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Internet-Draft   Cisco Systems, Inc.
Intended status: Standards Track   A. Houri
Expires: April 3, 2014   IBM
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                                                     September 30, 2013

         Interworking between the Session Initiation Protocol (SIP) and the
        Extensible Messaging and Presence Protocol (XMPP): Instant Messaging
                          draft-ietf-stox-im-04

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
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
messages sent between two entities for delivery in close to real time
(rather than messages that are 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 instant messaging. One-to-one chat sessions
and multi-party groupchat are covered in separate documents.

The architectural assumptions underlying such direct mappings are

provided in [I-D.ietf-stox-core], including mapping of addresses and
error condisions. 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.

The discussion venue for this document is the mailing list of the
STOX WG; visit https://www.ietf.org/mailman/listinfo/stox for
subscription information and discussion archives.

2. Terminology

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

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 a bot-controlled client, a component such as a
workflow application, a server, etc.). Continuing the tradition of
Shakespearean examples in XMPP documentation, we will say that the
XMPP user has an XMPP address of <juliet@example.com>.

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/resourcepart"). The following is an
example of such a stanza:

Example: 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

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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: 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: Hr0zny9l3@example.com
| CSeq: 1 MESSAGE
| Content-Type: text/plain
| Content-Length: 35
|
| Art thou not Romeo, and a Montague?

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                       |
|  type                      | (no mapping)             |
|  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 to the GRUU portion
    of the SIP URI [RFC5627].

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: 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
| Call-ID: M4spr4vdu@example.net
| 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: 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>
```

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           |  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
1.0 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. 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]).

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.

7. IANA Considerations

This document requests no actions of IANA.

8. References

8.1. Normative References

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Appendix A. Acknowledgements

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