Multi-User Jingle

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Multi-User Jingle

XMPP protocol extension for initiating and managing multiparty voice and video conferences within an XMPP MUC using Jingle

Jingle

XMPP protocol extension for initiating and managing peer-to-peer media sessions between two XMPP entities

XMPP

- Extensible Messaging and Presence Protocol
- ▶ The protocol formaly known as Jabber
- XML streams
- XMPP Core: RFC 3920
- ► XMPP IM: RFC 3921
- Extensions using XMPP Extension Proposals (XEP)

XMPP JID

Almost but not entirely unlike an e-mailaddress:

- sjoerd.simons@collabora.co.uk
- romeo@example.net
- juliet@capulet.com/balcony

Messages

```
<message to='romeo@example.net'
from='juliet@example.com/balcony'
    type='chat' xml:lang='en'>
    <body>Wherefore art thou, Romeo?</body>
</message>
```

Presence

Info/Query

```
<iq xmlns='iabber:client'
    to='iuliet@example.com/balconv'
    from='romeo@example.net/orchard'
    id='2846139002'
      type='get'>
   <query xmlns='http://jabber.org/protocol/disco#info'</pre>
     node='http://telepathy.freedesktop.org/wiki/Muji#iuNYhdSOy4nYDVPDhoTqCFubSz8='/>
 </ia>
  <iq xmlns='jabber:client'</pre>
   to='romeo@example.net/orchard'
   from='juliet@example.com/balcony'
   id='2846139002'
   type='result'>
 <query xmlns='http://jabber.org/protocol/disco#info'>
   <identity category='client'
             type='pc'
             name='Telepathv_Gabble_0.7.17' />
   <feature var='urn:xmpp:jingle:0'/>
   <feature var='urn:xmpp:iingle:apps:rtp:0'/>
   <feature var='urn:xmpp:iingle:transports:raw-udp:0'/>
 </query>
</iq>
```

Jingle

XMPP protocol extension for initiating and managing peer-to-peer media sessions between two XMPP entities

- ► XEP-0166: Jingle
- ► XEP-0167: Jingle RTP Sessions
- XEP-0176: Jingle ICE-UDP Transport Method
- ▶ XEP-0177: Jingle Raw UDP Transport Method

Jingle session initiation

```
<iq from='romeo@montague.lit/orchard'</pre>
    id='iingle1'
    to='juliet@capulet.lit/balcony'
    type='set'>
  <jingle xmlns='urn:xmpp:jingle:0'</pre>
          action='session-initiate'
          initiator='romeo@montague.lit/orchard'
          sid='a73sjjvkla37jfea'>
    <content creator='initiator' name='voice'>
      <description xmlns='urn:xmpp:jingle:apps:rtp:1' media='audio'>
        <pavload-type id='96' name='speex' clockrate='16000'/>
        <payload-type id='97' name='speex' clockrate='8000'/>
      </description>
      <transport xmlns='urn:xmpp:jingle:transports:ice-udp:0'/>
    </content>
    <content creator='initiator' name='video'>
      <description xmlns='urn:xmpp:jingle:apps:rtp:1' media='video'>
        <pavload—type id='98' name='THEORA' clockrate='90000'>
          <parameter name='height' value='600'/>
          <parameter name='width' value='800'/>
          <parameter name='delivery-method' value='inline'/>
          <parameter name='configuration' value='somebase16string'/>
        </payload-type>
      </description>
      <transport xmlns='urn:xmpp:jingle:transports:ice -udp:0'/>
    </content>
  </iingle>
</ia>
```

Jingle session initiation

```
<content creator='initiator' name='video'>
  <description
    xmlns='urn:xmpp:jingle:apps:rtp:1' media='video'>
    <payload-type id='98' name='THEORA'</pre>
      clockrate='90000'>
      <parameter name='height' value='600'/>
      <parameter name='width' value='800'/>
      <parameter name='delivery -method'</pre>
        value='inline'/>
      <parameter name='configuration'</pre>
         value='somebase16string'/>
     /payload-type>
  </description>
  <transport</pre>
    xmlns='urn:xmpp:jingle:transports:ice -udp:0'/>
</content>
```

Transport information

```
<iq from='romeo@montague.lit/orchard'</pre>
    id='info1'
    to='juliet@capulet.lit/balcony'
    type='set'>
  <jingle xmlns='urn:xmpp:jingle:0'</pre>
           action='transport-info'
           initiator='romeo@montague.lit/orchard'
           sid='a73sjjvkla37jfea'>
    <content creator='initiator' name='voice'>
      <transport xmlns='urn:xmpp:jingle:transports:ice -udp:0'</pre>
                  pwd='asd88fgpdd777uzjYhagZg
                  ufrag='8hhy'>
        <candidate component='1'</pre>
                    foundation='1'
                     generation='0'
                     ip = '10.0.1.1'
                     network='1'
                     port='8998'
                     priority='2130706431'
                     protocol='udp'
                    type='host'/>
      </transport>
    </content>
  </jingle>
</iq>
```

Accepting a Jingle session

```
<ig from='juliet@capulet.lit/balcony'</pre>
    id='accept1'
    to='romeo@montague.lit/orchard'
    type='set'>
  <iingle xmlns='urn:xmpp:iingle:0'</pre>
          action='session-accept'
          initiator='romeo@montague.lit/orchard'
          responder='iuliet@capulet.lit/balconv'
          sid='a73siivkla37ifea'>
    <content creator='initiator' name='voice'>
      <description xmlns='urn:xmpp:iingle:apps:rtp:1' media='voice'>
        <payload-type id='96' name='speex' clockrate='16000'/>
        <payload-type id='97' name='speex' clockrate='8000'/>
      </description>
      <transport xmlns='urn:xmpp:iingle:transports:ice -udp:0'>
      </transport>
    </content>
    <content creator='initiator' name='video'>
      <description xmlns='urn:xmpp:jingle:apps:rtp:1' media='video'>
        <payload-type id='98' name='theora' clockrate='90000'>
          <parameter name='height' value='600'/>
          <parameter name='width' value='800'/>
          <parameter name='delivery-method' value='inline'/>
          <parameter name='configuration' value='somebase16string'/>
          <parameter name='sampling' value='YCbCr-4:2:2'/>
        </payload-type>
      </description>
      <transport xmlns='urn:xmpp:iingle:transports:ice-udp:0'/>
    </content>
  </iingle>
</ia>
```

Multi User Chat

- ► MUC: XEP-0045
- Widely deployed
- ▶ Messages in the muc are ordered!

Joining a muc

The MUC responds with presences of all current MUC members, with our own presence as the last.

Multi-User Jingle and MUC

- ► The MUC server shouldn't need to provide any infrastructure for Multi-User Jingle
- Shouldn't interfere with clients not supporting Multi-User Jingle
- Shouldn't depend on the one leader

Multi-User Jingle

- ► Each client announces the streams it's interested in and it's payload mapping in its presence
- ► Each clients does its own payload mapping calculation when joining based on the information from existing clients
- ▶ Each clients sets up a Jingle session to all existing clients
- ▶ Joining the Multi-User Jingle session split in in two stages to prevent race conditions.

Joining step 1

Announce that you're preparing to start or join the session:

```
coresence xmlns="iabber:client"
          to="test0@night.luon.net/7722055431232389935112486"
          from="muji@conference.night.luon.net/test0">
  <c xmlns="http://iabber.org/protocol/caps"
     node="http://telepathy.freedesktop.org/wiki/Mingle"
     hash="sha-1"
     ver="9KIXkd+F+C/WPRXVRn77ai5k4gl="/>
  <muji xmlns="http://telepathy.freedesktop.org/muji">
    <content name="video"</pre>
             preparing="true" />
    <content name="audio"
             preparing="true" />
  </muji>
  <x xmlns="http://jabber.org/protocol/muc#user">
    <item affiliation="owner"
          jid="test0@night.luon.net/7722055431232389935112486"
          role="moderator"/>
  </x>
</presence>
```

Joining step 2

After all clients that announced they were preparing to join have done so, update your presence with your payload mapping:

```
cpresence xmlns="jabber:client"
          to="test0@night.luon.net/7722055431232389935112486"
          from="muii@conference.night.luon.net/test0">
  <c xmlns="http://jabber.org/protocol/caps"
     node="http://telepathy.freedesktop.org/wiki/Muji"
     hash="sha-1"
     ver="9KIXkd+F+C/WPRXVRn77ai5k4qI="/>
  <muji xmlns="http://telepathy.freedesktop.org/muji">
    <content name="audio">
      <description xmlns="urn:xmpp:jingle:apps:rtp:0"</pre>
                   media="audio">
        <payload-type id='96' name='speex' clockrate='16000'/>
        <payload-type id='97' name='speex' clockrate='8000'/>
      </description>
    </content>
    <content name="video">
      <description xmlns="urn:xmpp:jingle:apps:rtp:0"</pre>
                   media="video">
        <payload-type id="96" name="THEORA" clockrate="90000">
          <parameter name="delivery-method" value="inline" />
          <parameter name="configuration" value="somebase16value" />
        </payload-type>
      </description>
    </content>
  </muii>
  <x xmlns="http://jabber.org/protocol/muc#user">
    <item affiliation="owner" jid="test0@night.luon.net/7722055431232389935112486"</pre>
          role="moderator" />
  </x>
</presence>
```

Demo!

- Python client to make it easy to play with the protocol
- ► Farsight2 for the RTP streaming
- ▶ libnice (through farsight) for the ICE transport

Multi-User Jingle

Advantages:

- ▶ Only needs basic infrastructure
- ► Each client can decide how to present the conference

Disadvantages:

Does not scale to large groups

Scaling Multi-User jingle

Scaling without extra infrastructure is limited by:

- Amount of streams a client can decode
- ▶ Amount of upstream bandwidth
- Amount of downstream bandwidth

RTP relay

Clients send their streams to the relay, which relays it to (all) others

Advantage:

▶ Removes the limitation on the clients upstream bandwidth Disadvantages:

▶ Adds some latency especially when the relay is badly choosen



Mixer

Clients their streams to the mixer, which combines (mixes them) in some way and send them to others.

Advantages:

- Removes the limitation on the amount of streams can be decoded by the client
- ▶ Removes the limitation on the clients downstream bandwidth
- ▶ Removes the limitation on the clients upstream bandwidth

Mixer

Disadvantages:

- ▶ The mixer needs to reencode and mix the data
 - CPU intensive (transcoding)
 - Lowers the quality
- Clients don't have control over the presentation anymore.

Combined relay and mixer

Let clients choose whether they want to receive a mixed stream or not.

Advantages:

- Removes the limitation on clients upstream bandwidth.
- Allows clients to decide about the trade-off between downstream bandwidth and having higher quality/control over the presentation

Codecs

- ► Each client only encodecs the media once. Which means the conference ends up using the lowest common denominator
- ▶ Not such a big issue for audio
- Scalable video codecs might be a solution
 - ► Have a low resolution, low quality base layer. On which extra layers are added to improve quality
 - Decide per client which layers to send
 - ► H264/SVC exists, but is heavily patented
 - ▶ No free scalable video available :(

Links

- Project wiki: http:
 //telepathy.freedesktop.org/wiki/MultiUserJingle
- ► NINet site: http://www.nlnet.nl/project/mujingle/
- Farsight2: http://farsight.freedesktop.org
- ▶ libnice: http://nice.freedesktop.org