Interactions of Preconditions with Session Mobility in the Session Initiation Protocol (SIP)

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Abstract

This document describes how to use SIP preconditions in situations that involve session mobility. This document updates RFC3312, which defines the framework for SIP preconditions.
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1 Introduction

RFC 3312 [1] defines the framework for SIP [2] preconditions and focuses on media sessions that do not move around. That is, media is sent between the same end-points throughout the duration of the session.

However, media sessions established by SIP are not always static. SIP offers mechanisms to provide session mobility, namely re-INVITEs and UPDATEs [5]. While existing implementations of RFC 3312 [1] can probably handle session mobility, there is a need to explicitly point out the issues involved and make a slight update to some of the procedures defined there. With the updated procedures defined in this document, messages carrying precondition information become more explicit about the current status of the preconditions.

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 [3].

3 Issues Related to Session Mobility

Section 5 of RFC 3312 [1] describes how to use SIP [2] preconditions with the offer/answer model [4]. RFC 3312 gives a set of rules that allow a user agent to communicate changes in the current status of the preconditions to the remote user agent.

The idea is that a given user agent knows about the current status of some part of the preconditions (e.g., send direction of the QoS precondition) through local information (e.g., an RSVP RESV is received indicating that resource reservation was successful). The UAC informs the UAS about changes in the current status by sending an offer to the UAS. The UAS, in turn, could (if needed) send an offer to the UAC informing it about the status of the part of the preconditions the UAS has local information about.

Note, however, that UASs do not usually send updates about the current status to the UAC because UASs are the ones resuming session establishment when all the preconditions are met. Therefore, rather than performing an offer/answer exchange to inform the UAC that all the preconditions are met, they simply send a 180 (Ringing) response indicating that session establishment has been resumed.

While RFC 3312 [1] allows to update current status information using offers as described above, it does not allow to downgrade current
status values in answers, as shown in the third row of Table 3 of RFC 3312. However, such downgrades are sometimes needed. Figure 1 shows an example where performing such a downgrade in an answer would be needed.

![Figure 1: Session Mobility using 3pcc](image)

The 3pcc [6] controller in Figure 1 has established a session between A and B using dialog 1 towards A and dialog 2 towards B. At that point, the controller wants A to have a session with C instead of B. To transfer A to C (configuration shown at the bottom of Figure 1), the controller sends an empty (no offer) re-INVITE to A. Since A does not know that the session will be moved, its offer in the 200 OK states that the current status of the media stream in the send direction is "Yes". The controller, after contacting C establishing dialog 3, sends back an answer to A. This answer contains a new destination for the media (C) and should have downgraded the current status of the media stream to "No", since there is no reservation of resources between A and C.

4 Update to RFC 3312

Below there are a set of new rules that update RFC 3312 [1] to address the issues above.
The rule below applies to offerers that are moving a media stream to a new address:

When a stream is being moved to a new transport address, the offerer MUST set all the current status values it does not have local information about to "No".

Note that for streams using segmented status (as opposed to end-to-end status), the fact that the address for the media stream at the local segment changes may or may not affect the status of the preconditions at the remote segment. However, moving an existing stream to a new location, from the preconditions point of view, is like establishing a new stream. Therefore, it is appropriate to set all the current status values to "No" and start a new precondition negotiation from scratch.

The updated table and the rules below applies to an answerer that is moving a media stream. That is, the offerer was not aware of the move when it generated the offer.

Table 3 of RFC 3312 [1] needs to be updated to allow answers to downgrade current status values. Table 1 below shows the result.

<table>
<thead>
<tr>
<th>Transac. status table</th>
<th>Local status table</th>
<th>New values transac./local</th>
</tr>
</thead>
<tbody>
<tr>
<td>no</td>
<td>no</td>
<td>no/no</td>
</tr>
<tr>
<td>yes</td>
<td>yes</td>
<td>yes/yes</td>
</tr>
<tr>
<td>yes</td>
<td>no</td>
<td>depends on local info</td>
</tr>
<tr>
<td>no</td>
<td>yes</td>
<td>depends on local info</td>
</tr>
</tbody>
</table>

Table 1: Possible values for the "Current" fields

An answerer MUST downgrade the current status values that received in the offer if it has local information about them or if the media stream is being moved to a new transport address.

Note that for streams using segmented status the address change at the answerer may or may not affect the status of the preconditions at the offerer’s segment. However, as stated above, moving an existing stream to a new location, from the preconditions point of view, is like establishing a new stream. Therefore, it is appropriate to set all the current status values to "No" and start a new precondition negotiation from scratch.

The new table below applies to an offerer that receives an answer that updates or downgrades its local status tables.
Offerers should update their local status tables when they receive an answer as shown in Table 2.

<table>
<thead>
<tr>
<th>Transac. status table</th>
<th>Local status table</th>
<th>New value</th>
<th>Local Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>no</td>
<td>no</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>no</td>
<td>yes</td>
<td>no</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Possible values for the "Current" fields after an answer

5 Desired Status

The desired status that a UA wants for a media stream after the stream is moved to a new transport address may be different than the desired status negotiated for the stream originally. A UA, for instance, may require mandatory QoS over a low-bandwidth link but be satisfied with optional QoS when the stream is moved to a high-bandwidth link.

If the new desired status is higher than the previous one (e.g., optional to mandatory), the UA, following RFC 3312 procedures, may upgrade its desired status in an offer or in an answer. If the new desired status is lower that the previous one (e.g., mandatory to optional), the UA, following RFC 3312 procedures as well, may downgrade its desired status only in an offer (i.e., not in an answer.)

6 Security Considerations

An attacker adding preconditions to a session description or modifying existing preconditions could keep sessions from being established. An attacker removing preconditions from a session description could force sessions to be established without meeting mandatory preconditions.

It is thus STRONGLY RECOMMENDED that integrity protection be applied to the SDP session descriptions. S/MIME is the natural choice to provide such end-to-end integrity protection, as described in RFC 3261 [2].

7 Authors’ Addresses

Gonzalo Camarillo
Ericsson
8 Normative References


9 Informative References


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