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G. Camarillo
Ericsson
J. Rosenberg
Cisco Systems

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The Alternative Network Address Types (ANAT) Semantics for the Session Description Protocol (SDP) Grouping Framework

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Abstract

This document defines the Alternative Network Address Types (ANAT) semantics for the Session Description Protocol (SDP) grouping framework. The ANAT semantics allow alternative types of network addresses to establish a particular media stream.

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1. Introduction

A Session Description Protocol (SDP) [2] session description contains the media parameters to be used in establishing a number of media streams. For a particular media stream, an SDP session description contains, among other parameters, the network addresses and the codec to be used in transferring media. SDP allows for a set of codecs per media stream, but only one network address.

The ability to offer a set of network addresses to establish a media stream is useful in environments with both IPv4-only hosts and IPv6-only hosts, for instance.

This document defines the Alternative Network Address Types (ANAT) semantics for the SDP grouping framework [4]. The ANAT semantics allow for the expression of alternative network addresses (e.g., different IP versions) for a particular media stream.

1.1. Scope and Relation with Interactive Connectivity Establishment

The ANAT semantics are intended to address scenarios that involve different network address types (e.g., different IP versions). They are not intended to provide alternative transport addresses with the same network type. Systems that need to provide different transport addresses with the same network type 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 backward compatibility.

We have chosen to group 'm' lines with different IP versions at the 'm' level (ANAT 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.

Additionally, ICE only allows us to provide a single primary address when the peer does not support ICE. The ANAT semantics avoid relegating certain types of addresses (e.g., IPv6 addresses) to only be a secondary alternate to another address type (e.g., IPv4 addresses).

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

2. Terminology

In this document, the key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" are to be interpreted as described in BCP 14, RFC 2119 [1] and indicate requirement levels for compliant implementations.

3. ANAT Semantics

We define a new "semantics" attribute within the SDP grouping framework [4]: ANAT (Alternative Network Address Types).

Media lines grouped using ANAT semantics provide alternative network addresses of different types for a single logical media stream. The entity creating a session description with an ANAT group MUST be ready to receive (or send) media over any of the grouped 'm' lines. The ANAT semantics MUST NOT be used to group media streams whose network addresses are of the same type.

4. Preference

The entity generating a session description may have an order of preference for the alternative network address types offered. The identifiers of the media streams MUST be listed in order of preference in the group line. For example, in the session description in Section 6, the 'm' line with mid=1 has a higher preference than the 'm' line with mid=2.

5. Offer/Answer and ANAT

An offerer using SIP [3] to send its offer SHOULD place the sdp-anat option-tag [5] in a Require header field.

An answerer receiving a session description that uses the ANAT semantics SHOULD use the address with the highest priority it understands and set the ports of the rest of the 'm' lines of the group to zero.

6. Example

The session description below contains an IPv4 address and an IPv6 address grouped using ANAT. The format corresponding to the mapping of ICE into SDP [6] can be used in both 'm' lines to provide additional addresses.

```
v=0
o=bob 280744730 28977631 IN IP4 host.example.com
s=
t=0 0
a=group:ANAT 1 2
m=audio 25000 RTP/AVP 0
c=IN IP6 2001:DB8::1
a= <ICE-encoded additional IPv6 addresses (and ports)>
a=mid:1
m=audio 22334 RTP/AVP 0
c=IN IP4 192.0.2.1
a= <ICE-encoded additional IPv4 addresses (and ports)>
a=mid:2
```

7. Security Considerations

An attacker adding group lines, using the ANAT 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 ANAT semantics could make an 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 [3], S/MIME is the natural choice to provide such end-to-end integrity protection, as described in RFC 3261 [3]. Other applications MAY use a different form of integrity protection.

8. IANA Considerations

The IANA has registered the following new 'semantics' attribute for the SDP grouping framework [4]:

Semantics	Token	Reference
Alternative Network Address Types	ANAT	[RFC4091]

ANAT has been registered in the SDP parameters registry under Semantics for the "group" SDP Attribute.

9. References

9.1. Normative References

[1] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[2] Handley, M. and V. Jacobson, "SDP: Session Description Protocol", RFC 2327, April 1998.

[3] Rosenberg, J., Schulzrinne, H., Camarillo, G., Johnston, A., Peterson, J., Sparks, R., Handley, M., and E. Schooler, "SIP: Session Initiation Protocol", RFC 3261, June 2002.

[4] Camarillo, G., Eriksson, G., Holler, J., and H. Schulzrinne, "Grouping of Media Lines in the Session Description Protocol (SDP)", RFC 3388, December 2002.

[5] Camarillo, G. and J. Rosenberg, "Usage of the Session Description Protocol (SDP) Alternative Network Address Types (ANAT) Semantics in the Session Initiation Protocol (SIP)", RFC 4092, June 2005.

9.2. Informative References

[6] Rosenberg, J., "Interactive Connectivity Establishment (ICE): A Methodology for Network Address Translator (NAT) Traversal for Multimedia Session Establishment Protocols", Work in Progress, February 2005.

Authors' Addresses

Gonzalo Camarillo
Ericsson
Hirsalantie 11
Jorvas 02420
Finland

EMail: Gonzalo.Camarillo@ericsson.com

Jonathan Rosenberg
Cisco Systems
600 Lanidex Plaza
Parsippany, NJ 07054
US

EMail: jdrosen@cisco.com

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