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**Interworking between the Session Initiation Protocol (SIP) and the
Extensible Messaging and Presence Protocol (XMPP): One-to-One Text Chat**
[draft-ietf-stox-chat-01](#)

Abstract

This document defines a bidirectional protocol mapping for the exchange of instant messages in the context of a one-to-one chat session between a user of the Session Initiation Protocol (SIP) and a user of the Extensible Messaging and Presence Protocol (XMPP). Specifically for SIP text chat, this document specifies a mapping to the Message Session Relay Protocol (MSRP).

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1. Introduction

Both the Session Initiation Protocol [[RFC3261](#)] and the Extensible Messaging and Presence Protocol [[RFC6120](#)] can be used for the purpose of one-to-one text chat over the Internet. To ensure interworking between these technologies, it is important to define bidirectional protocol mappings.

The architectural assumptions underlying such protocol mappings are provided in [[I-D.ietf-stox-core](#)], including mapping of addresses and error conditions. This document specifies mappings for one-to-one text chat sessions (sometimes called "session-mode" messaging); in particular, this document specifies mappings between XMPP messages of type "chat" and the Message Session Relay Protocol [[RFC4975](#)]. Mappings for single instant messages and groupchat are provided in separate documents.

The approach taken here is to directly map syntax and semantics from one protocol to another. The mapping described herein depends on the protocols defined in the following specifications:

- o XMPP chat sessions using message stanzas of type "chat" are specified in [[RFC6121](#)].
- o SIP-based chat sessions using the SIP INVITE and SEND request types are specified in [[RFC4975](#)].

In SIMPLE, a chat session is formally negotiated just as any other session type is using SIP. By contrast, a one-to-one chat "session" in XMPP is an informal construct and is not formally negotiated: a user simply sends a message of type "chat" to a contact, the contact then replies to the message, and the sum total of such messages exchanged during a defined period of time is considered to be a chat session. To overcome the disparity between these approaches, a gateway that wishes to map between SIP and XMPP for one-to-one chat sessions needs to maintain some additional state, as described below.

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.

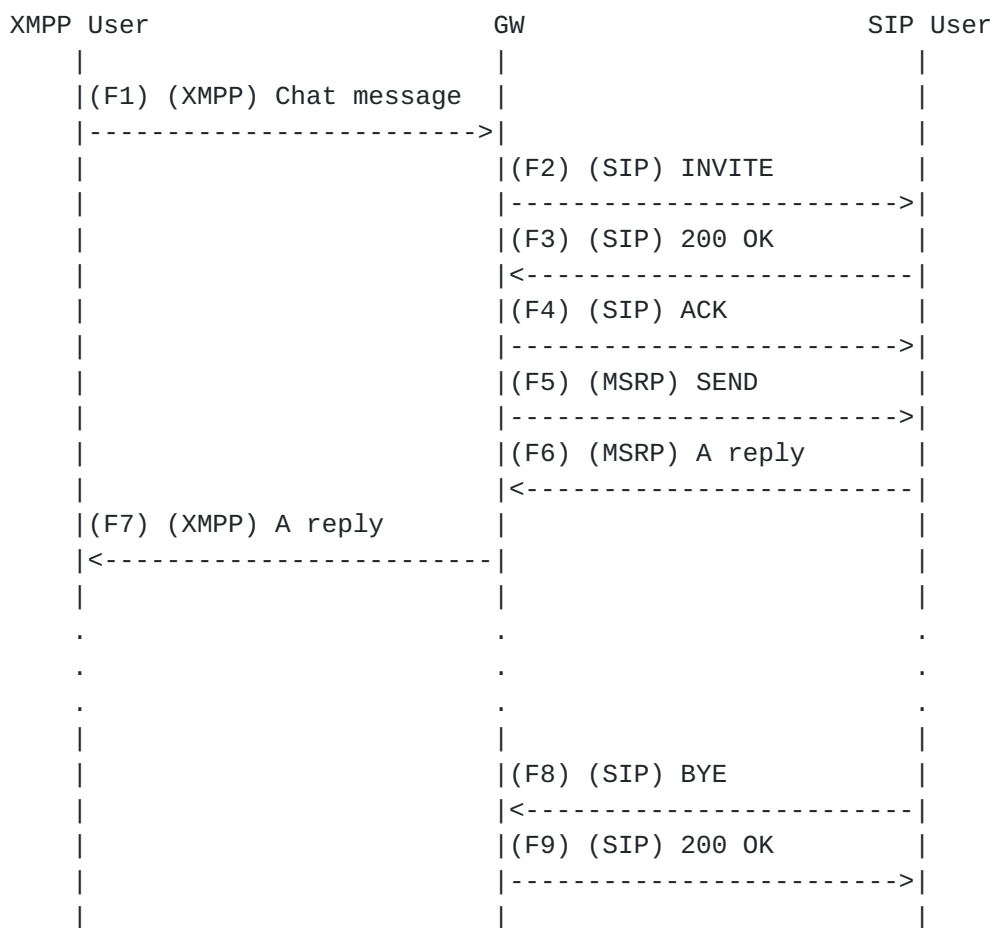
2. Terminology

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 MSRP

In XMPP, the "informal session" approach is to simply send someone a <message/> of type "chat" without starting any session negotiation ahead of time (as described in [RFC6121]). The XMPP "informal session" approach maps very well into a SIP MESSAGE request, as described in [I-D.ietf-stox-core]. However, the XMPP informal session approach can also be mapped to MSRP if the XMPP-to-SIP gateway maintains additional state.

The order of events is as follows.



First the XMPP user would generate an XMPP chat message.

Example: (F1) Juliet sends an XMPP message

```
| <message from='juliet@example.com/balcony'  
|         to='romeo@example.net'  
|         type='chat'>  
|   <thread>711609sa</thread>  
|   <body>Art thou not Romeo, and a Montague?</body>  
| </message>
```

The local SIP-to-XMPP gateway at the SIMPLE server would then initiate an MSRP session with Romeo on Juliet's behalf (since there is no reliable way for the SIMPLE server to determine if Romeo's user agent supports MSRP, it simply needs to guess).

Example: (F2) Gateway starts a formal session on behalf of Juliet

```
| INVITE sip:romeo@example.net SIP/2.0  
| To: <sip:romeo@example.net>  
| From: <sip:juliet@example.com>  
| Contact: <sip:juliet@example.com>;gr=balcony  
| Subject: Open chat with Juliet?  
| Call-ID: 711609sa  
| Content-Type: application/sdp  
|  
| c=IN IP4 x2s.example.com  
| m=message 7654 TCP/MSRP *  
| a=accept-types:text/plain  
| a=lang:en  
| a=lang:it  
| a=path:msrp://x2s.example.com:7654/jshA7weztas;tcp
```

Here we assume that Romeo accepts the MSRP session request.

Example: (F3) Romeo accepts the request

```
| SIP/2.0 200 OK  
| To: <sip:juliet@example.com>;gr=balcony  
| From: <sip:romeo@example.net>  
| Contact: <sip:romeo@example.net>;gr=orchard  
| Call-ID: 711609sa  
| Content-Type: application/sdp  
|  
| c=IN IP4 s2x.example.net  
| m=message 12763 TCP/MSRP *  
| a=accept-types:text/plain  
| a=lang:it  
| a=path:msrp://s2x.example.net:12763/kjhd37s2s20w2a;tcp
```


The XMPP-to-SIP gateway then acknowledges the session acceptance on behalf of Romeo.

Example: (F4) Gateway sends ACK to Romeo's UA

```
| ACK sip:juliet@example.com SIP/2.0
| To: <sip:romeo@example.net>;gr=orchard
| From: <sip:juliet@example.com>
| Contact: <sip:juliet@example.com>;gr=balcony
| Call-ID: 711609sa
```

The XMPP-to-SIP gateway then transforms the original XMPP chat message into MSRP.

Example: (F5) Gateway transforms XMPP message to MSRP

```
| MSRP a786hjs2 SEND
| From-Path: msrp://x2s.example.com:7654/jshA7weztas;tcp
| To-Path: msrp://s2x.example.net:12763/kjhd37s2s20w2a;tcp
| Message-ID: 87652491
| Byte-Range: 1-25/25
| Content-Type: text/plain
|
| Art thou not Romeo, and a Montague?
| -----a786hjs2$
```

Romeo can then send a reply using his MSRP user agent.

Example: (F6) Romeo sends a reply

```
| MSRP a786hjs2 SEND
| To-Path: msrp://x2s.example.com:7654/jshA7weztas;tcp
| From-Path: msrp://s2x.example.net:12763/kjhd37s2s20w2a;tcp
| Message-ID: 87652491
| Byte-Range: 1-25/25
| Failure-Report: no
| Content-Type: text/plain
|
| Neither, fair saint, if either thee dislike.
| -----a786hjs2$
```

The SIP-to-XMPP gateway would then transform that message into appropriate XMPP syntax for routing to the intended recipient.

Example: (F7) Gateway transforms MSRP message to XMPP

```
| <message from='romeo@example.net/orchard'  
|         to='juliet@example.com/balcony'  
|         type='chat'>  
|   <thread>711609sa</thread>  
|   <body>Neither, fair saint, if either thee dislike.</body>  
| </message>
```

When the MSRP user wishes to end the chat session, the user's MSRP client sends a SIP BYE.

Example: (F8) Romeo terminates the chat session

```
| BYE juliet@example.com sip: SIP/2.0  
| Max-Forwards: 70  
| From: <sip:romeo@example.net>;tag=087js  
| To: <sip:juliet@example.com>;tag=786  
| Call-ID: 711609sa  
| Cseq: 1 BYE  
| Content-Length: 0
```

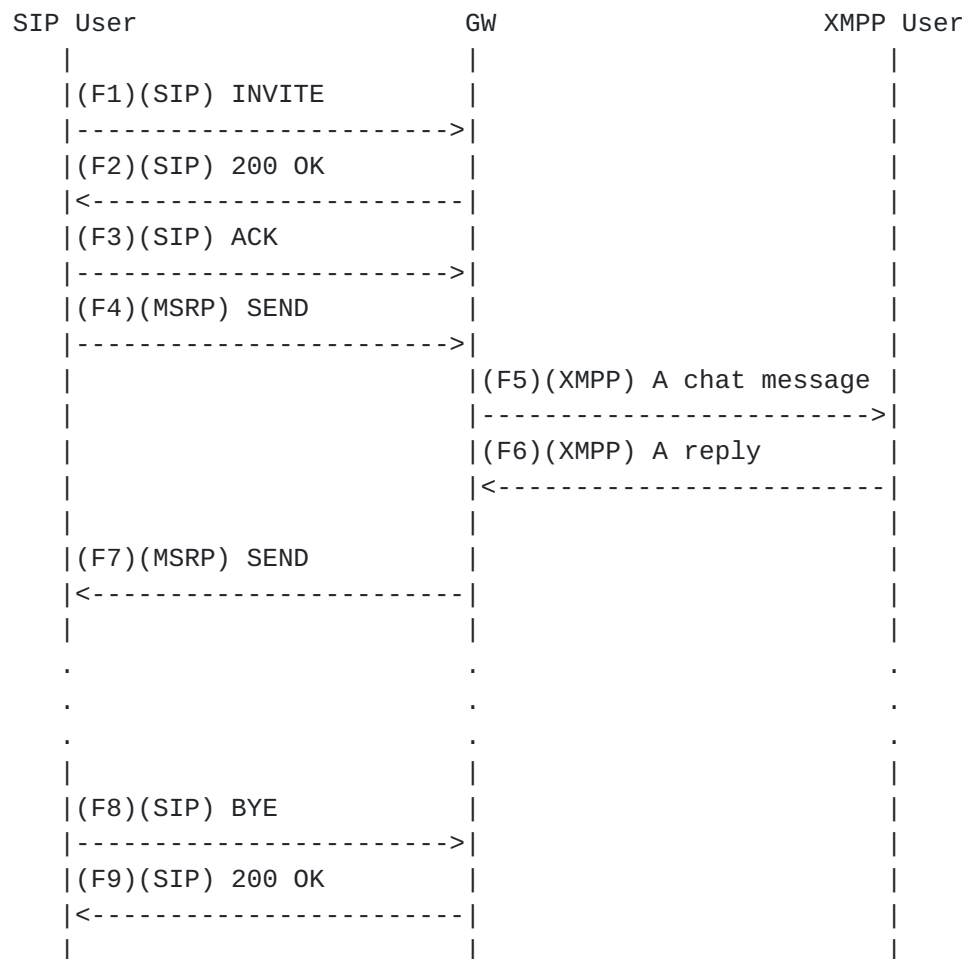
The BYE is then acknowledged by the XMPP-to-SIP gateway.

Example: (F9) Gateway acknowledges termination

```
| SIP/2.0 200 OK  
| From: <sip:juliet@example.com>;tag=786  
| To: <sip:romeo@example.net>;tag=087js  
| Call-ID: 711609sa  
| CSeq: 1 BYE  
| Content-Length: 0
```

4. MSRP to XMPP

When an MSRP client sends messages through a gateway to an XMPP client that does not support formal sessions, the order of events is as follows.



Example: (F1) SIP user starts the session

```
| INVITE sip:juliet@example.com SIP/2.0
| To: <sip:juliet@example.com>
| From: <sip:romeo@example.net>
| Contact: <sip:romeo@example.net>;gr=orchard
| Subject: Open chat with Romeo?
| Call-ID: 742507no
| Content-Type: application/sdp
|
| c=IN IP4 s2x.example.net
| m=message 7313 TCP/MSRP *
| a=accept-types:text/plain
| a=lang:en
| a=lang:it
| a=path:msrp://s2x.example.net:7313/ansp71weztas;tcp
```


Example: (F2) Gateway accepts session on Juliet's behalf

```
| SIP/2.0 200 OK
| To: <sip:romeo@example.net>;gr=orchard
| From: <sip:juliet@example.com>
| Contact: <sip:juliet@example.com>;gr=balcony
| Call-ID: 742507no
| Content-Type: application/sdp
|
| c=IN IP4 x2s.example.com
| m=message 8763 TCP/MSRP *
| a=accept-types:text/plain
| a=lang:it
| a=path:msrp://x2s.example.com:8763/lkjh37s2s20w2a;tcp
```

Example: (F3) Romeo sends ACK

```
| ACK sip:juliet@example.com SIP/2.0
| To: <sip:juliet@example.com>;gr=balcony
| From: <sip:romeo@example.net>
| Contact: <sip:romeo@example.net>;gr=orchard
| Call-ID: 742507no
```

Example: (F4) Romeo sends a message

```
| MSRP ad49kswow SEND
| To-Path: msrp://x2s.example.com:8763/lkjh37s2s20w2a;tcp
| From-Path: msrp://s2x.example.net:7313/ansp71weztas;tcp
| Message-ID: 44921zaqwsx
| Byte-Range: 1-32/32
| Failure-Report: no
| Content-Type: text/plain
|
| I take thee at thy word ...
| -----ad49kswow$
```

Example: (F5) Romeo sends a message (XMPP translation)

```
| <message from='romeo@example.net'
|         to='juliet@example.com'
|         type='chat'>
|   <thread>742507no</thread>
|   <body>I take thee at thy word ...</body>
| </message>
```


Example: (F6) Juliet sends a reply

```
| <message from='juliet@example.com'  
|         to='romeo@example.net'  
|         type='chat'>  
|   <thread>711609sa</thread>  
|   <body>What man art thou ...?</body>  
| </message>
```

Example: (F8) Gateway transforms XMPP message to MSRP

```
| MSRP a786hjs2 SEND  
| To-Path: msrp://s2x.example.net:7313/jshA7weztas;tcp  
| From-Path: msrp://x2s.example.com:8763/lkjh37s2s20w2a;tcp  
| Message-ID: 87652491  
| Byte-Range: 1-25/25  
| Failure-Report: no  
| Content-Type: text/plain  
|  
| What man art thou ...?  
| -----a786hjs2$
```

Example: (F9) Romeo terminates the session

```
| BYE juliet@example.com sip: SIP/2.0  
| Max-Forwards: 70  
| To: <sip:juliet@example.com>;gr=balcony  
| From: <sip:romeo@example.net>  
| Contact: <sip:romeo@example.net>;gr=orchard  
| Call-ID: 742507no  
| Cseq: 1 BYE  
| Content-Length: 0
```

Example: (F10) Gateway acknowledges the termination of the session on behalf of XMPP user

```
| SIP/2.0 200 OK  
| To: <sip:juliet@example.com>;gr=balcony  
| From: <sip:romeo@example.net>  
| Contact: <sip:romeo@example.net>;gr=orchard  
| Call-ID: 742507no  
| CSeq: 1 BYE
```

5. Composing Events

Both XMPP and MSRP enable a user agent to receive notifications when a person's conversation partner is composing an instant message

within the context of a chat session.

For XMPP, the Chat State Notifications specification [[XEP-0085](#)] defines five states: active, inactive, gone, composing, and paused. Some of these states are related to the act of message composition (composing, paused), whereas others are related to the sender's involvement with the chat session (active, inactive, gone).

For MSRP (and SIMPLE in general), the Indication of Message Composition for Instant Messaging specification [[RFC3994](#)] defines two states: idle and active. Here the idle state indicates that the sender is not actively composing a message, and the active state indicates that the sender is indeed actively composing a message (the sending user agent simply toggles between the two states, changing to active if the user is actively composing a message and changing to idle if the user is no longer actively composing a message).

Because the XEP-0085 states can represent information that is not captured in [RFC 3994](#), gateways can either (a) map only the composing-related states or (b) map all the XEP-0085 states.

The following mappings are suggested.

Table 1: Mapping of SIMPLE isComposing events to XMPP chat states

+-----+	
isComposing Event	Chat State
+-----+	
active	composing
idle	active
+-----+	

Table 2: Mapping of XMPP chat states to SIMPLE isComposing events

+-----+	
Chat State	isComposing Event
+-----+	
active	idle
inactive	idle
gone	[none, see note]
composing	active
paused	idle
+-----+	

Note: Although there is no mapping for the "gone" chat state, receipt of the "gone" state can be used as a trigger for terminating the formal chat session within MSRP.

6. Delivery Reports

Both XMPP and MSRP enable a user agent to receive notifications when a message has been received by the intended recipient.

For XMPP, the Message Receipts specification [[XEP-0184](#)] defines a method and XML namespace for requesting and returning indications that a message has been received by a client controlled by the intended recipient.

For MSRP, a native reporting feature is included, in the form of report chunks (see Sections [7.1.2](#) and [7.1.3](#) of [[RFC4975](#)]).

Examples follow.

First, the XMPP user sends a message containing a request for delivery notification.

Example: Juliet sends a message with a receipt request

```
| <message from='juliet@example.com'  
|         id='87652491'  
|         to='romeo@example.net'  
|         type='chat'>  
|   <thread>711609sa</thread>  
|   <body>What man art thou ...?</body>  
|   <request xmlns='urn:xmpp:receipts'/>  
| </message>
```

Example: Gateway transforms XMPP message to MSRP

```
| MSRP a786hjs2 SEND  
| To-Path: msrp://s2x.example.net:7313/jshA7weztas;tcp  
| From-Path: msrp://x2s.example.com:8763/lkjh37s2s20w2a;tcp  
| Message-ID: 87652491  
| Byte-Range: 1-25/25  
| Success-Report: yes  
| Failure-Report: no  
| Content-Type: text/plain  
|  
| What man art thou ...?  
| -----a786hjs2$
```

Next, the recipient returns a report.

Example: Recipient returns receipt

```
| MSRP hx74g336 REPORT
| To-Path: msrp://x2s.example.com:8763/lkjh37s2s20w2a;tcp
| From-Path: msrp://s2x.example.net:7313/jshA7weztas;tcp
| Message-ID: 87652491
| Byte-Range: 1-106/106
| Status: 000 200 OK
| -----hx74g336$
```

Example: Transformed message receipt

```
| <message from='romeo@example.net'
|         id='87652491'
|         to='juliet@example.com'>
|   <received xmlns='urn:xmpp:receipts' id='87652491'/>
| </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]).

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 recommended to use [RFC3862] for instant messages.

9. References

9.1. Normative References

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[Appendix A](#). Acknowledgements

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