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The Alternative Semantics for the Session Description Protocol Grouping Framework

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Abstract

This document defines the alternative (ALT) semantics for the SDP grouping framework. The ALT semantics allow offering alternative media configurations to establish a particular media stream.

Table of Contents

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 one transport address and a list of codecs per media stream. The users can choose to use any of those codecs at any point in time during the session, but they only have a single transport address to choose from.

Being able to dynamically change transport address during a session is useful when a system cannot determine its own transport address as seen from the remote end in presence of a NAT (Network Address Translator), but it can provide a list of possible candidates. Having several alternative transport addresses for a particular stream also provides a fail-over mechanism in case one of the addresses becomes unreachable.

This document defines the alternative (ALT) semantics for the SDP grouping framework [2]. The ALT semantics allow expressing alternative configurations, including transport addresses and codecs, for a particular media stream.

1.1 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 [3] and indicate requirement levels for compliant SIP implementations.

2 ALT Semantics

We define a new "semantics" attribute within the SDP grouping framework [2]: ALT (Alternative).

Media lines grouped using ALT semantics represent alternative configurations of a single logical media stream. The entity receiving a session description with an ALT group MUST be ready to receive media over any of the grouped m lines.

2.1 Preference

The entity generating a session description may have an order of preference for all the alternative configurations 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:ALT 1 2
```

In the ALT context, preferred means that the recipient of the SDP SHOULD send data using the m line with the highest preference that is acceptable to it.

> In SDP, the codecs within a given media line are listed in order of preference. The ALT semantics effectively stretch the concept of dynamic changes of codec in the middle of a session to dynamic changes of transport addresses and other media parameters in the middle of a session. Therefore, we have chosen to use the same mechanism (i.e., a list ordered by preference) to express preferences among grouped media lines.

2.2 Media Stream Establishment Attempts

An entity receiving a set of streams grouped using ALT semantics cannot assume that it will be possible to successfully use all the alternative configurations offered. Some of the m lines may contain transport addresses that are unreachable for the recipient of the session description.

Such entity SHOULD try to establish the grouped m lines in order of preference. How an m line is established depends on the type of the media stream. Establishing a TCP-based m line involves establishing a TCP connection whereas establishing an RTP-based m line involves sending RTP or RTCP packets.

An entity SHOULD use network feedback (e.g., ICMP messages) and/or timeouts to determine whether or not the establishment of the media stream has been successful. If the establishment is not successful, the receiver of the session description SHOULD try to establish the next m line of the ALT group in order of preference.

An entity MAY try to establish different m lines of the ALT group in parallel. However, even if more than one m line are established successfully, an entity MUST only send media over one of the successfully established m lines.

During the session, a sender MAY choose to use any of the grouped m lines at a particular point in time to send data. This makes it possible to use the ALT semantics as a fail-over mechanism for ongoing sessions. If once a media stream has been successfully established, there is some type of transmission error, the end-points can try to use any other configuration from the ALT group to try to

recover from the error.

2.3 Backward Compatibility and the "alt" SIP Option Tag

The receiver of a session description with an ALT group is supposed to establish only one media stream. However, if the entity receiving such a session description does not understand the ALT semantics or the grouping framework, it will establish all the streams of the ALT group. If this entity sends media in parallel over all the streams at the same time, the resulting session bandwidth will be much higher than the expected by the creator of the session. The ALT semantics MUST NOT be used when this situation is unacceptable.

Note, however, that there are scenarios where the situation described above is not problematic. In sendonly sessions, for instance, this problem is minimized, because the creator of the SDP is the only one sending media. The receiver that does not understand ALT will be receiving media over only one m line at a time.

Scenarios that involve SIP [4] and the offer/answer model [5] are not problematic either, since they can use SIP options tags to ensure that the answerer understands the ALT semantics. Therefore, we define the option tag "alt" for use in the Require and Supported header fields. A SIP entity that includes the "alt" option tag in a Supported header field understands the ALT semantics defined in this document.

2.4 ALT and the Offer/Answer Model

An answerer getting a number of m lines grouped using ALT semantics may find some of them unacceptable. They may contain codecs that the answerer does not support or contain any other parameter that makes them unacceptable. Following normal SIP procedures, the answerer will set their ports to zero in the answer [5].

The answerer follows the steps described in Section 2.2 using only those m lines that were found, in principle, acceptable.

3 Example

An end-point receiving the SDP description below needs to choose between the destination ports 20000 and 30000. The end-point will be able to change dynamically between both ports during the session.

```
v=0
o=Laura 289083124 289083124 IN IP4 one.example.com
t=0 0
```

```
c=IN IP4 192.0.0.1
a=group:ALT 1 2
m=audio 20000 RTP/AVP 0
a=mid:1
m=audio 30000 RTP/AVP 0
a=mid:2
```

4 IANA Considerations

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

Semantics	Token	Reference
Alternative	ALT	[RFCxxxx]

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

This document defines a SIP option tag (alt) in Section 2.3. It should be registered in the SIP parameters registry (http://www.iana.org/assignments/sip-parameters) under "Option Tags", with the description below.

> A SIP entity that includes the "alt" option tag in a Supported header field understands the ALT semantics.

5 Security Considerations

An attacker adding group lines using the ALT 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 ALT 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 [4], 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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7 Normative References

[1] M. Handley and V. Jacobson, "SDP: session description protocol," RFC 2327, Internet Engineering Task Force, Apr. 1998.

[2] G. Camarillo, G. Eriksson, J. Holler, and H. Schulzrinne, "Grouping of media lines in the session description protocol (SDP)," RFC 3388, Internet Engineering Task Force, Dec. 2002.

[3] S. Bradner, "Key words for use in rfcs to indicate requirement levels," RFC 2119, Internet Engineering Task Force, Mar. 1997.

[4] J. Rosenberg, H. Schulzrinne, G. Camarillo, A. R. Johnston, J. Peterson, R. Sparks, M. Handley, and E. Schooler, "SIP: session initiation protocol," RFC 3261, Internet Engineering Task Force, June 2002.

[5] J. Rosenberg and H. Schulzrinne, "An offer/answer model with session description protocol (SDP)," RFC 3264, Internet Engineering Task Force, June 2002.

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