**Interworking between the Session Initiation Protocol (SIP) and the
Extensible Messaging and Presence Protocol (XMPP): Instant Messaging
draft-ietf-stox-im-06**

Abstract

   This document defines a bidirectional protocol mapping for the
   exchange of single instant messages between the Session Initiation
   Protocol (SIP) and the Extensible Messaging and Presence Protocol
   (XMPP).

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1. Introduction

   In order to help ensure interworking between instant messaging (IM)
   systems that conform to the instant messaging / presence requirements
   [RFC2779], it is important to clearly define protocol mappings
   between such systems. Within the IETF, work has proceeded on two
   instant messaging technologies:

   o Various extensions to the Session Initiation Protocol ([RFC3261])
      for instant messaging, as developed within the SIP for Instant
      Messaging and Presence Leveraging Extensions (SIMPLE) Working
      Group; the relevant specification for instant messaging is
      [RFC3428]
   o The Extensible Messaging and Presence Protocol (XMPP), which
      consists of a formalization of the core XML streaming protocols
      developed originally by the Jabber open-source community; the
      relevant specifications are [RFC6120] for the XML streaming layer
      and [RFC6121] for basic presence and instant messaging extensions

   One approach to helping ensure interworking between these protocols
   is to map each protocol to the abstract semantics described in
   [RFC3860]; that is the approach taken by
   [I-D.ietf-simple-cpim-mapping] and [RFC3922]. By contrast, the
   approach taken in this document is to directly map semantics from one
   protocol to another (i.e., from SIP/SIMPLE to XMPP and vice-versa).

   Both XMPP and IM-aware SIP systems enable entities to exchange
   "instant messages". The term "instant message" usually refers to a
   message sent between two entities for delivery in close to real time
   (rather than a message that is stored and forwarded to the intended
   recipient upon request). This document covers single messages only
   (sometimes called "pager-mode" messaging), since they form the lowest
   common denominator for IM. Separate documents cover one-to-one chat
   sessions [I-D.ietf-stox-chat] and multi-party groupchat
   [I-D.ietf-stox-groupchat].

   The architectural assumptions underlying such direct mappings are
   provided in [I-D.ietf-stox-core], including mapping of addresses and
   error conditions. The mappings specified in this document cover
   basic instant messaging functionality, i.e., the exchange of a single
   instant message between a SIP user and an XMPP user in either
   direction. Mapping of more advanced functionality is out of scope
   for this document, but other documents in this "series" cover such
   topics.

2. Terminology

A number of terms used here are explained in [RFC3261], [RFC3428],
[RFC6120], and [RFC6121].

Continuing the tradition of Shakespearean examples in XMPP
documentation, the actors in this document are an XMPP user
<juliet@example.com> and a SIP user <romeo@example.net>.

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

3. XMPP to SIP

As described in [RFC6121], a single instant message is an XML
stanza of type "normal" sent over an XML stream (since
"normal" is the default for the 'type' attribute of the
stanza, the attribute is often omitted). In this document we will
assume that such a message is sent from an XMPP client to an XMPP
server over an XML stream negotiated between the client and the
server, and that the client is controlled by a human user (this is a
simplifying assumption introduced for explanatory purposes only; the
XMPP sender could be an automated client, a component such as a
workflow application, a server, etc.).

When Juliet wants to send an instant message to Romeo, she interacts
with her XMPP client, which generates an XMPP <message/> stanza. The
syntax of the <message/> stanza, including required and optional
elements and attributes, is defined in [RFC6121] (for single instant
messages, the value of the 'to' address SHOULD be a "bare JID" of the
form "localpart@domainpart"). The following is an example of such a
stanza:

Example 1: XMPP user sends message:

```
|  <message from='juliet@example.com/balcony'
|           to='romeo@example.net'>
|     <body>Art thou not Romeo, and a Montague?</body>
|  </message>
```

Upon receiving such a message stanza, the XMPP server needs to
determine the identity of the domainpart in the 'to' address, which
it does by following the procedures discussed in
[I-D.ietf-stox-core]. Here we assume that the XMPP server has
determined the domain is serviced by a SIMPLE server, that it

contains or has available to it an XMPP-SIMPLE gateway or connection
manager (which enables it to speak natively to SIMPLE servers), and
that it hands off the message stanza to the XMPP-SIMPLE gateway.

The XMPP-SIMPLE gateway is then responsible for translating the XMPP
message stanza into a SIP MESSAGE request from the XMPP user to the
SIP user:

Example 2: XMPP user sends message (SIP transformation):

```
| MESSAGE sip:romeo@example.net SIP/2.0
| Via: SIP/2.0/TCP x2s.example.com;branch=z9hG4bK776sgdkse
| Max-Forwards: 70
| To: sip:romeo@example.net
| From: <sip:juliet@example.com;gr=balcony>;tag=12345
| Call-ID: D9AA95FD-2BD5-46E2-AF0F-6CFAA96BDDFA
| CSeq: 1 MESSAGE
| Content-Type: text/plain
| Content-Length: 35
|
| Art thou not Romeo, and a Montague?
```

The destination SIP server is responsible for delivering the message
to the intended recipient, and the recipient is responsible for
generating a response (e.g., 200 OK).

Example 3: SIP user agent indicates receipt of message:

```
| SIP/2.0 200 OK
| Via: SIP/2.0/TCP x2s.example.com;branch=z9hG4bK776sgdkse
| From: sip:romeo@example.net;tag=vwxyz
| To: sip:juliet@example.com;tag=12345
| Call-ID: D9AA95FD-2BD5-46E2-AF0F-6CFAA96BDDFA
| CSeq: 1 MESSAGE
| Content-Length: 0
```

As described in [RFC3428], a downstream proxy could fork a MESSAGE
request, but it would return only one 200 OK to the gateway.

   Informational Note: This document does not specify handling of the
   200 OK by the XMPP-SIMPLE gateway (e.g., to enable message
   acknowledgements). See [I-D.ietf-stox-chat] for a mapping of
   message acknowledgements in the context of one-to-one chat
   sessions.

The mapping of XMPP syntax to SIP syntax SHOULD be as shown in the
following table. (Mappings for several aspects not mentioned here
are specified in [I-D.ietf-stox-chat].)

Table 1: Message syntax mapping from XMPP to SIP

```
+----------------------------+--------------------------+
|  XMPP Element or Attribute |  SIP Header or Contents  |
+----------------------------+--------------------------+
|  <body/>                   |  body of MESSAGE         |
|  <subject/>                |  Subject                 |
|  <thread/>                 |  Call-ID                 |
|  from                      |  From (1)                |
|  id                        |  (no mapping)            |
|  to                        |  To or Request-URI       |
|  type                      |  (no mapping) (2)        |
|  xml:lang                  |  Content-Language        |
+----------------------------+--------------------------+
```

1. As shown in the foregoing example and described in
    [I-D.ietf-stox-core], the XMPP-SIMPLE gateway SHOULD map the full
    JID (localpart@domainpart/resourcepart) of the XMPP sender to the
    SIP From header and include the resourcepart as the GRUU portion
    [RFC5627] of the SIP URI.
2. Because there is no SIP header field that matches the meaning of
    the XMPP message 'type' values ("normal", "chat", "groupchat",
    "headline", "error"), no general mapping is possible here.

4. SIP to XMPP

   As described in [RFC3428], a single instant message is a SIP MESSAGE
   request sent from a SIP user agent to an intended recipient who is
   most generally referenced by an Instant Message URI of the form
   <im:user@domain> but who might be referenced by a SIP or SIPS URI of
   the form <sip:user@domain> or <sips:user@domain>. Here again we
   introduce the simplifying assumption that the user agent is
   controlled by a human user, whom we shall dub <romeo@example.net>.

   When Romeo wants to send an instant message to Juliet, he interacts
   with his SIP user agent, which generates a SIP MESSAGE request. The
   syntax of the MESSAGE request is defined in [RFC3428]. The following
   is an example of such a request:

Example 4: SIP user sends message:

```
|   MESSAGE sip:juliet@example.com SIP/2.0
|   Via: SIP/2.0/TCP s2x.example.net;branch=z9hG4bKeskdgs677
|   Max-Forwards: 70
|   To: sip:juliet@example.com
|   From: sip:romeo@example.net;tag=vwxyz
|   Call-ID: 9E97FB43-85F4-4A00-8751-1124FD4C7B2E
|   CSeq: 1 MESSAGE
|   Content-Type: text/plain
|   Content-Length: 44
|
|   Neither, fair saint, if either thee dislike.
```

Section 5 of [RFC3428] stipulates that a SIP User Agent presented
with an im: URI should resolve it to a sip: or sips: URI. Therefore
we assume that the Request-URI of a request received by a SIMPLE-XMPP
gateway will contain a sip: or sips: URI. The SIP server needs to
determine the identity of the domain portion of the Request-URI or To
header, which it does by following the procedures discussed in
[I-D.ietf-stox-core]. Here we assume that the SIP server has
determined that the domain is serviced by an XMPP server, that it
contains or has available to it a SIP-to-XMPP gateway or connection
manager (which enables it to speak natively to XMPP servers), and
that it hands off the message to the gateway.

The SIP-to-XMPP gateway is then responsible for translating the
request into an XMPP message stanza from the SIP user to the XMPP
user and returning a SIP "200 OK" message to the sender:

Example 5: SIP user sends message (XMPP transformation):

```
|   <message from='romeo@example.net/orchard'
|            to='juliet@example.com'>
|     <body>Neither, fair saint, if either thee dislike.</body>
|   </message>
```

Note that the stanza handling rules specified in [RFC6121] allow the
receiving XMPP server to deliver a message stanza whose 'to' address
is a bare JID ("localpart@domainpart") to multiple connected devices.
This is similar to the "forking" of messages in SIP.

The mapping of SIP syntax to XMPP syntax SHOULD be as shown in the
following table. (Mappings for several aspects not mentioned here
are specified in [I-D.ietf-stox-chat].)

Table 2: Message syntax mapping from SIP to XMPP

```
+--------------------------+----------------------------+
|  SIP Header or Contents  |  XMPP Element or Attribute  |
+--------------------------+----------------------------+
|  Call-ID                 |  <thread/>                 |
|  Content-Language        |  xml:lang                  |
|  CSeq                    |  (no mapping)              |
|  From                    |  from (1)                  |
|  Subject                 |  <subject/>                |
|  Request-URI or To       |  to                        |
|  body of MESSAGE         |  <body/>                   |
+--------------------------+----------------------------+
```

1. As shown in the foregoing example and described in
    [I-D.ietf-stox-core], if the SIMPLE-XMPP gateway has information
    about the GRUU [RFC5627] of the particular endpoint that sent the
    SIP message then it SHOULD map the sender's address to a full JID
    (localpart@domainpart/resourcepart) in the 'from' attribute of
    the XMPP stanza and include the GRUU as the resourcepart.

    When transforming SIP pager-mode messages, a SIMPLE-XMPP gateway
    SHOULD specify no XMPP 'type' attribute or, equivalently, a 'type'
    attribute whose value is "normal" [RFC6121].

    See Section 5 of this document about the handling of SIP message
    bodies that contain content types other than plain text.

5. Content Types

    SIP requests of type MESSAGE are allowed to contain essentially any
    content type. The recommended procedures for SIMPLE-to-XMPP gateways
    to use in handling these content types are as follows.

    A SIMPLE-to-XMPP gateway MUST process SIP messages that contain
    message bodies of type "text/plain" and MUST encapsulate such message
    bodies as the XML character data of the XMPP <body/> element.

    A SIMPLE-to-XMPP gateway SHOULD process SIP messages that contain
    message bodies of type "text/html"; if so, a gateway MUST transform
    the "text/html" content into XHTML content that conforms to the
    XHTML-IM Integration Set specified in [XEP-0071].

    Although a SIMPLE-to-XMPP gateway MAY process SIP messages that
    contain message bodies of types other than "text/plain" and "text/
    html", the handling of such content types is a matter of
    implementation.

6. **Internationalization Considerations**

   Both XMPP and SIP support the UTF-8 encoding [RFC3629] of Unicode
   characters [UNICODE] within messages, and signalling of the language
   for a particular message (in XMPP via the 'xml:lang' attribute and in
   SIP via the Content-Language header). Several examples follow, using
   the "XML Notation" for Unicode characters outside the ASCII range
   described in [RFC3987].

   Example 6: SIP user sends message:

   | MESSAGE sip:juliet@example.com SIP/2.0
   | Via: SIP/2.0/TCP s2x.example.net;branch=z9hG4bKeskdgs677
   | Max-Forwards: 70
   | To: sip:juliet@example.com
   | From: sip:romeo@example.net;tag=vwxyz
   | Call-ID: 9E97FB43-85F4-4A00-8751-1124FD4C7B2E
   | CSeq: 1 MESSAGE
   | Content-Type: text/plain
   | Content-Length: 45
   | Content-Language: cs
   |
   | Nic z ob쎩ho, m쎡 d쒛vo spanil쎡,
   | nenavid쎭얡-li jedno nebo druh쎩.

   Example 7: SIP user sends message (XMPP transformation):

   | <message from='romeo@example.net'
   | to='juliet@example.com'
   | xml:lang='cs'>
   | <body>
   | Nic z ob쎩ho, m쎡 d쒛vo spanil쎡,
   | nenavid쎭얡-li jedno nebo druh쎩.
   | </body>
   | </message>

7. **IANA Considerations**

   This document requests no actions of IANA.

8. **Security Considerations**

   Detailed security considerations for instant messaging protocols are
   given in [RFC2779], for SIP-based instant messaging in [RFC3428] (see
   also [RFC3261]), and for XMPP-based instant messaging in [RFC6121]
   (see also [RFC6120]). The security considerations provided in

[I-D.ietf-stox-core] also apply.

This document specifies methods for exchanging instant messages through a gateway that translates between SIP and XMPP. Such a gateway MUST be compliant with the minimum security requirements of the instant messaging protocols for which it translates (i.e., SIP and XMPP). The addition of gateways to the security model of instant messaging specified in [RFC2779] introduces some new risks. In particular, end-to-end security properties (especially confidentiality and integrity) between instant messaging user agents that interface through a SIMPLE-XMPP gateway can be provided only if common formats are supported. Specification of those common formats is out of scope for this document, although it is preferred to use [RFC3862] for instant messages.

9. References

9.1. Normative References

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