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     Indicating Exclusive Support of RTP and RTP Control Protocol (RTCP)
          Multiplexing Using the Session Description Protocol (SDP)

Abstract

   This document defines a new Session Description Protocol (SDP) media-
   level attribute, 'rtcp-mux-only', that can be used by an endpoint to
   indicate exclusive support of RTP and RTP Control Protocol (RTCP)
   multiplexing. The document also updates RFC 5761 by clarifying that
   an offerer can use a mechanism to indicate that it is not able to
   send and receive RTCP on separate ports.

Status of This Memo

   This is an Internet Standards Track document.

   This document is a product of the Internet Engineering Task Force
   (IETF). It represents the consensus of the IETF community. It has
   received public review and has been approved for publication by the
   Internet Engineering Steering Group (IESG). Further information on
   Internet Standards is available in Section 2 of RFC 7841.

   Information about the current status of this document, any errata,
   and how to provide feedback on it may be obtained at
   https://www.rfc-editor.org/info/rfc8858.

Table of Contents

1. Introduction

   [RFC5761] defines how to multiplex RTP and RTCP on a single IP
   address and port, referred to as RTP/RTCP multiplexing. [RFC5761]
   also defines an SDP [RFC4566] attribute, 'rtcp-mux', that can be used
   by entities to indicate support of RTP/RTCP multiplexing and
   negotiate usage of it.

   As defined in [RFC5761], if the peer endpoint does not support RTP/
   RTCP multiplexing, both endpoints should use separate ports for
   sending and receiving of RTCP (referred to as fallback to usage of
   separate ports for RTP and RTCP).

   Some newer applications that do not require backward compatibility
   with peers that cannot multiplex RTCP might choose not to implement
   separation of RTP and RTCP. Examples of such applications are W3C
   WebRTC applications [WebRTC], which are not required to interoperate
   with non-WebRTC clients. For such applications, this document
   defines an SDP attribute to signal intent to require multiplexing.
   The use of this attribute in SDP offers [RFC3264] may harm the
   interoperability of entities that ever need to interoperate with
   peers that do not support RTC/RTCP multiplexing. Also, while the SDP
   answerer [RFC3264] might support, and prefer usage of, fallback to
   nonmultiplex, the attribute indicates that fallback to nonmultiplex
   cannot be enabled. One example of where nonmultiplex is preferred is
   where an endpoint is connected to a radio interface and wants to use
   different bearers (possibly with different quality characteristics)
   for RTP and RTCP. Another example is where one endpoint is acting as
   a gateway to a network where RTP/RTCP multiplexing cannot be used.
   In such a case, the endpoint may also prefer nonmultiplexing towards
   the other network. Otherwise, the endpoint would have to perform
   demultiplexing of RTP and RTCP.

   This document defines a new SDP media-level attribute, 'rtcp-mux-
   only', that can be used by an endpoint to indicate exclusive support
   of RTP/RTCP multiplexing. The document also updates [RFC5761] by
   clarifying that an offerer can use a mechanism to indicate that it is
   not able to send and receive RTCP on separate ports.

   This document also describes the Interactive Connectivity
   Establishment (ICE) [RFC8445] considerations when indicating
   exclusive support of RTP/RTCP multiplexing.

2. Conventions

   The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
   "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and
   "OPTIONAL" in this document are to be interpreted as described in
   BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all
   capitals, as shown here.

3. SDP 'rtcp-mux-only' Attribute

   This section defines a new SDP media-level attribute, 'rtcp-mux-
   only'.

      Name: rtcp-mux-only

      Value: N/A

      Usage Level: media

      Charset Dependent: no

      Syntax: rtcp-mux-only

Example: a=rtcp-mux-only

   In an SDP offer, the offerer uses the SDP 'rtcp-mux-only' attribute
   to indicate exclusive support of RTP/RTCP multiplexing for the RTP-
   based media associated with the SDP media description ("m=" line).

   In an SDP answer, the 'rtcp-mux' attribute [RFC5761] indicates that
   the answerer supports, and accepts usage of, RTP/RTCP multiplexing
   for the RTP-based media associated with the SDP media description
   ("m=" line).

   The usage of the 'rtcp-mux-only' attribute in an SDP answer is
   forbidden.

   The usage of the SDP 'rtcp-mux-only' attribute is only defined for
   RTP-based media.

   The mux category [RFC8859] for the 'rtcp-mux-only' attribute is
   "IDENTICAL", which means that the attribute, if used within a BUNDLE
   group [RFC8843], must be associated with all multiplexed RTP-based
   media descriptions within the BUNDLE group.

   The 'rtcp-mux-only' attribute applies to the whole associated media
   description. The attribute MUST NOT be defined per source (using the
   SDP 'ssrc' attribute [RFC5576]).

   The SDP offer/answer procedures [RFC3264] associated with the
   attribute are defined in Section 4.

4. SDP Offer/Answer Procedures

4.1. General

   This section defines the SDP offer/answer procedures [RFC3264] for
   indicating exclusive support of RTP/RTCP multiplexing and negotiating
   usage of it.

   The procedures in this section apply to individual RTP-based SDP
   media descriptions ("m=" lines).

4.2. Generating the Initial SDP Offer

   When sending the initial offer, if the offerer wants to indicate
   exclusive RTP/RTCP multiplexing for RTP-based media, it MUST
   associate an SDP 'rtcp-mux-only' attribute with the associated SDP
   media description ("m=" line).

   In addition, if the offerer associates an SDP 'rtcp-mux-only'
   attribute with an SDP media description ("m=" line), the offerer MUST
   also associate an SDP 'rtcp-mux' attribute with the same SDP media
   description ("m=" line), following the procedures in [RFC5761].

   If the offerer associates an SDP 'rtcp' attribute [RFC3605] with an
   SDP media description ("m=" line), and if the offerer also associates
   an SDP 'rtcp-mux-only' attribute with the same SDP media description
   ("m=" line), the address and port values of the SDP 'rtcp' attribute
   MUST match the corresponding values for RTP.

   NOTE: This specification does not mandate the usage of the SDP 'rtcp'
   attribute for RTP/RTCP multiplexing.

4.3. Generating the Answer

   When an answerer receives an offer that contains an SDP 'rtcp-mux-
   only' attribute associated with an RTP-based SDP media description
   ("m=" line), then if the answerer accepts the usage of RTP/RTCP
   multiplexing, it MUST associate an SDP 'rtcp-mux' attribute with the
   corresponding SDP media description ("m=") in the associated answer,
   following the procedures in [RFC5761]. If the answerer does not
   accept the usage of RTP/RTCP multiplexing, it MUST either reject the
   SDP media description ("m=") by setting the port value to zero in the

associated answer, or reject the whole offer, following the
procedures in [RFC3264].

The answerer MUST NOT associate an SDP 'rtcp-mux-only' attribute with
an SDP media description ("m=" line) in the answer.

4.4. Offerer Processing of the SDP Answer

If an offerer associated an SDP 'rtcp-mux-only' attribute with an
RTP-based SDP media description ("m=" line) in an offer, and if the
corresponding SDP media description ("m=" line) in the associated
answer contains an SDP 'rtcp-mux' attribute, the offerer MUST apply
the RTP/RTCP multiplexing procedures [RFC5761] to the associated RTP-
based media. If the corresponding SDP media description ("m=" line)
in the associated answer does not contain an SDP 'rtcp-mux'
attribute, the offerer MUST either take appropriate actions in order
to disable the associated RTP-based media -- e.g., send a new offer
with a zero port value associated with the SDP media description
("m=" line) -- or send a new offer without associating an SDP 'rtcp-
mux-only' attribute with the SDP media description ("m=" line).

NOTE: This document does not mandate specific actions on how to
terminate the RTP media. The offerer might, for example, terminate
the RTP media by sending a new offer in which the port value of the
SDP media description is set to zero.

4.5. Modifying the Session

When an offerer sends a subsequent offer, if the offerer and answerer
have previously negotiated usage of exclusive RTP/RTCP multiplexing
for the media associated with an RTP-based SDP media description
("m=" line), the offerer SHOULD associate an SDP 'rtcp-mux-only' with
the corresponding SDP media description ("m=" line).

In addition, if the offerer associates an SDP 'rtcp-mux-only'
attribute with an SDP media description ("m=" line), the offerer MUST
also associate an SDP 'rtcp-mux' attribute with the same SDP media
description ("m=" line), following the procedures in [RFC5761].

If the offerer does not associate the attributes with the
corresponding SDP media description ("m=" line), it is an indication
that the offerer no longer wants to use RTP/RTCP multiplexing and
instead MUST fall back to usage of separate ports for RTP and RTCP
once the offer has been accepted by the answerer.

When an offerer sends a subsequent offer, if the offerer and answerer
have not previously negotiated usage of RTP/RTCP multiplexing for the
media associated with an RTP-based SDP media description ("m=" line),
the offerer MAY indicate exclusive support of RTP/RTCP multiplexing,
following the procedures in Section 4.2. The offerer MUST process
the associated answer following the procedures in Section 4.4.

It is RECOMMENDED to not switch between usage of RTP/RTCP
multiplexing and usage of separate ports for RTP and RTCP in a
subsequent offer, unless there is a use case that mandates it.

5. Update to RFC 5761

5.1. General

This section updates Sections 5.1.1 and 5.1.3 of [RFC5761] by
clarifying that an offerer can use a mechanism to indicate that it is
not able to send and receive RTCP on separate ports, and that the
offerer shall terminate the affected streams if the answerer does not
indicate support of RTP/RTCP multiplexing. It also clarifies that,
when the offerer is not able to send and receive RTCP on separate
ports, the offerer will not provide an SDP 'candidate' attribute for
RTCP, nor will the offerer provide a fallback port for RTCP (using
the SDP 'rtcp' attribute).

5.2. Update to 4th Paragraph of Section 5.1.1

NOTE: [RFC8035] also updates Section 5.1.1 of [RFC5761]. While the
paragraph updated in this document is not updated by [RFC8035], the
location of the paragraph within Section 5.1.1 is moved.

OLD TEXT:

> If the answer does not contain an "a=rtcp-mux" attribute, the
> offerer MUST NOT multiplex RTP and RTCP packets on a single port.
> Instead, it should send and receive RTCP on a port allocated
> according to the usual port-selection rules (either the port pair,
> or a signalled port if the "a=rtcp:" attribute [10] is also
> included). This will occur when talking to a peer that does not
> understand the "a=rtcp-mux" attribute.

NEW TEXT:

> If the answer does not contain an "a=rtcp-mux" attribute, the
> offerer MUST NOT multiplex RTP and RTCP packets on a single port.
> Instead, it should send and receive RTCP on a port allocated
> according to the usual port-selection rules (either the port pair,
> or a signaled port if the "a=rtcp:" attribute [10] is also
> included). This will occur when talking to a peer that does not
> understand the "a=rtcp-mux" attribute. However, if the offerer
> indicated in the offer that it is not able to send and receive
> RTCP on a separate port, the offerer MUST disable the media
> streams associated with the attribute. The mechanism for
> indicating that the offerer is not able to send and receive RTCP
> on a separate port is outside the scope of this specification.

5.3. Update to 2nd Paragraph of Section 5.1.3

OLD TEXT:

> If it is desired to use both ICE and multiplexed RTP and RTCP, the
> initial offer MUST contain an "a=rtcp-mux" attribute to indicate
> that RTP and RTCP multiplexing is desired and MUST contain
> "a=candidate:" lines for both RTP and RTCP along with an "a=rtcp:"
> line indicating a fallback port for RTCP in the case that the
> answerer does not support RTP and RTCP multiplexing. This MUST be
> done for each media where RTP and RTCP multiplexing is desired.

NEW TEXT:

> If it is desired to use both ICE and multiplexed RTP and RTCP, the
> initial offer MUST contain an "a=rtcp-mux" attribute to indicate
> that RTP and RTCP multiplexing is desired and MUST contain
> "a=candidate:" lines for both RTP and RTCP along with an "a=rtcp:"
> line indicating a fallback port for RTCP in the case that the
> answerer does not support RTP and RTCP multiplexing. This MUST be
> done for each media where RTP and RTCP multiplexing is desired.
> However, if the offerer indicates in the offer that it is not able
> to send and receive RTCP on a separate port, the offerer MUST NOT
> include "a=candidate:" lines for RTCP and MUST NOT provide a
> fallback port for RTCP using the "a=rtcp:" line.

6. ICE Considerations

As defined in [RFC8445], if an entity is aware that the remote peer
supports, and is willing to use, RTP/RTCP multiplexing, the entity
will only provide RTP candidates (component ID 1). However, only
providing RTP candidates does not, as such, imply exclusive support
of RTP/RTCP multiplexing. RTCP candidates also would not be provided
in cases where RTCP is not supported at all. Therefore, additional
information is needed in order to indicate support of exclusive RTP/
RTCP multiplexing. This document defines such a mechanism using the
SDP 'rtcp-mux-only' attribute.

7. Security Considerations

This document does not introduce new security considerations beyond

those specified in [RFC3605] and [RFC5761].

8. IANA Considerations

    This document updates the "Session Description Protocol Parameters"
    registry as specified in Section 8.2.4 of [RFC4566]. Specifically,
    it adds the SDP 'rtcp-mux-only' attribute to the table for SDP media-
    level attributes.

        Attribute name: rtcp-mux-only

        Type of attribute: media-level

        Subject to charset: no

        Purpose: Indicate exclusive support of RTP/RTCP multiplexing

        Appropriate Values: N/A

        Contact name: Christer Holmberg (christer.holmberg@ericsson.com)

        Mux Category: IDENTICAL

9. References

9.1. Normative References

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9.2. Informative References

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[RFC5576]   Lennox, J., Ott, J., and T. Schierl, "Source-Specific
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