The Alternative IP Versions Semantics for the Session Description Protocol Grouping Framework

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Abstract

This document defines the alternative IP versions (IPV) semantics for the SDP grouping framework. The IPV semantics allow offering alternative transport addresses that use different IP versions to establish a particular media stream.
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1 Introduction

An SDP [1] session description contains the media parameters to be used to establish a number of media streams. For a particular media stream, an SDP session description contains, among other parameters, the transport addresses and the codec to be used to transfer media. SDP allows providing a set of codecs per media stream, but only one transport address.

Being able to offer a set of transport addresses to establish a media stream is useful in environments with both IPv4-only hosts and IPv6-only hosts.

This document defines the alternative IP versions (IPV) semantics for the SDP grouping framework [2]. The IPV semantics allow expressing alternative transport addresses with different IP versions for a particular media stream.

1.1 Scope and Relation with ICE

The IPV semantics are intended to address scenarios that involve different IP versions. They are not intended to provide alternative transport addresses with the same IP version. Systems that need to provide different transport addresses with the same IP version should use the SDP format defined in ICE (Interactive Connectivity Establishment) [6] instead.

ICE is used by systems that cannot determine their own transport address as seen from the remote end but that can provide several possible alternatives. ICE encodes the address that is most likely to be valid in an m= line and the rest of addresses as a= lines after that m= line. This way, systems that do not support ICE simply ignore the a= lines and only use the address in the m= line. This achieves good backwards compatibility.

We have chosen to group m= lines with different IP versions at the m= level (IPV semantics) rather than at the a= level (ICE format) in order to keep the IPv6 syntax free from ICE parameters used for legacy (IPv4) NATs (Network Address Translators). This yields a syntax much closer to vanilla SDP, where IPv6 addresses are defined in their own m= line, rather than in parameters belonging to a different m= line.

In addition to that, the separation between IPV and ICE helps systems that support IPv4 and IPv6 but that do not need to support ICE (e.g., a multicast server).

1.2 Terminology
In this document, the key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" are to be interpreted as described in RFC 2119 and indicate requirement levels for compliant SIP implementations.

2 IPV Semantics

We define a new "semantics" attribute within the SDP grouping framework: IPV (Alternative IP Versions).

Media lines grouped using IPV semantics provide alternative transport addresses with different IP versions for a single logical media stream. The entity creating a session description with an IPV group MUST be ready to receive (or send) media over any of the grouped m lines.

3 Preference

The entity generating a session description may have an order of preference for the alternative IP versions offered. The identifiers of the media streams MUST be listed in order of preference in the group line. In the example below, the m line with mid=1 has a higher preference than the m line with mid=2.

a=group:IPV 1 2

4 Offer/Answer and IPV

When ICE is used, the ICE spec explains how to choose a particular IP address among all the alternatives received. When ICE is not used, an answerer receiving a session description that uses the IPV semantics SHOULD use the address with highest priority it understands and set the ports of the rest of the m= lines of the group to zero.

4.1 IPV and Media Configurations

The creator of a session description MAY want to use different media configurations (e.g., audio codec) for different transport addresses in the same IPV group. The receiver of such a session may find some of the m lines unacceptable. They may contain codecs that the answerer does not support or contain any other parameter that makes them unacceptable. The answerer should, following normal SIP procedures, set their ports to zero in the answer.
5 Backwards Compatibility

IPv4-only and IPv6-only systems would only understand one of m= lines of the IPV group. Therefore, they will not have any problem establishing sessions that use IPV.

It is STRONGLY RECOMMENDED that dual-stack IPv6/IPv4 hosts implement the IPV semantics. Dual-stack hosts that failed to implement IPV would need more RTTs to establish a session with a single-stack host. When acting as answerers, they would establish more media streams than needed. This could increase the session bandwidth in the first instants of the session, until the remote end could issue a new offer with only one m= line.

6 Example

The session description below contains an IPv4 address and an IPv6 address grouped using IPV.

```
v=0
o=bob 280744730 28977631 IN IP4 host.example.com
s=
t=0 0
a=group:IPV 1 2
m=audio 6886 RTP/AVP 0
c=IN IP6 2201:056D::112E:144A:1E24
a=mid:1
m=audio 22334 RTP/AVP 0
c=IN IP4 192.0.2.2
a=mid:2
```

7 IANA Considerations

IANA needs to register the following new "semantics" attribute for the SDP grouping framework [2]:

<table>
<thead>
<tr>
<th>Semantics</th>
<th>Token</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative IP Versions</td>
<td>IPV</td>
<td>[RFCxxxx]</td>
</tr>
</tbody>
</table>

It should be registered in the SDP parameters registry (http://www.iana.org/assignments/sdp-parameters) under Semantics for
the "group" SDP Attribute.

8 Security Considerations

An attacker adding group lines using the IPV semantics to an SDP session description could make an end-point use only one out of all the streams offered by the remote end, when the intention of the remote-end might have been to establish all the streams.

An attacker removing group lines using IPV semantics could make and end-point establish a higher number of media streams. If the end-point sends media over all of them, the session bandwidth may increase dramatically.

It is thus STRONGLY RECOMMENDED that integrity protection be applied to the SDP session descriptions. For session descriptions carried in SIP [5], S/MIME is the natural choice to provide such end-to-end integrity protection, as described in RFC 3261. Other applications MAY use a different form of integrity protection.

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10 Normative References


[6] J. Rosenberg, "Interactive connectivity establishment (ICE): a methodology for nettwork address translator (NAT) traversal for the session initiation protocol (SIP)," internet draft, Internet
11 Informative References

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