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Infrastructure of audiovisual services – Communication
procedures

Gateway control protocol: Explicit congestion notification support

Recommendation ITU-T H.248.82

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Recommendation ITU-T H.248.82

Gateway control protocol: Explicit congestion notification support

Summary

Recommendation ITU-T H.248.82 defines a package to allow ITU-T H.248 controlled media gateways to support explicit congestion notification (ECN). ECN is a mechanism to provide indications of incipient congestion affecting a Real-Time Protocol (RTP) stream to a receiver and, usually, to a sender. ECN when used with an RTP stream over UDP uses the RTP control protocol to provide feedback of ECN congestion markings to an RTP sender. The mechanism allows senders and/or receivers to react in order to reduce congestion in real-time communications. This Recommendation only describes the use of ECN in RTP over UDP streams.

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T H.248.82	2013-03-16	16

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.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Recommendation ITU-T H.248.82

Gateway control protocol: Explicit congestion notification support

1 Scope

Explicit congestion notification is a mechanism to provide indications of incipient congestion affecting an RTP stream to a receiver and, usually, to a sender. ECN, when used with an RTP stream over UDP, uses the RTP control protocol to provide feedback of ECN congestion markings to an RTP sender. Depending on previous signalling the sender and/or receiver can take action to minimize congestion in reception of the ECN congestion markings.

The session description protocol (SDP) is utilized to indicate support of ECN and what parameters relate to its use. As a media gateway (MG) sends/receives RTP based media (and RTCP), these parameters must be agreed and coordinated between the media gateway controller (MGC) and the MG. In ITU-T H.248 controlled gateways, this information must be provided via ITU-T H.248.

This Recommendation defines the "ECN for RTP-over-UDP Support Package" in order to establish ECN support on media gateways.

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 E.107] Recommendation ITU-T E.107 (2007), *Emergency Telecommunications Service (ETS) and interconnection framework for national implementations of ETS*.
- [ITU-T H.248.1] Recommendation ITU-T H.248.1 (2013), *Gateway Control Protocol: Version 3*.
- [ITU-T H.248.47] Recommendation ITU-T H.248.47 (2008), *Gateway Control Protocol: Statistic conditional reporting package*.
- [ITU-T H.248.50] Recommendation ITU-T H.248.50 (2010), *Gateway Control Protocol: NAT traversal toolkit packages*.
- [ITU-T H.248.64] Recommendation ITU-T H.248.64 (2013), *Gateway Control Protocol: IP router packages*.
- [ITU-T H.248.81] Recommendation ITU-T H.248.81 (2011), *Gateway Control Protocol: Guidelines on the use of the international emergency preference scheme (IEPS) call indicator and priority indicator in ITU-T H.248 profiles*.
- [IETF RFC 3168] IETF RFC 3168 (2001), *The Addition of Explicit Congestion Notification (ECN) to IP*.
- [IETF RFC 3550] IETF RFC 3550 (2003), *RTP: A Transport Protocol for Real-Time Applications*.
- [IETF RFC 3611] IETF RFC 3611 (2003), *RTP Control Protocol Extended Reports (RTCP XR)*.

- [IETF RFC 4585] IETF RFC 4585 (2006), *Extended RTP Profile for Real-time Transport Control Protocol (RTCP)-Based Feedback (RTP/AVPF)*.
- [IETF RFC 5245] IETF RFC 5245 (2010), *Interactive Connectivity Establishment (ICE): A Protocol for Network Address Translator (NAT) Traversal for Offer/Answer Protocols*.
- [IETF RFC 5506] IETF RFC 5506 (2009), *Support for Reduced-Size Real-Time Transport Control Protocol (RTCP): Opportunities and Consequences*.
- [IETF RFC 6679] IETF RFC 6679 (2012), *Explicit Congestion Notification (ECN) for RTP over UDP*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 sender [IETF RFC 6679]: A sender of RTP packets carrying an encoded media stream. The sender can change how the media transmission is performed by varying the media coding or packetization. It is one endpoint of the ECN control loop.

NOTE – The sender in this sense may or may not be the same as the RTP End System.

3.1.2 receiver [IETF RFC 6679]: A receiver of RTP packets with the intention to consume the media stream. It sends RTCP feedback on the received stream. It is the other end-point of the ECN control loop.

NOTE – The receiver in this sense may or may not be the same as the RTP End System.

3.2 Terms defined in this Recommendation

This Recommendation defines the following term:

3.2.1 AuditValue.req: An ITU-T H.248.1 AuditValue command request.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

ABNF	Augmented Backus-Naur Form
B2BIH	Back-to-Back Internet protocol Host
B2BRE	Back-to-Back RTP End system
CE	Congestion Experienced
DCCP	Datagram Congestion Control Protocol
ECN	Explicit Congestion Notification
ECT	ECN Capable Transport
ETS	Emergency Telecommunications Service
IP	Internet Protocol
IPR	Internet Protocol Router
LD	Local Destination
LS	Local Source
Lx	Layer number

MCU	Media Control Unit
MG	Media Gateway
MGC	Media Gateway Controller
MSRP	Message Sending Relay Protocol
NAT	Network Address Translation
RD	Remote Destination
RS	Remote Source
RTP	Real Time Protocol
RTCP	Real-Time Transport Control Protocol
SCTP	Stream Control Transport Protocol
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SSRC	Synchronization Source
STUN	Session Traversal Utilities for NAT
UDP	User Datagram Protocol

5 Conventions

Elements of the ITU-T H.248 protocol model, e.g., Context, Termination, Stream, Event are represented using the first letter capitalized. ITU-T H.248 Property, Event, Signal and Parameter identities are given in *italics*. When used in the main text SDP syntax is highlighted in bold i.e., "**m**".

6 Use of ECN with ITU-T H.248

ITU-T H.248 entities (MG and MGC) may be involved with ECN in multiple ways. Clause 6.1 introduces the basic control principle. Subsequent clauses illustrate example IP transport (and possibly application) protocol-specific use of ECN with ITU-T H.248.

6.1 Basic ECN control loop

[IETF RFC 3168] defines an addition to IP for ECN support. This support relates to a unidirectional connection model, i.e., IP traffic in IP source host to IP destination host direction. Figure 1 illustrates the basic ECN control principle. The control loop may be abstracted by four components in the user plane:

1. the *congestion notification information* flow in source to destination host direction;
2. the *feedback information* flow in reverse direction, back to the traffic source;
3. the *actuating elements* in case of indicated congestion (typically located in the source host); and
4. the *sensor elements*, responsible for indicating congestion (at a network route, in an IP hop) by ECN marking in the IP path.

There might be a further component in the control plane for:

5. the indication and negotiation of a congestion control.