International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

H.248.57

(10/2014)

SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Infrastructure of audiovisual services – Communication procedures

Gateway control protocol: RTP control protocol package

Recommendation ITU-T H.248.57

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Recommendation ITU-T H.248.57

Gateway control protocol: RTP control protocol package

Summary

Recommendation ITU-T H.248.57 defines an ITU-T H.248 package for ephemeral terminations with real-time transport protocol-based streams and allows the media gateway controller to control the *handling* of real-time transport protocol control protocol (RTCP) traffic within the ITU-T H.248 stream. RTCP handling comprises functions such as the indication of whether an RTCP flow is used, resource management functions for specific RTCP resources and the allocation scheme of transport port values.

This revision supports additional RTCP port allocation rules in the context of real-time transport protocol (RTP) transport multiplexing.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T H.248.57	2008-06-13	16	11.1002/1000/9483
2.0	ITU-T H.248.57	2013-03-16	16	11.1002/1000/11861
3.0	ITU-T H.248.57	2014-10-14	16	11.1002/1000/12239

* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

FOREWORD

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at http://www.itu.int/ITU-T/ipr/.

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Recommendation ITU-T H.248.57

Gateway control protocol: RTP control protocol package

1 Scope

This Recommendation contains functionality to describe the use of the real-time transport protocol control protocol (RTCP) in ITU-T H.248-controlled media gateways. RTCP is used, for example, to monitor the quality of service and to convey information about the participants in an on-going real-time transport protocol (RTP) session.

[ITU-T H.248.1] assumes that when an RTP stream is specified in a local or remote descriptor, that an RTCP flow may be established according to the rules defined in section 11 of [IETF RFC 3550]. Additional ITU-T H.248/RTCP behaviour is defined in clause E.12.5 of [ITU-T H.248.1]. However, some media gateways may not instantiate an RTCP flow. For interoperability and for some applications such as firewall and network address translation (NAT), it is important for the media gateway controller (MGC) to be certain of the media gateway (MG) behaviour with respect to port allocation for RTCP. The "RTCP Handling Package" defined in this Recommendation provides a property to control this RTCP flow allocation.

This revision supports additional RTCP port allocation rules in context of RTP transport multiplexing.

1.1 Overview

RTCP *handling* may comprise the following seven functions:

1) Indication of the *existence* of an RTCP flow of an RTP session (RTP with or without RTCP).
2) Indication of *endpoint identifiers* on *RTP level* that are relevant for both RTP and RTCP (e.g., synchronization source (SSRC)).

In addition, if an RTCP flow exists:

3) Resource management of *endpoint identifiers* on *layer 4* (UDP *ports*; i.e., reservation, allocation and indication of a specific allocation rule) for RTCP flows.
4) Resource management of *endpoint identifiers* on *RTP level* (e.g., CNAME) for RTCP flows.
5) Resource management of *other resources* required for RTCP flows (e.g., reservation and allocation of transport capacity).
6) Indication of *specific modes of operation* for RTCP (e.g., layer 4 multiplexing of RTP and RTCP flows, or multiplexing mode of RTCP reports in a single RTCP packet).

Orthogonal to the above functions:

7) Mapping *scheme* of RTP and RTCP flows on ITU-T H.248 streams.

This Recommendation deals with functions one and three only. Other functions are out of the scope of this Recommendation.

In addition, this Recommendation assumes that regarding function seven, RTP and RTCP flows are always mapped into a single ITU-T H.248 stream. Other mapping schemes are out of the scope of this Recommendation and may make this Recommendation's procedures irrelevant.

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 H.248.1] Recommendation ITU-T H.248.1 (2013), *Gateway control protocol: Version 3*. <http://www.itu.int/rec/T-REC-H.248.1>

[IETF RFC 3550] IETF RFC 3550 (2003), *RTP: A Transport Protocol for Real-Time Applications*. <http://www.ietf.org/rfc/rfc3550.txt>

[IETF RFC 3605] IETF RFC 3605 (2003), *Real Time Control Protocol (RTCP) attribute in Session Description Protocol (SDP).* <http://www.ietf.org/rfc/rfc3605.txt>

[IETF RFC 4566] IETF RFC 4566 (2006), *SDP: Session Description Protocol.* <http://www.ietf.org/rfc/rfc4566.txt>

[IETF RFC 5761] IETF RFC 5761 (04/2010), *Multiplexing RTP Data and Control Packets on a Single Port.* <http://www.ietf.org/rfc/rfc5761.txt>

3 Definitions

3.1 Terms defined elsewhere

None.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 RTCP flow: The sending and reception of RTCP packets as described by section 6 of [IETF RFC 3550]. The RTCP flow relates to an "(ITU-T H.248) *control flow*" (see clause 3.2.9 of [ITU-T H.248.1]).

NOTE – An RTCP flow comprises all RTCP traffic on an RTP session. An RTCP flow may be further separated into RTCP sub-flows due to different RTCP report types. An RTCP sub-flow is identified by a specific RTCP packet type codepoint.

3.2.2 RTP flow: The sending and reception of RTP packets of an *RTP session*. The RTP flow relates to an "ITU-T H.248 *media flow*" (see [ITU-T H.248.1]).

3.2.3 RTP/RTCP transport multiplexing: A single IP transport (L4) port for RTP and RTCP packets.

NOTE – This term may be also referred to as "RTP transport multiplexing".

3.2.4 RTP session: An RTP session comprises a single RTP flow and an optional RTCP flow.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AVP	Audio Visual Profile
ISDN	Integrated Services Digital Network
LD	Local Descriptor
LS	Local Source
MG	Media Gateway
MGC	Media Gateway Controller
NAT	Network Address Translation
PSTN	Public Switched Telephone Network
RD	Remote Descriptor
RS	Remote Source
RTCP	Real-time Transport protocol Control Protocol
RTP	Real-time Transport Protocol
SDP	Session Description Protocol
SSRC	Synchronization Source

5 Conventions

None.

6 RTCP Handling Package

Package name: RTCP Handling Package

Package ID: rtcph (0x00b5)

Description: This package allows the MGC to indicate to the MG per stream whether or not to establish an RTCP control flow when an RTP media flow (e.g., for RTP profiles such as RTP/AVP, etc.) is created.

Version: 1

Extends: None.

6.1 Properties

6.1.1 RTCP Allocation Specific Behaviour

Property name: RTCP Allocation Specific Behaviour

Property ID: rsb (0x0009)

Description: This property indicates whether or not an RTCP flow and an associated port is automatically associated with an RTP flow.

Type: Boolean

Possible values: ON (an RTCP flow shall be allocated or de-allocated automatically with the creation or deletion of the RTP flow);

	OFF (an RTCP flow shall not be allocated or de-allocated automatically with the creation or deletion of the RTP flow)
Default:	Provisioned
Defined in:	Local control
Characteristics:	Read/Write

6.2 Events

None.

6.3 Signals

None.

6.4 Statistics

None.

6.5 Error codes

None.

6.6 Procedures

6.6.1 Reservation and allocation of layer 4 ports for RTP and RTCP

The port number allocation rules, as defined by [IETF RFC 3550], are used as the starting point.

6.6.1.1 Overview – Four RTCP transport addresses

Figure 1 shows a bidirectional RTP session with RTCP in each direction: there are thus four traffic flows. The RTP-based media flow and RTCP-based control flow sharing the same IP addresses (see Note regarding possible exceptions), but using normally different layer 4 (L4) (UDP) ports. These four RTCP ports are shown in Figure 1.

NOTE – The session description protocol (SDP) attribute "a=rtcp:" also allows the explicit specification of an IP network address in addition to the layer 4 port. This may then lead to different IP addresses for RTP and RTCP flows. Figure 1 illustrates the particular case of identical IP addresses.

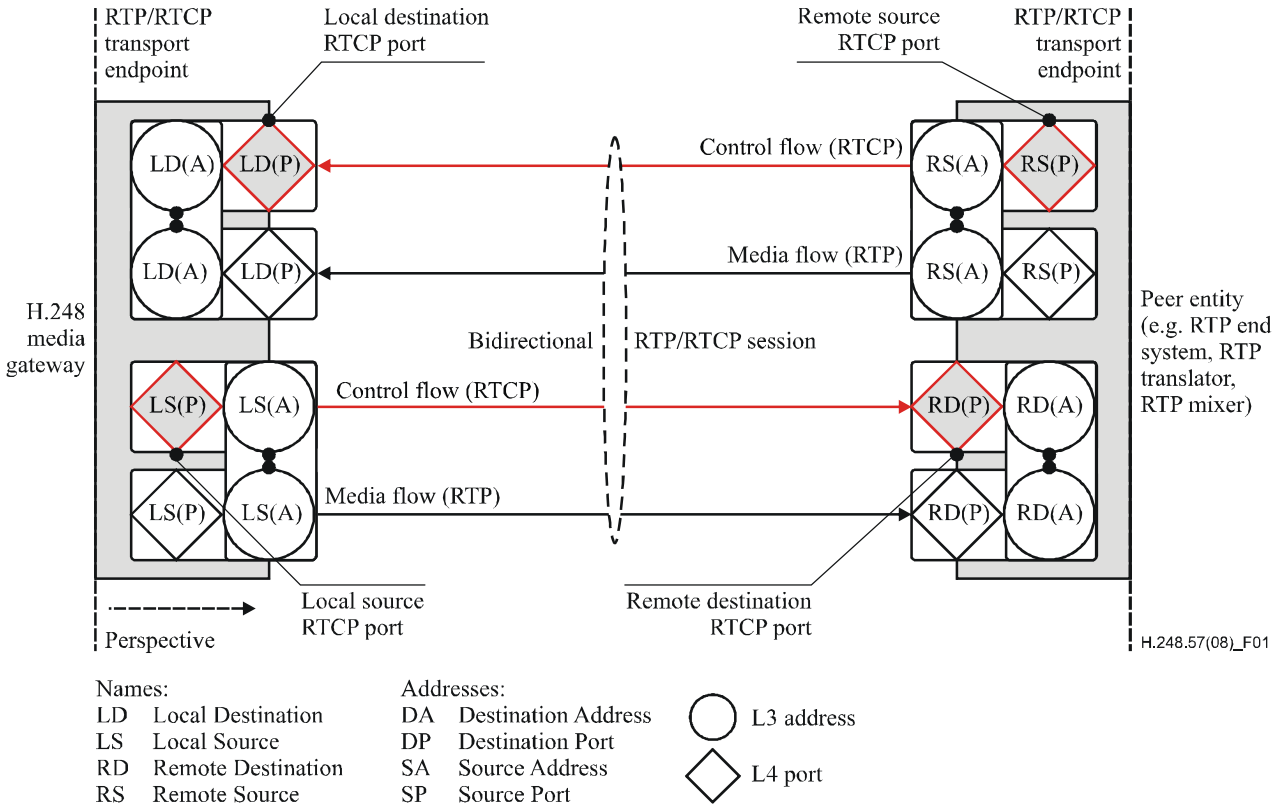

Figure 1 – Connection endpoint naming conventions – the four RTCP ports of a bidirectional RTP/RTCP session

6.6.1.2 Specific behaviour "activated"

If the MGC sets the rtcph/rsb property to "ON", when the MG is requested to allocate/de-allocate a local destination port for an RTP stream, a consecutive port for the reception of the associated RTCP flow is automatically allocated/de-allocated.

6.6.1.3 Specific behaviour "deactivated"

If the MGC sets the rtcph/rsb property to "OFF", then only a single port is allocated to the RTP stream and no RTCP flow is assumed to exist for the stream.

6.6.1.4 Precedence of rtcph/rsb property over other port allocation mechanisms

The setting of the rtcph/rsb property in general takes precedence over any values set in the local and remote descriptors with regard to port allocation for RTP streams. However, there is one exception: if the rtcph/rsb property is set to ON and a specific RTCP transport address is provided in the local and/or remote descriptor, e.g., using SDP "`a=rtcp:`" attribute as defined in [IETF RFC 3605], the RTCP packets should use the transport addresses indicated by the local/remote descriptors.

6.6.1.4.1 Notes to SDP attribute "a=rtcp"

Within the scope of this Recommendation, it is noted that:

– the SDP attribute "`a=rtcp:`" also allows the explicit specification of an IP network address in addition to the layer 4 port; and that,

– this SDP attribute may also principally be used in the ITU-T H.248 local descriptor (LD) in addition to its usage in the ITU-T H.248 remote descriptor (RD).

Note that both the IP address and the port number appearing in the "`a=rtcp:`" attribute may be underspecified. When this is the case, the MG is free to allocate any transport address to the RTCP flow (i.e., not necessarily using the same IP address as the RTP flow).

6.6.1.5 Summary of basic rules according to IETF RFC 3550 and IETF RFC 3605

Table 1 provides a summary of the port allocation rules for RTCP.

Table 1 – Allocation rules for RTCP ports with IETF RFC 3550 (with and without IETF RFC 3605 attribute)

ITU-T H.248 property value	"a=rtcp" sent to MG?	Local endpoints		Remote endpoints	
		LD(A, P)	LS(A, P)	RD(A, P)	RS(A, P)
rsb = "ON"	No	Consecutive port to the one indicated by the local descript.	MG (Note 1)	Consecutive port to the one indicated by the remote descript.	Out of scope
	Yes in H.248 LD	"a=rtcp" port	MG (Note 1)	–	–
	Yes in H.248 RD	–	–	"a=rtcp:" port	Out of scope
rsb = "OFF"	No	No port allocated	No port allocated	No port allocated	Out of scope
	Yes in H.248 LD	No port allocated (Note 2)	No port allocated (Note 2)	No port allocated (Note 2)	Out of scope
	Yes in H.248 RD	No port allocated (Note 2)	No port allocated (Note 2)	No port allocated (Note 2)	Out of scope
NOTE 1 – The management of LS(A) and LS(P) resources is under control of the MG. The MG shall apply the "consecutive" port allocation rule. NOTE 2 – This is a semantic contradiction, however the MG shall ignore the "a=rtcp:" attribute.					

6.6.1.6 Additional rules due to "number of port" qualifier according to IETF RFC 4566

[IETF RFC 4566] defines the "number of port" qualifier for the SDP "m=" line used to specify multiple transport ports. The RTCP port allocation rules (see Note) are also provided by [IETF RFC 4566] in the case of RTP-based media. The "number of port" qualifier indicates the number of RTP/RTCP flow pairs for a single ITU-T H.248 stream.

NOTE – Section 5.14 of [IETF RFC 4566] states that "In such a case, the ports used depend on the transport protocol. For RTP, the default is that only the even-numbered ports are used for data with the corresponding one-higher odd ports used for the RTCP belonging to the RTP session, and the <number of ports> denoting the number of RTP sessions " ..." If non-contiguous ports are required, they must be signalled using a separate attribute (for example, "a=rtcp:" as defined in …)".

RTCP port values shall thus be odd numbers, also in case of "a=rtcp" usage. This Recommendation does suppose a single SDP "a=rtcp" attribute per SDP media description ("m=" line) when [IETF RFC 3605] is used.

Table 2 provides a summary of these rules in conjunction with the rsb property.

Table 2 – Allocation rules for RTCP ports for RTP applications using SDP "number of port" qualifier

ITU-T H.248 property value	"a=rtcp" sent to MG?	Local endpoints		Remote endpoints	
		LD(A, P)	LS(A, P)	RD(A, P)	RS(A, P)
rsb = "ON"	No	Consecutive port to the one indicated by the local descript. (for the first pair) plus rule "contiguous (odd) for each further RTP/RTCP pair"	See Table 1	Consecutive port to the one indicated by the remote descript. (for the first pair) plus rule "contiguous (odd) for each further RTP/RTCP pair"	See Table 1
	Yes in H.248 LD	"a=rtcp:" port (for the first RTP/RTCP pair) plus rule "contiguous (odd) for each further RTP/RTCP pair" (Note 1)	See Table 1	–	–
	Yes in H.248 RD	–	–	"a=rtcp:" port (for the first RTP/RTCP pair) plus rule "contiguous (odd) for each further RTP/RTCP pair" (Note 2)	See Table 1
rsb = "OFF"	No	See Table 1	See Table 1	See Table 1	See Table 1
	Yes in H.248 LD	See Table 1	See Table 1	See Table 1	See Table 1
	Yes in H.248 RD	See Table 1	See Table 1	See Table 1	See Table 1

NOTE 1 – If both 'number of ports' and "a=rtcp:" are indicated in the LD, the RTCP port of the first pair is allocated according to the "a=rtcp:" and the RTP port of the next pair takes the one-higher value to the RTCP port of the last pair. The RTCP port of the next pair takes the consecutive higher number to the RTP port.

NOTE 2 – If both 'number of ports' and "a=rtcp:" are indicated in the RD, the RTCP port of the first pair is allocated according to the "a=rtcp:" and the RTP port of the next pair takes the one-higher value to the RTCP port of the last pair. The RTCP port of the next pair takes the consecutive higher number to the RTP port.

6.6.2 RTP sessions with or without an RTCP flow (existence of RTCP flow)

RTCP is fundamentally optional for RTP.

6.6.2.1 Indication of the existence of RTCP per ITU-T H.248 stream or termination

As the use of RTCP is optional, the default behaviour of an MG as to the use of RTCP flows is not described in [ITU-T H.248.1]. The default behaviour could be, e.g., defined in an ITU-T H.248 profile specification (see, e.g., template clauses for connection model, stream descriptor or SDP information elements in Appendix III of [ITU-T H.248.1]).

The usage protocol elements (e.g., such as the ITU-T H.248 rtcph/rsb property, or ITU-T H.248 statistics on RTCP basis, or RTCP-specific SDP information elements according to [b-IETF RFC 3556], [IETF RFC 3605] or [b-IETF RFC 3890]) in ITU-T H.248 commands, which provide an indication of RTCP, shall overrule the default behaviour.

6.6.2.2 RTCP-less RTP sessions

No UDP port (or other resources) for RTCP will be reserved.

6.6.2.3 RTP sessions with RTCP

Handling of RTCP shall follow the guidelines of this Recommendation.

6.6.3 Mapping of RTP and RTCP flows on ITU-T H.248 streams

6.6.3.1 Mapping schemes

6.6.3.1.1 Single ITU-T H.248 stream for RTP and RTCP

The default assumption is that an RTP/RTCP session is mapped on a single ITU-T H.248 stream.

NOTE – This is based on clause E.12 of [ITU-T H.248.1] (in case of usage for ITU-T H.248 RTP terminations) and the reference on RTP profile "RTP/AVP" according to [IETF RFC 3550]. The default media description (e.g., by SDP information elements) for media types/formats for media transport "RTP/AVP" does not explicitly specify RTCP. RTCP is implicitly part of the same ITU-T H.248 stream as for RTP per default.

6.6.3.1.2 Individual ITU-T H.248 streams for RTP and RTCP

An individual ITU-T H.248 stream, solely for RTCP traffic, could be used in principle. Although, it is so far not possible to provide sufficient information within the ITU-T H.248 stream descriptor for "comprehensive" specification of RTCP flows.

Such an individual ITU-T H.248 stream could be characterized by the 2-tuples of IP address and port (which is not really specific for RTCP).

6.6.3.2 Mapping control

Mapping control is subject of the usage and capabilities of the ITU-T H.248 stream descriptor. There are no protocol means presently available for the individual stream mapping mode.

The rtcph/rsb property shall not be used to influence the mapping between RTP and RTCP flows on ITU-T H.248 streams.

7 Additional support of RTP transport multiplexing

7.1 Introduction

The use of RTP transport multiplexing is indicated by the MGC towards the MG via the SDP attribute "a=rtcp-mux" [IETF RFC 5761] in the ITU-T H.248 LD and/or RD. RTP transport multiplexing may be used in addition to the existing capabilities of the RTCP Handling Package (see clause 6).

7.2 Backward compatibility

In order to ensure backward compatibility in ITU-T H.248 profiles with existing support of the RTCP Handling Package, possible interactions between RTCP port allocation rules according to [IETF RFC 3550], [IETF RFC 3605] and [IETF RFC 5761] must be considered.

Table 3 below provides a summary of all rules for interaction resolution.

Table 3 – Overview of applied rules for resolving interaction issues

Interaction resolution rule		Comment
R0	If ITU-T H.248 "*rtcph/rsb*" property value 'OFF', then the SDP attribute "*a=rtcp"* sent by the MGC shall be ignored by the MG.	Existing rule, see Note 2/Table 1
R1	If "*rtcph/rsb*" is omitted, then the *provisioned default value* applies, which either is value "ON" or "OFF".	See Annex A for more information.
R2	SDP attribute "*a=rtcp-mux*" modifies ITU-T H.248 "*rtcph/rsb*" property to value 'ON'.	If not, RTCP transport multiplexing couldn't be supported.
R3	SDP attribute "*a=rtcp-mux*" overrules SDP attribute "*a=rtcp*".	In line with [IETF RFC 5761].
R4	If ITU-T H.248 "*rtcph/rsb*" property value 'OFF' overrules SDP attribute "*a=rtcp-mux*", i.e., then the SDP attribute "*a=rtcp-mux"* sent by the MGC shall be ignored by the MG.	In order to preserve basic *rtcph* semantics.

7.3 Summary of rules according to IETF RFC 3550, IETF RFC 3605 and IETF RFC 5671

The rules according to [IETF RFC 3550], [IETF RFC 3605] and [IETF RFC 5671] are distributed over the five tables, Tables 4-a to 4-e. and can be summarized as follows, for quick reference:

– Table 4-a: combinations of "a=rtcp-mux" and rsb = "ON" without "a=rtcp";

– Table 4-b: combinations of "a=rtcp-mux" and rsb = "ON" with "a=rtcp" in ITU-T H.248 LD;

– Table 4-c: combinations of "a=rtcp-mux" and rsb = "ON" with "a=rtcp" in ITU-T H.248 RD;

– Table 4-d: combinations of "a=rtcp-mux" and rsb = "ON" with "a=rtcp" in ITU-T H.248 LD and RD;

– Table 4-e: all combinations with rsb = "OFF".

Table 4-a – Rules according to IETF RFC 3550, IETF RFC 3605 and IETF RFC 5671 – Part 1/5

H.248 rsb property value	"a=rtcp" sent to MG?	"a=rtcp-mux" sent to MG?	Local endpoints		Remote endpoints	
			LD(A, P)	LS(A, P)	RD(A, P)	RS(A, P)
omitted			If rtcph/rsb is omitted, then the provisioned default value applies, which is either "ON" or "OFF". Thus, then corresponding rows below apply.			
rsb = "ON"	No	No	Consecutive port to the one indicated by the local descript. m-line, $LD(A)_{RTCP} = LD(A)_{RTP}$ $LD(P)_{RTCP} = LD(P)_{RTP} + 1$	MG (Note 1), where $LS(A)_{RTCP} = LS(A)_{RTP}$ $LS(P)_{RTCP} = LS(P)_{RTP} + 1$ Typically also: $LS(A,P)_{RTP} = LD(A,P)_{RTP}$ $LS(A,P)_{RTCP} = LD(A,P)_{RTCP}$	Consecutive port to the one indicated by the remote descript. m-line, $RD(A)_{RTCP} = RD(A)_{RTP}$ $RD(P)_{RTCP} = RD(P)_{RTP} + 1$	Out of scope
		Yes in H.248 LD	$LD(A,P)_{RTCP} = LD(A,P)_{RTP}$	MG (Note 1), where $LS(A,P)_{RTCP} = LS(A,P)_{RTP}$ Typically also: $LS(A,P)_{RTCP} = LD(A,P)_{RTCP}$ $= LD(A,P)_{RTP} = LS(A,P)_{RTP}$	Consecutive port to the one indicated by the remote descript. m-line, $RD(A)_{RTCP} = RD(A)_{RTP}$ $RD(P)_{RTCP} = RD(P)_{RTP} + 1$	Out of scope
		Yes in H.248 RD	$LD(A)_{RTCP} = LD(A)_{RTP}$ $LD(P)_{RTCP} = LD(P)_{RTP} + 1$	MG (Note 1), where $LS(A)_{RTCP} = LS(A)_{RTP}$ $LS(P)_{RTCP} = LS(P)_{RTP} + 1$ Typically also: $LS(A,P)_{RTP} = LD(A,P)_{RTP}$ $LS(A,P)_{RTCP} = LD(A,P)_{RTCP}$	$RD(A,P)_{RTCP} = RD(A,P)_{RTP}$	Out of scope
		Yes in H.248 LD & RD	$LD(A,P)_{RTCP} = LD(A,P)_{RTP}$	MG (Note 1), where $LS(A,P)_{RTCP} = LS(A,P)_{RTP}$ Typically also: $LS(A,P)_{RTCP} = LD(A,P)_{RTCP}$ $= LD(A,P)_{RTP} = LS(A,P)_{RTP}$	$RD(A,P)_{RTCP} = RD(A,P)_{RTP}$	Out of scope

Table 4-b – Rules according to IETF RFC 3550, IETF RFC 3605 and IETF RFC 5671 – Part 2/5

H.248 rsb property value	"a=rtcp" sent to MG?	"a=rtcp-mux" sent to MG?	Local endpoints		Remote endpoints	
			LD(A, P)	LS(A, P)	RD(A, P)	RS(A, P)
rsb = "ON"	Yes in H.248 LD	No	$LD(A)_{RTCP} = LD(A)_{RTP}$ $LD(P)_{RTCP}$ = "a=rtcp" value	MG (Note 1), where $LS(A)_{RTCP} = LS(A)_{RTP}$ Typically also: $LS(A,P)_{RTCP} = LD(A,P)_{RTCP}$	$RD(A)_{RTCP} = RD(A)_{RTP}$ $RD(P)_{RTCP} = RD(P)_{RTP} + 1$	Out of scope
		Yes in H.248 LD	$LD(A,P)_{RTCP} = LD(A,P)_{RTP}$ (rule R2 ("a=rtcp-mux" overrules "a=rtcp"))	MG (Note 1), where $LS(A,P)_{RTCP} = LS(A,P)_{RTP}$ Typically also: $LS(A,P)_{RTCP} = LD(A,P)_{RTCP} = LD(A,P)_{RTP} = LS(A,P)_{RTP}$	$RD(A)_{RTCP} = RD(A)_{RTP}$ $RD(P)_{RTCP} = RD(P)_{RTP} + 1$	Out of scope
		Yes in H.248 RD	$LD(A)_{RTCP} = LD(A)_{RTP}$ $LD(P)_{RTCP}$ = "a=rtcp" value	MG (Note 1), where $LS(A)_{RTCP} = LS(A)_{RTP}$ Typically also: $LS(P)_{RTCP}$ = "a=rtcp" port $LS(A,P)_{RTCP} = LD(A,P)_{RTCP}$	$RD(A,P)_{RTCP} = RD(A,P)_{RTP}$	Out of scope
		Yes in H.248 LD & RD	$LD(A,P)_{RTCP} = LD(A,P)_{RTP}$ (rule R2 ("a=rtcp-mux" overrules "a=rtcp"))	MG (Note 1), where $LS(A,P)_{RTCP} = LS(A,P)_{RTP}$ Typically also: $LS(A,P)_{RTCP} = LD(A,P)_{RTCP} = LD(A,P)_{RTP} = LS(A,P)_{RTP}$	$RD(A,P)_{RTCP} = RD(A,P)_{RTP}$	Out of scope

Table 4-c – Rules according to IETF RFC 3550, IETF RFC 3605 and IETF RFC 5671 – Part 3/5

H.248 rsb property value	"a=rtcp" sent to MG?	"a=rtcp-mux" sent to MG?	Local endpoints		Remote endpoints	
			LD(A, P)	LS(A, P)	RD(A, P)	RS(A, P)
rsb = "ON"	Yes in H.248 RD	No	$LD(A)_{RTCP} = LD(A)_{RTP}$ $LD(P)_{RTCP} = LD(P)_{RTP} + 1$	MG (Note 1), where $LS(A)_{RTCP} = LS(A)_{RTP}$ $LS(P)_{RTCP} = LS(P)_{RTP} + 1$ Typically also: $LS(A,P)_{RTP} = LD(A,P)_{RTP}$ $LS(A,P)_{RTCP} = LD(A,P)_{RTCP}$	$RD(A)_{RTCP} = RD(A)_{RTP}$ $RD(P)_{RTCP}$ = "a=rtcp:" port	Out of scope
		Yes in H.248 LD	$LD(A,P)_{RTCP} = LD(A,P)_{RTP}$	MG (Note 1), where $LS(A,P)_{RTCP} = LS(A,P)_{RTP}$ Typically also: $LS(A,P)_{RTCP} = LD(A,P)_{RTCP} = LD(A,P)_{RTP} = LS(A,P)_{RTP}$	$RD(A)_{RTCP} = RD(A)_{RTP}$ $RD(P)_{RTCP}$ = "a=rtcp:" port	Out of scope
		Yes in H.248 RD	$LD(A)_{RTCP} = LD(A)_{RTP}$ $LD(P)_{RTCP} = LD(P)_{RTP} + 1$	MG (Note 1), where $LS(A)_{RTCP} = LS(A)_{RTP}$ $LS(P)_{RTCP} = LS(P)_{RTP} + 1$ Typically also: $LS(A,P)_{RTP} = LD(A,P)_{RTP}$ $LS(A,P)_{RTCP} = LD(A,P)_{RTCP}$	$RD(A,P)_{RTCP} = RD(A,P)_{RTP}$ (rule R2 ("a=rtcp-mux" overrules "a=rtcp"))	Out of scope
		Yes in H.248 LD & RD	$LD(A,P)_{RTCP} = LD(A,P)_{RTP}$	MG (Note 1), where $LS(A,P)_{RTCP} = LS(A,P)_{RTP}$ Typically also: $LS(A,P)_{RTCP} = LD(A,P)_{RTCP} = LD(A,P)_{RTP} = LS(A,P)_{RTP}$	$RD(A,P)_{RTCP} = RD(A,P)_{RTP}$ (rule R2 ("a=rtcp-mux" overrules "a=rtcp"))	Out of scope

Table 4-d – Rules according to IETF RFC 3550, IETF RFC 3605 and IETF RFC 5671 – Part 4/5

H.248 rsb property value	"a=rtcp" sent to MG?	"a=rtcp-mux" sent to MG?	Local endpoints		Remote endpoints	
			LD(A, P)	LS(A, P)	RD(A, P)	RS(A, P)
rsb = "ON"	Yes in H.248 LD & RD	No	$LD(A)_{RTCP} = LD(A)_{RTP}$ $LD(P)_{RTCP}$ = "a=rtcp:" port	MG (Note 1), where $LS(A)_{RTCP} = LS(A)_{RTP}$ Typically also: $LS(A,P)_{RTCP} = LD(A,P)_{RTCP}$	$RD(A)_{RTCP} = RD(A)_{RTP}$ $RD(P)_{RTCP}$ = "a=rtcp:" port	Out of scope
		Yes in H.248 LD	$LD(A,P)_{RTCP} = LD(A,P)_{RTP}$ (rule R2 ("a=rtcp-mux" overrules "a=rtcp"))	MG (Note 1), where $LS(A,P)_{RTCP} = LS(A,P)_{RTP}$ Typically also: $LS(A,P)_{RTCP} = LD(A,P)_{RTCP} = LD(A,P)_{RTP} = LS(A,P)_{RTP}$	$RD(A)_{RTCP} = RD(A)_{RTP}$ $RD(P)_{RTCP}$ = "a=rtcp:" port	Out of scope
		Yes in H.248 RD	$LD(A)_{RTCP} = LD(A)_{RTP}$ $LD(P)_{RTCP}$ = "a=rtcp:" port	MG (Note 1), where $LS(A)_{RTCP} = LS(A)_{RTP}$ Typically also: $LS(A,P)_{RTCP} = LD(A,P)_{RTCP}$	$RD(A,P)_{RTCP} = RD(A,P)_{RTP}$ (rule R2 ("a=rtcp-mux" overrules "a=rtcp"))	Out of scope
		Yes in H.248 LD & RD	$LD(A,P)_{RTCP} = LD(A,P)_{RTP}$ (rule R2 ("a=rtcp-mux" overrules "a=rtcp"))	MG (Note 1), where $LS(A,P)_{RTCP} = LS(A,P)_{RTP}$ Typically also: $LS(A,P)_{RTCP} = LD(A,P)_{RTCP} = LD(A,P)_{RTP} = LS(A,P)_{RTP}$	$RD(A,P)_{RTCP} = RD(A,P)_{RTP}$ (rule R2 ("a=rtcp-mux" overrules "a=rtcp"))	Out of scope

Table 4-e – Rules according to IETF RFC 3550, IETF RFC 3605 and IETF RFC 5671 – Part 5/5

H.248 rsb property value	"a=rtcp" sent to MG?	"a=rtcp-mux" sent to MG?	Local endpoints		Remote endpoints	
			LD(A, P)	LS(A, P)	RD(A, P)	RS(A, P)
rsb = "OFF"	No	No	No port allocated	No port allocated	No port allocated	Out of scope
		Yes in H.248 LD	No port allocated (Note 3)	No port allocated (Note 3)	No port allocated (Note 3)	Out of scope
		Yes in H.248 RD	No port allocated (Note 3)	No port allocated (Note 3)	No port allocated (Note 3)	Out of scope
		Yes in H.248 LD & RD	No port allocated (Note 3)	No port allocated (Note 3)	No port allocated (Note 3)	Out of scope
	Yes in H.248 LD	No	No port allocated (Note 2)	No port allocated (Note 2)	No port allocated (Note 2)	Out of scope
		Yes in H.248 LD	No RTCP control flow at all, thus: No port allocated (Note 3) (rule R2 ("rsb=OFF" overrules SDP attribute "a=rtcp-mux"))	No port allocated (Note 3)	No port allocated (Note 2)	Out of scope
		Yes in H.248 RD	No port allocated (Note 2)	No port allocated (Note 2)	No port allocated (Note 3)	Out of scope
		Yes in H.248 LD & RD	No port allocated (Notes 2, 3)	No port allocated (Notes 2, 3)	No port allocated (Note 3)	
	Yes in H.248 RD	No	No port allocated	No port allocated	No port allocated (Note 2)	Out of scope
		Yes in H.248 LD	No port allocated (Note 3)	No port allocated (Note 3)	No port allocated (Note 2)	Out of scope
		Yes in H.248 RD	No port allocated	No port allocated	No RTCP control flow at all, thus: No port allocated (Notes 2, 3) (rule R2 ("rsb=OFF" overrules SDP attribute "a=rtcp-mux"))	Out of scope
		Yes in H.248 LD & RD	No port allocated (Note 3)	No port allocated (Note 3)	No port allocated (Notes 2, 3)	Out of scope

Table 4-e – Rules according to IETF RFC 3550, IETF RFC 3605 and IETF RFC 5671 – Part 5/5

H.248 rsb property value	"a=rtcp" sent to MG?	"a=rtcp-mux" sent to MG?	Local endpoints		Remote endpoints	
			LD(A, P)	LS(A, P)	RD(A, P)	RS(A, P)
	Yes in H.248 LD & RD	No	No port allocated (Note 2)	No port allocated (Note 2)	No port allocated (Note 2)	Out of scope
		Yes in H.248 LD	No port allocated (Notes 2, 3)	No port allocated (Notes 2, 3)	No port allocated (Note 2)	Out of scope
		Yes in H.248 RD	No port allocated (Note 2)	No port allocated (Note 2)	No port allocated (Notes 2, 3)	Out of scope
		Yes in H.248 LD & RD	No port allocated (Notes 2, 3)	No port allocated (Notes 2, 3)	No port allocated (Notes 2, 3)	Out of scope

Common notes for Tables 4-a to 4-e:

NOTE 1 –The management of LS(A) and LS(P) resources is under control of the media gateway unless the MGC explicitly adds "*gm/esas* = ON" and/or "*gm/lsps* = ON" and signals corresponding local source address and/or port.

In such a case there might be an inconsistency if "a=rtcp:*x*" is present in the LD and if "*gm/esps* = ON" and "*gm/lsp=y*" with "$x \neq y$" are present in LocalControl. This potential inconsistency is not further investigated in this Recommendation.

NOTE 2 – This is a semantic contradiction, however the MG shall ignore the "a=rtcp:" attribute.

NOTE 3 – This is a semantic contradiction, however the MG shall ignore the "a=rtcp-mux" attribute.

Annex A

ITU-T H.248 profiles with and without support of RTCP Handling Package

(This annex forms an integral part of this Recommendation.)

A.1 Background

There are ITU-T H.248 profiles with and without support of the *RTCP Handling Package* for ITU-T H.248 media gateways with RTP bearer traffic. Only such MG types are in scope of this Recommendation.

A.2 ITU-T H.248 profiles without support of RTCP Handling Package

Historically, all ITU-T H.248 profiles related to MG types with scope on "physical-to-RTP" interworking – such as public switched telephone network (PSTN)/integrated services digital network (ISDN) residential, access and trunking gateways – were defined without usage of the *RTCP Handling Package*. An RTCP port was always and implicitly allocated based on the "N+1" rule, independent whether RTCP was finally used or not.

However, the *RTCP Handling Package* could also be added to such ITU-T H.248 profiles, as well as SDP elements for RTCP port allocation control.

This Recommendations takes into account such kind of possible profile upgrade scenarios.

A.3 ITU-T H.248 profiles with support of RTCP Handling Package

The *RTCP Handling Package* was produced when the first ITU-T H.248 profiles for IP-IP MGs were defined. These MGs support multiple modes of operation concerning bearer traffic handling, particularly the so-called media-agnostic (RTP unaware) mode which created the demand for an explicit signalling element concerning the reservation and allocation of two IP transport connection endpoints for the two flow components of the ITU-T H.248 stream.

This Recommendation takes into account these types of possible profile upgrade scenarios.

Bibliography

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Printed in Switzerland
Geneva, 2015