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Impedance Mismatch
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Media level ice-options SDP attribute
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Abstract

This document normatively updates RFC 5245 by redefining the ice-options SDP attribute as a session-level and media-level attribute.

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1. Introduction

ICE [RFC5245] defines the ice-options SDP attribute as session-level only attribute, but when ICE is used with disaggregated media (see section 3 of [I-D.loreto-splices-disaggregated-media]), there is a possibility that different media use different ICE implementations and/or different networks, and so these different media will require different values for this attribute.

As an example, the ice-options attribute value "rtp+ecn" (defined in [RFC6679]) signals ECN capability. Two aggregated media using two different RTP implementations may want to use different values for this attribute.

Note that there is a similar problem for the ice-lite attribute but unfortunately it does not seem possible to design a way to use the ice-lite attribute at the media level that is compatible with legacy implementations that recognize only the session-level attribute.

2. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119] .

3. The ice-options Attribute

The ice-options attribute is redefined by this document as a session-level and media-level attribute.

All future new ICE options MUST also define how media-level ICE options using this new value are aggregated to eventually generate the value of the session-level ICE option, so legacy implementations that only recognize session-level ICE options can interoperate with implementations that recognize ICE options at both levels.

Before applying this specific aggregation rule, the session-level ice-options attribute MUST be copied as media-level attribute in each media.

4. The ice-lite Attribute

The ice-lite attribute is not redefined by this specification.

5. The ice-mismatch Attribute

[RFC5245] section 15.3 defines this attribute as been media level, which seems correct, but section 21.1.4 erroneously registered this attribute in IANA as session level. An errata [1] has been filled and the IANA registry has been accordingly fixed.

6. Specific Aggregation Rule for the rtp+ecn ICE Option

If all aggregated media using ICE contain a media-level "rtp+ecn" ICE option, as defined by [RFC6064] , then an "rtp+ecn" ICE option MUST be inserted at the session-level.

7. Security Considerations

This document does not add any security considerations beyond what is discussed in [RFC5245] .

8. IANA Considerations

No IANA considerations.

9. Acknowledgements

This document was written with the xml2rfc tool described in [RFC2629] .

10. References

10.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
- [RFC5245] Rosenberg, J., "Interactive Connectivity Establishment (ICE): A Protocol for Network Address Translator (NAT) Traversal for Offer/Answer Protocols", RFC 5245, April 2010.
- [RFC6679] Westerlund, M., Johansson, I., Perkins, C., O'Hanlon, P., and K. Carlberg, "Explicit Congestion Notification (ECN) for RTP over UDP", RFC 6679, August 2012.

10.2. Informative References

- [RFC2629] Rose, M., "Writing I-Ds and RFCs using XML", RFC 2629, June 1999.
- [RFC4566] Handley, M., Jacobson, V., and C. Perkins, "SDP: Session Description Protocol", RFC 4566, July 2006.
- [RFC5159] Dondeti, L. and A. Jerichow, "Session Description Protocol (SDP) Attributes for Open Mobile Alliance (OMA) Broadcast (BCAST) Service and Content Protection", RFC 5159, March 2008.
- [RFC5888] Camarillo, G. and H. Schulzrinne, "The Session Description Protocol (SDP) Grouping Framework", RFC 5888, June 2010.
- [RFC6064] Westerlund, M. and P. Frojdh, "SDP and RTSP Extensions Defined for 3GPP Packet-Switched Streaming Service and Multimedia Broadcast/Multicast Service", RFC 6064, January 2011.
- [I-D.loreto-splices-disaggregated-media] Camarillo, G., Loreto, S., and R. Shekh-Yusef, "Disaggregated Media in the Session Initiation Protocol (SIP)", draft-loreto-splices-disaggregated-media-02 (work in progress), June 2011.

URIs

- [1] <http://www.rfc-editor.org/errata_search.php?eid=3149>

Appendix A. Examples

A.1. Aggregating media all supporting ICE

In this example, we have two SDP to aggregate. The first SDP contains an ice-options attribute at the media level:

```
v=0
o=jdoe 2890844526 2890842807 IN IP4 10.0.1.1
s=
c=IN IP4 192.0.2.3
t=0 0
a=ice-options:rtp+ecn
a=ice-pwd:asd88fgpdd777uzjYhagZg
a=ice-ufrag:8hhY
m=audio 45664 RTP/AVP 0
b=RS:0
b=RR:0
a=rtpmap:0 PCMU/8000
a=candidate:1 1 UDP 2130706431 10.0.1.1 8998 typ host
a=candidate:2 1 UDP 1694498815 192.0.2.3 45664 typ srflx raddr
    10.0.1.1 rport 8998
m=text 45666 RTP/AVP 98
b=RS:0
b=RR:0
a=rtpmap:98 t140/1000
a=candidate:1 1 UDP 2130706431 10.0.1.1 9000 typ host
a=candidate:2 1 UDP 1694498815 192.0.2.3 45666 typ srflx raddr
    10.0.1.1 rport 9000
```

The second SDP also have an ice-options attribute at the media level:

```
v=0
o=jdoe 1 1 IN IP4 10.0.1.2
s=
c=IN IP4 192.0.2.4
t=0 0
a=ice-options:rtp+ecn
a=ice-pwd:f7sD7f7dF87s87d7da5564
a=ice-ufrag:776G
m=video 10000 RTP/AVP
b=RS:0
b=RR:0
a=rtpmap:0 PCMU/8000
a=candidate:1 1 UDP 2130706431 10.0.1.2 10000 typ host
a=candidate:2 1 UDP 1694498815 192.0.2.4 45000 typ srflx raddr
    10.0.1.1 rport 10000
```

The first step is to copy the session-level ice-options attribute as media-level attribute. The first SDP is modified like this:

```
v=0
o=jdoe 2890844526 2890842807 IN IP4 10.0.1.1
s=
c=IN IP4 192.0.2.3
t=0 0
a=ice-options:rtp+ecn
a=ice-pwd:asd88fgpdd777uzjYhagZg
a=ice-ufrag:8hhY
m=audio 45664 RTP/AVP 0
b=RS:0
b=RR:0
a=rtpmap:0 PCMU/8000
a=ice-options:rtp+ecn
a=candidate:1 1 UDP 2130706431 10.0.1.1 8998 typ host
a=candidate:2 1 UDP 1694498815 192.0.2.3 45664 typ srflx raddr
10.0.1.1 rport 8998
m=text 45666 RTP/AVP 98
b=RS:0
b=RR:0
a=rtpmap:98 t140/1000
a=ice-options:rtp+ecn
a=candidate:1 1 UDP 2130706431 10.0.1.1 9000 typ host
a=candidate:2 1 UDP 1694498815 192.0.2.3 45666 typ srflx raddr
10.0.1.1 rport 9000
```

The second SDP is modified like this:

```
v=0
o=jdoe 1 1 IN IP4 10.0.1.2
s=
c=IN IP4 192.0.2.4
t=0 0
a=ice-options:rtp+ecn
a=ice-pwd:f7sD7f7dF87s87d7da5564
a=ice-ufrag:776G
m=video 10000 RTP/AVP
b=RS:0
b=RR:0
a=rtpmap:0 PCMU/8000
a=ice-options:rtp+ecn
a=candidate:1 1 UDP 2130706431 10.0.1.2 10000 typ host
a=candidate:2 1 UDP 1694498815 192.0.2.4 45000 typ srflx raddr
10.0.1.1 rport 10000
```

After aggregation, all the individual media keep their media-level ice-options attribute, and a session-level ice-options attribute is added as per the rule in Section 3 :

```
v=0
o=- 1309452627 1309452627 IN IP4 10.0.1.1
s=
t=0 0
a=ice-options:rtp+ecn
m=audio 45664 RTP/AVP 0
c=IN IP4 192.168.2.3
b=RS:0
b=RR:0
a=rtpmap:0 PCMU/8000
a=ice-options:rtp+ecn
a=ice-pwd:asd88fgpdd777uzjYhagZg
a=ice-ufrag:8hhY
a=candidate:1 1 UDP 2130706431 10.0.1.1 8998 typ host
a=candidate:2 1 UDP 1694498815 192.0.2.3 45664 typ srflx raddr
    10.0.1.1 rport 8998
m=text 45666 RTP/AVP 98
c=IN IP4 192.168.2.3
b=RS:0
b=RR:0
a=rtpmap:98 t140/1000
a=ice-options:rtp+ecn
a=ice-pwd:asd88fgpdd777uzjYhagZg
a=ice-ufrag:8hhY
a=candidate:1 1 UDP 2130706431 10.0.1.1 9000 typ host
a=candidate:2 1 UDP 1694498815 192.0.2.3 45666 typ srflx raddr
    10.0.1.1 rport 9000
m=video 10000 RTP/AVP
c=IN IP4 192.168.2.4
b=RS:0
b=RR:0
a=rtpmap:0 PCMU/8000
a=ice-options:rtp+ecn
a=candidate:1 1 UDP 2130706431 10.0.1.2 10000 typ host
a=candidate:2 1 UDP 1694498815 192.0.2.4 45000 typ srflx raddr
    10.0.1.1 rport 10000
```

A.2. Aggregating media partially supporting ICE

In this example, we have two SDP to aggregate, but the second one does not use ICE. The first SDP contains an ice-options attribute at the media level:


```
v=0
o=jdoe 2890844526 2890842807 IN IP4 10.0.1.1
s=
c=IN IP4 192.0.2.3
t=0 0
a=ice-options:rtp+ecn
a=ice-pwd:asd88fgpdd777uzjYhagZg
a=ice-ufrag:8hhY
m=audio 45664 RTP/AVP 0
b=RS:0
b=RR:0
a=rtpmap:0 PCMU/8000
a=candidate:1 1 UDP 2130706431 10.0.1.1 8998 typ host
a=candidate:2 1 UDP 1694498815 192.0.2.3 45664 typ srflx raddr
    10.0.1.1 rport 8998
m=text 45666 RTP/AVP 98
b=RS:0
b=RR:0
a=rtpmap:98 t140/1000
a=candidate:1 1 UDP 2130706431 10.0.1.1 9000 typ host
a=candidate:2 1 UDP 1694498815 192.0.2.3 45666 typ srflx raddr
    10.0.1.1 rport 9000
```

The second SDP does not contain any ice-options attribute:

```
v=0
o=jdoe 1 1 IN IP4 10.0.1.2
s=
c=IN IP4 192.0.2.4
t=0 0
m=video 10000 RTP/AVP
a=rtpmap:0 PCMU/8000
```

The first step is to copy the session-level ice-options attribute as media-level attribute. Only the first SDP is modified in this example:

```
v=0
o=jdoe 2890844526 2890842807 IN IP4 10.0.1.1
s=
c=IN IP4 192.0.2.3
t=0 0
a=ice-options:rtp+ecn
a=ice-pwd:asd88fgpdd777uzjYhagZg
a=ice-ufrag:8hhY
m=audio 45664 RTP/AVP 0
b=RS:0
b=RR:0
a=rtpmap:0 PCMU/8000
a=ice-options:rtp+ecn
a=candidate:1 1 UDP 2130706431 10.0.1.1 8998 typ host
a=candidate:2 1 UDP 1694498815 192.0.2.3 45664 typ srflx raddr
    10.0.1.1 rport 8998
m=text 45666 RTP/AVP 98
b=RS:0
b=RR:0
a=rtpmap:98 t140/1000
a=ice-options:rtp+ecn
a=candidate:1 1 UDP 2130706431 10.0.1.1 9000 typ host
a=candidate:2 1 UDP 1694498815 192.0.2.3 45666 typ srflx raddr
    10.0.1.1 rport 9000
```

After aggregation, all the individual media keep their media-level ice-options attribute, and a session-level ice-options attribute is added as per the rule in Section 3 :

```
v=0
o=- 1309452627 1309452627 IN IP4 10.0.1.1
s=
t=0 0
a=ice-options:rtp+ecn
m=audio 45664 RTP/AVP 0
c=IN IP4 192.168.2.3
b=RS:0
b=RR:0
a=rtpmap:0 PCMU/8000
a=ice-options:rtp+ecn
a=ice-pwd:asd88fgpdd777uzjYhagZg
a=ice-ufrag:8hhY
a=candidate:1 1 UDP 2130706431 10.0.1.1 8998 typ host
a=candidate:2 1 UDP 1694498815 192.0.2.3 45664 typ srflx raddr
    10.0.1.1 rport 8998
m=text 45666 RTP/AVP 98
c=IN IP4 192.168.2.3
b=RS:0
b=RR:0
a=rtpmap:98 t140/1000
a=ice-options:rtp+ecn
a=ice-pwd:asd88fgpdd777uzjYhagZg
a=ice-ufrag:8hhY
a=candidate:1 1 UDP 2130706431 10.0.1.1 9000 typ host
a=candidate:2 1 UDP 1694498815 192.0.2.3 45666 typ srflx raddr
    10.0.1.1 rport 9000
m=video 10000 RTP/AVP
c=IN IP4 192.168.2.4
a=rtpmap:0 PCMU/8000
```

Appendix B. Analysis of similar issues in other attributes

In the MMUSIC WG session in Quebec City, it was suggested that the problem was perhaps larger than just ICE attributes. This section is the result of a systematic look at all the session level only SDP attributes registered by IANA at the date of this document. The conclusion is that only the ICE attributes are of concern but that steps should be taken to ensure that these problems cannot happen for future new attributes.

Attribute	Reference	Comments
cat	[RFC4566]	OK
keywds	[RFC4566]	OK
type	[RFC4566]	OK
type:broadcast	[RFC4566]	Appendix B.1
type:H332	[ITU Recommendation H.332]	OK
type:meeting	[RFC4566]	OK
type:moderated	[RFC4566]	OK
type:test	[RFC4566]	OK
charset	[RFC4566]	Appendix B.2
charset:iso8895-1	[RFC4566]	Appendix B.2
tool	[RFC4566]	Appendix B.3
ipbcp	[ITU-T Q.1970]	Appendix B.4
group	[RFC5888]	OK
ice-lite	[RFC5245]	Section 4
ice-mismatch	[RFC5245]	Section 5
ice-options	[RFC5245]	Section 3
bcastversion	[RFC5159]	Appendix B.4
3GPP-Integrity-Key	[RFC6064]	Appendix B.4
3GPP-SDP-Auth	[RFC6064]	Appendix B.4
alt-group	[RFC6064]	Appendix B.4
PSCid	[TS 183 063]	Appendix B.4
bc_service	[TS 183 063]	Appendix B.4
bc_program	[TS 183 063]	Appendix B.4
bc_service_package	[TS 183 063]	Appendix B.4

B.1. The type:broadcast Attribute

The "type:broadcast" does not have any issue by itself, but it should be noted that it implies a default attribute of recvonly, so the disaggregation process must take this in account.

B.2. The charset Attribute

Because the main reason to use a different charset for a session description is to generate a more compact representation, it is probably OK that this attribute exists only at the session level. But the aggregation/disaggregation rules must explicitly convert the individual media descriptions to and from the common charset, ISO-10646.

B.3. The tool Attribute

The definition of this attribute make it clear that this attribute contains the name and version number of the tool that created the

session description as a whole. But it probably would be useful to define this attribute at the media level too, so we can know the tools used for create the individual media descriptions.

- B.4. The `ipbcp`, `bcastversion`, `3GPP-Integrity-Key`, `3GPP-SDP-Auth`, `alt-group`, `PSCid`, `bc_service`, `bc_program` and `bc_service_package` Attributes

These attributes were not defined in IETF Standard Track documents, so the analysis is left to the SDOs that produced this specifications.

Appendix C. Release notes

This section must be removed before publication as an RFC.

C.1. Modifications between -04 and -03

- o Updated `rtp+ecn` reference.
- o IANA registry for `ice-mismatch` fixed.

C.2. Design Notes

- o It has been proposed multiple times to use a different attribute name for the `ice-options` attribute when used at the media-level. Using a different name does not solve the aggregation problem and, in the opinion of this author, could create confusion.

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