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procedures

Gateway control protocol: RTP topology dependent RTCP handling by ITU-T H.248 media gateways with IP terminations

Recommendation ITU-T H.248.88



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Recommendation ITU-T H.248.88

Gateway control protocol: RTP topology dependent RTCP handling by ITU-T H.248 media gateways with IP terminations

Summary

RTCP is the control protocol associated to RTP, which has various connection models called RTP topologies. The handling of RTCP information may be RTP topology dependent. ITU-T H.248 media gateways may support various types of RTP topologies, driven by network application scenarios. Recommendation ITU-T H.248.88 provides both general and detailed information about this topic, as well as explicit control means to enforce dedicated RTP topologies in such media gateways.

History

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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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Recommendation ITU-T H.248.88

Gateway control protocol: RTP topology dependent RTCP handling by ITU-T H.248 media gateways with IP terminations

1 Scope

The scope of this Recommendation is related to RTP control protocol (RTCP) handling by ITU-T H.248 media gateways (MGs) [ITU-T H.248.1]. The required MG behaviour is fairly clear for the majority of use cases. However, there are some scenarios which benefit from or even require explicit signalling indication for an unambiguous control of MG RTCP (but also RTP) traffic handling behaviour.

This Recommendation covers:

- information on the history and motivation behind RTP topologies and RTCP handling and the available ITU-T H.248 tool landscape (clause 6);
- overview tables concerning RTP topology versus RTCP handling aspects and relevant ITU-T H.248 connection models (clause 7);
- RTCP service aspects (clause 8);
- scope and limitations of RTP topology control (clause 9);
- an ITU-T H.248 package for basic RTP topology control (clause 10); and
- package independent procedures for RTP topology control (clause 11).

This Recommendation may be useful in scenarios where an MG supports multiple RTP topologies and/or multiple RTP/RTCP services which may lead to ambiguous behaviour. In these scenarios an ITU-T H.248 profile specification may use the package in this Recommendation to alleviate this behaviour.

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 G.729.1] Recommendation ITU-T G.729.1 (2006), *G.729-based embedded variable bit-rate coder: An 8-32 kbit/s scalable wideband coder bitstream interoperable with G.729*.
- [ITU-T G.799.3] Recommendation ITU-T G.799.3 (2011), *Signal processing functionality and performance of an IP-to-IP voice gateway optimized for the transport of voice and voiceband data*.
- [ITU-T H.248.1] Recommendation ITU-T H.248.1 (2013), *Gateway Control Protocol: Version 3*.
- [ITU-T H.248.30] Recommendation ITU-T H.248.30 (2008), *Gateway control Protocol: RTCP extended performance metrics packages*.

- [ITU-T H.248.48] Recommendation ITU-T H.248.48 (2012), *Gateway control Protocol: RTCP XR block reporting package*.
- [ITU-T H.248.50] Recommendation ITU-T H.248.50 (2010), *Gateway control Protocol: NAT traversal toolkit packages*.
- [ITU-T H.248.57] Recommendation ITU-T H.248.57 (2013), *Gateway control Protocol: RTP control protocol package*.
- [ITU-T H.248.58] Recommendation ITU-T H.248.58 (2008), *Gateway control Protocol: Packages for application level H.248 statistics*.
- [ITU-T H.248.71] Recommendation ITU-T H.248.71 (2010), *Gateway control Protocol: RTCP support packages*.
- [ITU-T H.264] Recommendation ITU-T H.264 (2013), *Advanced video coding for generic audiovisual services*.
- [ITU-T Q.9] Recommendation ITU-T Q.9 (1988), *Vocabulary of switching and signalling terms*.
- [ITU-T T.411] Recommendation ITU-T T.411 (1993), *Information technology – Open Document Architecture (ODA) and interchange format: Introduction and general principles*.
- [ITU-T V.152] Recommendation ITU-T V.152 (2010), *Procedures for supporting voice-band data over IP networks*.
- [ITU-T Y.1221] Recommendation ITU-T Y.1221 (2010), *Traffic control and congestion control in IP-based networks*.
- [IETF RFC 3550] IETF RFC 3550 (2003), *RTP: A Transport Protocol for Real-Time Applications*.
- [IETF RFC 3551] IETF RFC 3551 (2003), *RTP Profile for Audio and Video Conferences with Minimal Control*.
- [IETF RFC 3611] IETF RFC 3611 (2003), *RTP Control Protocol Extended Reports (RTCP XR)*.
- [IETF RFC 3711] IETF RFC 3711 (2004), *The Secure Real-time Transport Protocol (SRTP)*.
- [IETF RFC 4585] IETF RFC 4585 (2006), *Extended RTP Profile for Real-time Transport Control Protocol (RTCP)-Based Feedback (RTP/AVPF)*.
- [IETF RFC 4588] IETF RFC 4588 (2006), *RTP Retransmission Payload Format*.
- [IETF RFC 5124] IETF RFC 5124 (2008), *Extended Secure RTP Profile for Real-time Transport Control Protocol (RTCP)-Based Feedback (RTP/SAVPF)*.
- [IETF RFC 5576] IETF RFC 5576 (2009), *Source-Specific Media Attributes in the Session Description Protocol (SDP)*.
- [IETF RFC 5760] IETF RFC 5760 (2010), *RTP Control Protocol (RTCP) Extensions for Single-Source Multicast Sessions with Unicast Feedback*.
- [IETF RFC 6051] IETF RFC 6051 (2010), *Rapid Synchronisation of RTP Flows*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 bit integrity [ITU-T Q.9]: Exists when the values of the bits in each octet of a digital bit stream at the output of a device or system are unchanged from those at the *input*.

NOTE – Digital processing devices such as A/μlaw converters, echo suppressors and digital pads must be disabled to provide bit integrity.

3.1.2 data integrity [ITU-T T.411]: The property that data has not been altered or destroyed.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 basic RTCP service: RTCP services based on RTCP packet types SR (200), RR (201), SDDES (202) and BYE (203).

NOTE – A minimum RTP implementation must support at least [IETF RFC 3550]. The resulting basic RTCP service is thus considered to be the absolute minimum of any RTP implementation (because [IETF RFC 3550] delegates any service based on RTCP packet type APP (204) to other RT(C)P-related RFCs).

3.2.2 fully protocol unaware forwarding: This applies to transparent forwarding where the MG is unaware of the Lx protocol(s). The MG is thus not able to execute any kind of operation on the Lx-PDU.

NOTE – An example of "fully RTP protocol unaware forwarding" is when the ITU-T H.248 descriptor(s) does not contain any kind of signalling information (such as ITU-T H.248 events, properties, signals, statistics or SDP elements) related to the indication of RTP traffic. This would be a fully L4+ agnostic stream setting.

3.2.3 Lx-PDU integrity: In the context of packet processing, it is the basic property of data integrity. The MG must guarantee bit integrity for forwarded protocol data units (PDU) at layer Lx. Lower layer protocol control information (PCI) may be modified.

3.2.4 RTP domain: A network domain with RTP entities which share a common RTP/RTCP-related identifier space. An RTP domain is characterized therefore by a domain-wide (and temporal, see Note 2) uniqueness of such protocol identifiers, which typically constitute unambiguous RTP traffic flows (e.g., protocol elements SSRC, CNAME, PT).

NOTE 1 – Temporal horizon of identifier values: [b-IETF RFC 6222] differentiates the identifier lifetime in short-term persistent and long-term persistent identifier value assignments.

NOTE 2 – An end-to-end RTP traffic flow could traverse multiple RTP domains, leading to the following observations:

- The end-to-end communication association would be comprised of multiple, concatenated RTP sessions.
- The edge of RTP domains is given by RTP entities with RTP topologies of type RTP End system or Back-to-Back RTP End system.

3.2.5 RTP packet integrity: Lx-PDU integrity for RTP packet PDU type [IETF RFC 3550]. RTP packet integrity implies RTCP packet integrity.

NOTE 1 – The embedded concept of bit integrity restricts this property to input-output related RTP topologies (e.g., the RTP end system topology would be excluded).

NOTE 2 – RTCP packet integrity is limited to end-to-end RTCP control flows, but not related to RTCP packets originating or terminating at the MG (such as possible RTCP XR packets).

3.2.6 RTP profile related RTCP service: The RTCP service given by a specific RTP profile.



3.2.7 RTP source translator: RTP topology related to the translation of RTP source specific parameters. This topology belongs to the high level category of RTP translator topology.

NOTE – This topology is not defined by [b-IETF RFC 5117].

3.2.8 RTCP service: An MG service tied to a particular RTCP packet type code point. The RTCP packet type (PT) value may be thus considered as RTCP service identifier.

NOTE 1 – This is the coarsest granularity of an RTCP service definition, but sufficient for this Recommendation. A finer grain RTCP service level could take into account further RTCP packet embedded identifiers such as the block type (BT) code point in the case of RTCP XR or the feedback message type (FMT) code point in the case of RTCP FB.

NOTE 2 – Another classification approach could derive generic (because usually PT-independent) RTCP service categories such as those related to performance monitoring, media encryption, codec rate control, congestion control, generic feedback, keeps alive, etc.

3.2.9 supplementary RTCP service: Any RTCP service in addition to basic RTCP services (clause 3.2.1) and/or RTP profile RTCP related services (clause 3.2.6).

3.2.10 transparent forwarding: MG packet forwarding behaviour with the characteristic of Lx-PDU integrity. This is a unidirectional characteristic of an Lx-PDU flow.

NOTE 1 – This is normally implicit, basic behaviour, where the RD settings on an ingress Termination match the LD settings on an egress Termination in the same Context: identical media descriptions imply transparent forwarding by the MG under the condition that the MG could derive the intended protocol layer Lx of transparent forwarding.

NOTE 2 – There would then be the characteristic of RTP packet integrity in the context of RTP transparent forwarding. The MG might be RTP aware; e.g., support of RTP related statistics or event detection would not violate transparent forwarding behaviour.

NOTE 3 – Delayed transparent forwarding is a variant of transparent forward from a temporal perspective, which is characterized by transparent forwarding, but Lx-PDUs might be intentionally delayed in the outgoing direction. The traffic characteristic of the Lx-PDU flow would be then modified. Examples:

- The application of IP traffic shaping (see clause 7.1.5 of [ITU-T Y.1221]) might be one example in the case of Lx equal to 'IP'.
- The application of RTP jitter elimination, reduction or adjustment (see [ITU-T G.799.3]) might be one example in the case of Lx equal to 'RTP'

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AGW	Access Gateway
APP	(RTCP) Application-defined packet type
AVP	(RTP) Audio Visual Profile
AVPF	(RTP) Audio Visual Profile with Feedback
B2BRE	Back-to-Back RTP End system
BGF	Border Gateway Function
BGW	Border Gateway
BR	(RTCP) Basic Report
BT	(RTCP) Block Type
CNAME	Canonical Name
CSRC	Contributing Source
DCCP	Datagram Congestion Control Protocol

FB	(RTCP) Feedback
FMT	(RTCP FB) Feedback Message Type
IP	Internet Protocol
LCD	Local Control Descriptor
LD	Local Descriptor
Lx	Layer x
MCU	Media Control Unit
MG	Media Gateway
MGC	Media Gateway Controller
MSRP	Message Session Relay Protocol
MUX	Multiplex
LD	Local Descriptor
NAPT	Network Address and Port Translation
NAT-T	NAT Traversal
PCI	Protocol Control Information
PDU	Protocol Data Unit
PP	Point to Point
PSTN	Public Switched Telephone Network
PT	(RTP) Payload Type; (RTCP) Packet Type
QoS	Quality of Service
RD	Remote Descriptor
RR	(RTCP) Receiver Report
RTCP	RTP Control Protocol
RTP	Real-time Transport Protocol
RTPASM	RTP Any Source Multicast
RTPASY	RTP Asymmetric Topologies
RTPE	RTP End system (or RTP endpoint)
RTPM	RTP Mixer
RTPMT	RTP Media Translator
RTPMU	RTP Multicast
RTPRTM	RTP RTCP-Terminating-MCU
RTPSSM	RTP Source Specific Multicast
RTPTF	RTP Transparent Forwarding
RTPTT	RTP Transport Translator
RTPVSM	RTP Video-Switch-MCU
SAVP	(RTP profile) Secure Audio Visual Profile
SAVPF	(RTP profile) Secure Audio Visual Profile with Feedback

