 8-bit binary fraction obtained by dividing the number of packets lost in the transmission path by the total number of packets expected and multiplying this value by 256 and taking the integer part. Thus a value of 0 would correspond to a packet loss rate of zero and a value of 64 would correspond to a packet loss rate of 0.25 (corresponding to 25 per cent).

Type: Integer

Possible values: Any value greater than or equal to 0

5.4.2 Jitter Buffer Discard Rate

Statistic Name: Jitter Buffer Discard Rate

StatisticID: jdr (0x000a)

Description: The proportion of packets discarded by the receiving jitter buffer since the start of transmission expressed as an 8-bit binary fraction obtained by dividing the number of packets discarded by the total number of packets expected and multiplying this value by 256 and taking the integer part.

Type: Integer

Possible values: Any value greater than or equal to 0

Level: Either

5.4.3 RTCP Round-Trip Delay

Statistic Name: RTCP Round-Trip Delay

StatisticID: rtd (0x000b)

Description: The round-trip delay between the RTP interfaces on the local and remote MGs.

Type: Integer

Possible values: Any value greater than or equal to 0 in milliseconds

Level: Either

5.4.4 End System Delay

Statistic Name: End System Delay

StatisticID: esd (0x000c)

Description: The end system delay, comprising encode, decode and jitter buffer delay. This may be combined with the RTCP Round-Trip Delay to estimate the overall Voice over IP segment round-trip delay.

Type: Integer

Possible values: Any value greater than or equal to 0 in milliseconds

Level: Either

5.4.5 Signal Level

Statistic Name: Signal Level

StatisticID: sl (0x000d)

Description: The ratio of the signal level to a 0 dBm0 reference.

Type: Integer

Possible values: Any value in dB

Level: Either

5.4.6 Noise Level

Statistic Name: Noise Level

StatisticID: nl (0x000e)

Description: The ratio of the silent period background noise level to a 0 dBm0 reference.

Type: Integer

Possible values: Any value less than or equal to 0 in dB

Level: Either

5.4.7 Residual Echo Return Loss

Statistic Name: Residual Echo Return Loss

StatisticID: rerl (0x000f)

Description: The echo return loss after the effects of echo cancellation.

Type: Integer

Possible values: Any value greater than or equal to 0 in dB.

Level: Either

5.4.8 R Factor

Statistic Name: R Factor

StatisticID: ns (0x0010)

Description: A value representing the receiving end call quality of the RTP stream terminated by this termination, calculated per ITU-T Rec. G.107. Table 1/G.108 provides interpretive information about the value of the R factor.

Type: Integer

Possible values: Any value between 0 and 100

Level: Either

5.4.9 External R Factor

Statistic Name: External R Factor

StatisticID: xns (0x0011)

Description: A value representing the effects of any call segment carried over a network segment external to the RTP stream terminated by this termination, calculated per ITU-T Rec. G.107. Table 1/G.108 provides interpretive information about the value of the R factor.

Type: Integer

Possible values: Any value between 0 and 100

Level: Either

5.4.10 Estimated MOSLQ

Statistic Name: Estimated MOSLQ

StatisticID: lq (0x0012)

Description: An estimated receiving end Listening Quality MOS, calculated per ITU-T Rec. G.107 and multiplied by 10 as described in IETF RFC 3611.

Type: Integer

Possible values: Any value between 10 to 50

Level: Either

5.4.11 Estimated MOSCQ

Statistic Name: Estimated MOSCQ

StatisticID: cq (0x0013)

Description: An estimated receiving end Conversational Quality MOS, calculated per ITU-T Rec. G.107 and multiplied by 10 as described by IETF RFC 3611.

Type: Integer

Possible values: Any value between 10 and 50

Level: Either

5.5 Procedures

None

6 RTCP XR Burst Metrics Package

Package Name: RTCP XR Burst Metrics Package

PackageID: xrbm (0x0081)

Description: This package defines properties and statistics for reporting burst metrics generated on the near-end termination for transmission toward the far end of the RTCP session.

Version: 1

Extends: rtcpxr version 1

6.1 Properties

6.1.1 Minimum Gap Threshold

Property Name: Minimum Gap Threshold

PropertyID: gmin (0x0002)

Description: A parameter used to define bursts. This is by default set to 16, which sets the threshold packet loss rate between bursts and gaps to approximately 6%. See the procedures for how to use Gmin to determine a burst. Gmin shall not be altered once the RTP stream is established. Attempts to do so should result in the MG returning error xxx.

Type: Integer

Possible values: Any positive integral value

Default: 16

Defined in: LocalControl Descriptor

Characteristics: Read/Write

6.2 Events

None

6.3 Signals

None

6.4 Statistics

6.4.1 Burst Loss Density

Statistic Name: Burst Loss Density

StatisticID: bld (0x0014)

Description: The average proportion of packets both lost and discarded during burst periods expressed as an 8-bit binary fraction. This is obtained by dividing the sum of the number of packets lost in the transmission path and discarded by the jitter buffer during burst periods by the total number of packets expected during burst periods, multiplying this value by 256 and taking the integer part.

A burst is a period during which a high proportion of packets are either lost in transit or discarded due to late arrival. In general, a burst is likely to result in audible degradation to call quality.

Type: Integer

Possible values: Any integral value greater than or equal to 0

Level: Either

6.4.2 Burst Duration

Statistic Name: Burst Duration

StatisticID: bd (0x0015)

Description: The average length of burst periods.

Type: Integer

Possible values: Any integral number of milliseconds greater than or equal to 0

Level: Either

6.4.3 Gap Loss Density

Statistic Name: Gap Loss Density

StatisticID: gld (0x0016)

Description: The average proportion of packets lost and discarded during gap periods expressed as an 8-bit binary fraction. This is obtained by dividing the sum of the number of packets lost in the transmission path and discarded by the jitter buffer during gap periods by the total number of packets expected during gap periods, multiplying this value by 256 and taking the integer part.

Type: Integer

Possible values: Any integral value greater than or equal to 0

Level: Either

6.4.4 Gap Duration

Statistic Name: Gap Duration

StatisticID: gd (0x0017)

Description: The average length of gap periods.

Type: Integer

Possible values: Any integral number of milliseconds greater than or equal to 0

Level: Either

6.5 Procedures

For the purposes of calculating the statistics above, a burst is defined as the longest sequence that:

a) starts with a lost or discarded packet;

b) does not contain any occurrences of consecutive received (and not discarded) packets numbering greater than or equal to the Gmin property value; and

c) ends with a lost or discarded packet.

A gap is defined as any of the following:

a) the period from the start of an RTP session to the receipt time of the last received packet before the first burst;

b) the period from the end of the last burst to either the time of the report or the end of the RTP session, whichever comes first; or

c) the period of time between two bursts.

7 Received RTCP XR Package

Package Name: Received RTCP XR Package

PackageID: recrtcpxr (0x00b0)

Description: This package defines properties and statistics to report extended quality of service metrics received from the far end of the RTCP session.

Version: 1

Extends: rtp version 1

7.1 Properties

7.1.1 Packet Loss Concealment Type

Property Name: Packet Loss Concealment Type

PropertyID: plc (0x0001)

Description: The type of packet loss concealment algorithm in use.

Type: Enumeration

Possible Values:		
	U (0x0001)	Unspecified
	D (0x0002)	Disabled – Silence insertion is being used.
	S (0x0003)	Standard
	E (0x0004)	Enhanced

Default: U

Defined in: LocalControl Descriptor

Characteristics: Read/Write

7.2 Events

None

7.3 Signals

None

7.4 Statistics

7.4.1 Network Packet Loss Rate

Statistic Name: Network Packet Loss Rate

StatisticID: nplr (0x0009)

Description: The proportion of packets lost since the start of transmission expressed as an 8-bit binary fraction obtained by dividing the number of packets lost in the transmission path by the total number of packets expected and multiplying this value by 256 and taking the integer part. Thus a value of 0 would correspond to a packet loss rate of zero and a value of 64 would correspond to a packet loss rate of 0.25 (corresponding to 25 per cent).

Type: Integer

Possible values: Any value greater than or equal to 0

Level: Either

7.4.2 Jitter Buffer Discard Rate

Statistic Name: Jitter Buffer Discard Rate

StatisticID: jdr (0x000a)

Description: The proportion of packets discarded by the receiving jitter buffer since the start of transmission expressed as an 8-bit binary fraction obtained by dividing the number of packets discarded by the total number of packets expected and multiplying this value by 256 and taking the integer part.

Type: Integer

Possible values: Any value greater than or equal to 0

Level: Either

7.4.3 RTCP Round-Trip Delay

Statistic Name: RTCP Round-Trip Delay

StatisticID: rtd (0x000b)

Description: The round-trip delay between the RTP interfaces on the local and remote MGs.

Type: Integer

Possible values: Any value greater than or equal to 0 in milliseconds

Level: Either

7.4.4 End System Delay

Statistic Name: End System Delay

StatisticID: esd (0x000c)

Description: The end system delay, comprising encode, decode and jitter buffer delay. This may be combined with the RTCP Round-Trip Delay to estimate the overall Voice over IP segment round-trip delay.

Type: Integer

Possible values: Any value greater than or equal to 0 in milliseconds

Level: Either

7.4.5 Signal Level

Statistic Name: Signal Level

StatisticID: sl (0x000d)

Description: The ratio of the signal level to a 0 dBm0 reference.

Type: Integer

Possible values: Any value in dB

Level: Either

7.4.6 Noise Level

Statistic Name: Noise Level

StatisticID: nl (0x000e)

Description: The ratio of the silent period background noise level to a 0 dBm0 reference.

Type: Integer

Possible values: Any value less than or equal to 0 in dB

Level: Either

7.4.7 Residual Echo Return Loss

Statistic Name: Residual Echo Return Loss

StatisticID: rerl (0x000f)

Description: The echo return loss after the effects of echo cancellation.

Type: Integer

Possible values: Any value greater than or equal to 0 in dB.

Level: Either

7.4.8 R Factor

Statistic Name: R Factor

StatisticID: ns (0x0010)

Description: A value representing the receiving end call quality of the RTP stream terminated by this termination, calculated per ITU-T Rec. G.107. Table 1/G.108 provides interpretive information about the value of the R factor.

Type: Integer

Possible values: Any value between 0 and 100

Level: Either

7.4.9 External R Factor

Statistic Name: External R Factor

StatisticID: xns (0x0011)

Description: A value representing the effects of any call segment carried over a network segment external to the RTP stream terminated by this termination, calculated per ITU-T Rec. G.107. Table 1/G.108 provides interpretive information about the value of the R factor.

Type: Integer

Possible values: Any value between 0 and 100

Level: Either

7.4.10 Estimated MOSLQ

Statistic Name: Estimated MOSLQ

StatisticID: lq (0x0012)

Description: An estimated receiving end Listening Quality MOS, calculated per ITU-T Rec. G.107 and multiplied by 10 as described in IETF RFC 3611.

Type: Integer

Possible values: Any value between 10 to 50

Level: Either

7.4.11 Estimated MOSCQ

Statistic Name: Estimated MOSCQ

StatisticID: cq (0x0013)

Description: An estimated receiving end Conversational Quality MOS, calculated per ITU-T Rec. G.107 and multiplied by 10 as described by IETF RFC 3611.

Type: Integer

Possible values: Any value between 10 and 50

Level: Either

7.5 Procedures

None

8 Received RTCP XR Burst Metrics Package

Package Name: Received RTCP XR Burst Metrics Package

PackageID: recxrbm (0x00b1)

Description: This package defines properties and statistics for reporting burst metrics received from the far end of the RTCP session.

Version: 1

Extends: recrtcpxr version 1

8.1 Properties

8.1.1 Minimum Gap Threshold

Property Name: Minimum Gap Threshold

PropertyID: gmin (0x0002)

Description: Parameter used to define bursts. This is by default set to 16, which sets the threshold packet loss rate between bursts and gaps to approximately 6%. See the procedures for how to use Gmin to determine a burst. Gmin shall not be altered once the RTP stream is established. Attempts to do so should result in the MG returning error xxx.

Type: Integer

Possible values: Any positive integral value

Default: 16

Defined in: LocalControl Descriptor

Characteristics: Read/Write

8.2 Events

None

8.3 Signals

None

8.4 Statistics

8.4.1 Burst Loss Density

Statistic Name: Burst Loss Density

StatisticID: bld (0x0014)

Description: The average proportion of packets both lost and discarded during burst periods expressed as an 8-bit binary fraction. This is obtained by dividing the sum of the number of packets lost in the transmission path and discarded by the jitter buffer during burst periods by the total number of packets expected during burst periods, multiplying this value by 256 and taking the integer part.

A burst is a period during which a high proportion of packets are either lost in transit or discarded due to late arrival. In general, a burst is likely to result in audible degradation to call quality.

Type: Integer

Possible values: Any integral value greater than or equal to 0

Level: Either

8.4.2 Burst Duration

Statistic Name: Burst Duration

StatisticID: bd (0x0015)

Description: The average length of burst periods.

Type: Integer

Possible values: Any integral number of milliseconds greater than or equal to 0

Level: Either

8.4.3 Gap Loss Density

Statistic Name: Gap Loss Density

StatisticID: gld (0x0016)

Description: The average proportion of packets lost and discarded during gap periods expressed as an 8-bit binary fraction. This is obtained by dividing the sum of the number of packets lost in the transmission path and discarded by the jitter buffer during gap periods by the total number of packets expected during gap periods, multiplying this value by 256 and taking the integer part.

Type: Integer

Possible values: Any integral value greater than or equal to 0

Level: Either

8.4.4 Gap Duration

Statistic Name: Gap Duration

StatisticID: gd (0x0017)

Description: The average length of gap periods.

Type: Integer

Possible values: Any integral number of milliseconds greater than or equal to 0

Level: Either

8.5 Procedures

For the purposes of calculating the statistics above, a burst is defined as the longest sequence that:

a) starts with a lost or discarded packet;

b) does not contain any occurrences of consecutive received (and not discarded) packets numbering greater than or equal to the Gmin property value; and

c) ends with a lost or discarded packet.

A gap is defined as any of the following:

a) the period from the start of an RTP session to the receipt time of the last received packet before the first burst;

b) the period from the end of the last burst to either the time of the report or the end of the RTP session, whichever comes first; or

c) the period of time between two bursts.

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