XEP-0282: DMUC2: Distributed MUC

Carlo von Loesch
xmpp:lynx@psyced.org

Philipp Hancke
xmpp:fippo@ve.symlynx.com

2010-06-11
Version 0.1

Multi-User Chats, distributed over several nodes in the XMPP network, using a master/slave architecture
Legal

Copyright

This XMPP Extension Protocol is copyright © 1999 – 2020 by the XMPP Standards Foundation (XSF).

Permissions

Permission is hereby granted, free of charge, to any person obtaining a copy of this specification (the "Specification"), to make use of the Specification without restriction, including without limitation the rights to implement the Specification in a software program, deploy the Specification in a network service, and copy, modify, merge, publish, translate, distribute, sublicense, or sell copies of the Specification, and to permit persons to whom the Specification is furnished to do so, subject to the condition that the foregoing copyright notice and this permission notice shall be included in all copies or substantial portions of the Specification. Unless separate permission is granted, modified works that are redistributed shall not contain misleading information regarding the authors, title, number, or publisher of the Specification, and shall not claim endorsement of the modified works by the authors, any organization or project to which the authors belong, or the XMPP Standards Foundation.

Warranty

## NOTE WELL: This Specification is provided on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, express or implied, including, without limitation, any warranties or conditions of TITLE, NON-INFRINGEMENT, MERCHANTABILITY, or FITNESS FOR A PARTICULAR PURPOSE. ##

Liability

In no event and under no legal theory, whether in tort (including negligence), contract, or otherwise, unless required by applicable law (such as deliberate and grossly negligent acts) or agreed to in writing, shall the XMPP Standards Foundation or any author of this Specification be liable for damages, including any direct, indirect, special, incidental, or consequential damages of any character arising from, out of, or in connection with the Specification or the implementation, deployment, or other use of the Specification (including but not limited to damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses), even if the XMPP Standards Foundation or such author has been advised of the possibility of such damages.

Conformance

This XMPP Extension Protocol has been contributed in full conformance with the XSF’s Intellectual Property Rights Policy (a copy of which can be found at <https://xmpp.org/about/xsf/ipr-policy> or obtained by writing to XMPP Standards Foundation, P.O. Box 787, Parker, CO 80134 USA).
1 Introduction

This document is one of several proposals for distributing XMPP chat rooms across multiple chat services. It is expected that the various approaches will be refined and harmonized before a final protocol is developed.

The architecture is that of a single root node, called MASTER and several repeater nodes, each called SLAVE. Every stanza is submitted via the slaves to the master, control is centralized there. The master then sends a copy of the stanza to each of the slaves where it is processed and then distributed to each of the slave’s leaf nodes, local users at this point. During redistribution, the slave shall not change the stanza’s ‘from’ attribute, which is only possible if the slave is in the same security domain as the user. The result of that is a decreased number of messages on the server-to-server links between the master’s server and each of the slave servers.

Note that this only applies to stanzas that are directed to all occupants, such as the change of availability status and messages whose ‘type’ attribute is set to ‘groupchat’.

While 1-1 stanzas such as in-room private messages or vcard-temp requests may also travel along that path they are currently unaffected by this.
2 Requirements

This specification addresses the following requirements:

• The existence of the slave shall be transparent for the user.
• Enable detection of connection loss.
• Enable occupants to remain in instance of the conference if connectivity is lost to other instances.
• Enable occupants to leave a chatroom while connectivity is lost.
• Enable syncing of history and room rosters on reconnect.
• Improve distribution of ‘broadcast’ stanzas.

3 Terminology

3.1 Dramatis Personae

Most of the examples in this document use the scenario of the 1990 war that split the Internet Relay Chat into several incompatible networks. The battlefield is represented here by the "wallops@channel.avalon.irc" chatroom. The characters are as follows:

<table>
<thead>
<tr>
<th>Room Nickname</th>
<th>Full JID</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wumpus</td>
<td><a href="mailto:argl@killrc.oulubox.irc">argl@killrc.oulubox.irc</a>/laptop</td>
<td>Moderator</td>
</tr>
<tr>
<td>Valdis</td>
<td><a href="mailto:valdis@killrc.oulubox.irc">valdis@killrc.oulubox.irc</a>/desktop</td>
<td>Participant</td>
</tr>
<tr>
<td>Phaedrus</td>
<td><a href="mailto:phaedrus@killrc.oulubox.irc">phaedrus@killrc.oulubox.irc</a>/phone</td>
<td>Participant</td>
</tr>
<tr>
<td>WiZ</td>
<td><a href="mailto:squit@eris.dclxvii.irc">squit@eris.dclxvii.irc</a>/jupiter</td>
<td>Moderator</td>
</tr>
<tr>
<td>Troy</td>
<td><a href="mailto:troy@eris.dclxvii.irc">troy@eris.dclxvii.irc</a>/screwdriver</td>
<td>Moderator</td>
</tr>
<tr>
<td>BigCheese</td>
<td><a href="mailto:rubenro@vesa.yeggmaex.irc">rubenro@vesa.yeggmaex.irc</a>/shaver</td>
<td>Participant</td>
</tr>
<tr>
<td>Efchen</td>
<td><a href="mailto:msa@vesa.yeggmaex.irc">msa@vesa.yeggmaex.irc</a>/bicycle</td>
<td>Participant</td>
</tr>
</tbody>
</table>

In our example we are presuming that three slaves from three hosts have registered with the master for traffic redistribution. They are doing so using slave@host jids, but they could be using any temporary jid the implementor finds useful to choose.
4 MASTER/SLAVE Protocol

This section describes the protocol between the master and the slaves, the interaction between each slave and its users are described in the next section.

4.1 Slave Requirements

The slave

- must be able to intercept any stanzas sent to the masters jid,
- must be able to verify if a local user has sent directed presence to the masters jid,
- must store room roster,
- must store local room roster
- must store room history (if desired by master)

4.2 Creating a Slave

to follow
Might include things like negotiation of keepalive frequency and amount of room might be useful to set some things like keepalive frequency, keeping/storing room history etc.

4.3 Initial Room Roster

After the creation of a new slave, the master must send the room roster (which at that time only consists of remote participants) to the slave:

```
Listing 1: Master Sends Room Roster to Slave

<pre>presence
  from='wallops@channel.avalon.irc/Wumpus'
  to='slave@vesa.yeggmaex.irc'>
  <x xmlns='http://jabber.org/protocol/muc#user'>
    <item affiliation='owner' role='moderator'/>
  </x>
</presence>
<pre>
<pre>presence
  from='wallops@channel.avalon.irc/Valdis'
  to='slave@vesa.yeggmaex.irc'>
  <x xmlns='http://jabber.org/protocol/muc#user'>
    <item affiliation='none' role='participant'/>
  </x>
</presence>
```
4.4 Initial Room History

After the creation of a new slave, the master MAY also send the discussion history to the slave. The slave shall store this and deliver it to entering participants.

from=masterjid to=slavejid?

4.5 ENTER

If a new occupant requests to enter the room, the master first sends a presence update to all participants to inform them of the presence of the new user. Then, the master sends the affected slave a stanza requesting it to add the user to the distribution list

Listing 2: Master informs Slave of New Occupant

```xml
<presence
    from='wallops@channel.avalon.irc/BigCheese'
    to='slave@vesa.yeggmaex.irc'>
  <x xmlns='urn:xmpp:tmp:dmuc:0'>
    <enter jid='rubenro@vesa.yeggmaex.irc/shaver'/>
    <history maxstanzas='20'/>
  </x>
  ...
</presence>
```
The slave MUST verify that the user has sent directed presence to the masters JID before. This helps to ensure that the user intended to enter the room. If this is true, the slave shall add the user to the distribution list and send the room roster, occupants own presence in room and discussion history to the full jid of the added user.

4.6 LEAVE

If an occupant sends an unavailable presence to the room, the master sends the affected slave a stanza requesting it to remove the user from the distribution list.

Listing 3: Master informs Slave of Occupant’s Departure

```
<presence
  from='wallops@channel.avalon.irc/BigCheese'
  to='slave@vesa.yeggmaex.irc'
  type='unavailable'>
  <x xmlns='urn:xmpp:tmp:dmuc:0'>
    <leave jid='rubenro@vesa.yeggmaex.irc/shaver'/>
  </x>
</presence>
```

The slave removes user and forwards the stanza to user.
The master then sends a presence update to all slaves to announce the occupants departure.

4.7 Presence Update

Presence updates are distributed by the master to all slaves.

Listing 4: Master sends presence update

```
<presence
  from='wallops@channel.avalon.irc/BigCheese'
  to='slave@killrc.oulubox.irc'>
  <x xmlns='http://jabber.org/protocol/muc#user'>
    <item affiliation='none'
      jid='rubenro@vesa.yeggmaex.irc/shaver'
      role='participant'/>
  </x>
</presence>
```
Note that the master MUST NOT send the full jid of the user to any slaves without members that are moderators.
When rebroadcasting this stanza to its local occupants, the slave MUST remove the participants full JID subject to the rules of XEP-0045. In addition, the slave stores the resulting changes to the room roster, so that it can send the correct state to entering users.

4.8 Slave Forwards Stanza to Master
The slave may relay messages from local users to the master. When doing so, it MUST NOT modify the stanzas 'from' attribute but MUST retain the original address of the sender.

```
Listing 5: Slave Relays a Message to the Master
<message from='rubenro@vesa.yeggmaex.irc/shaver'
         to='wallops@channel.avalon.irc'/
  <body>Phaedrus, we're all having a truly rotten time.</body>
</message>
```

4.9 Message Broadcast
When relaying a message, the master SHOULD add a urn:xmpp:delay element inside dmuc element so that the slave can provide proper timestamps to new users. The master then sends a copy of the stanza to each slave.

```
Listing 6: Message from Master to all Slaves
<message from='wallops@channel.avalon.irc/BigCheese'
         to='slave@killrc.oulubox.irc'
         type='groupchat'>
  <body>Phaedrus, we're all having a truly rotten time.</body>
  <$x xmlns='urn:xmpp:tmp:dmuc:0'>
```


4 MASTER/SLAVE PROTOCOL

After saving the stanza for the purpose of keeping a room history, the slave SHOULD remove the urn:xmpp:tmp:dmuc:0 element and send the stanza to each local user.

4.10 Master-Slave Keepalive

To ensure a working connecting, the master SHOULD send an XMPP Ping stanza to each slave if there has been no traffic for a certain amount of time. Likewise, each slave should ping the master if there has been no traffic for more than the usual amount of time.

4.11 Netsplit

4.11.1 Netsplit Detection

A 'lost connection' can be detected by either slave or master when a stanza sent to the master or a slave respectively bounced.

If the master receives a stanza with type=error from the slave JID, it MUST:
5 Use-Cases

This section narratively describes the master-slave protocol in context with client interactions.
5.1 Entering a Room

The user seeks to enter the wallops chatroom with the room nickname BigCheese:

```
Listing 7: User Seeks to Enter Room

<presence
  from='rubenro@vesa.yeggmaex.irc/shaver'
  to='wallops@channel.avalon.irc/BigCheese'>
  <x xmlns='http://jabber.org/protocol/muc'/>
</presence>
```

The master sends the presence update to each slave to inform the current occupants of BigCheese’s arrival:

```
Listing 8: Master Sends Presence Update to all Slaves

<presence
  from='wallops@channel.avalon.irc/BigCheese'
  to='slave@killrc.oulubox.irc'>
  <x xmlns='http://jabber.org/protocol/muc#user'>
    <item affiliation='none'
      jid='rubenro@vesa.yeggmaex.irc/shaver'
      role='participant'/>  
  </x>
</presence>
...
```

```
Listing 9: Slaves Distribute Presence Update to Users - killrc Slave

<presence
  from='wallops@channel.avalon.irc/BigCheese'
  to='slave@eris.dclxvii.irc'>
  <x xmlns='http://jabber.org/protocol/muc#user'>
    <item affiliation='none'
      jid='rubenro@vesa.yeggmaex.irc/shaver'
      role='participant'/>  
  </x>
</presence>
...
```

Each slave then distributes this presence update:

```
Listing 9: Slaves Distribute Presence Update to Users - killrc Slave

<presence
  from='wallops@channel.avalon.irc/BigCheese'
  to='slave@vesa.yeggmaex.irc'>
  <x xmlns='http://jabber.org/protocol/muc#user'>
    <item affiliation='none'
      jid='rubenro@vesa.yeggmaex.irc/shaver'
      role='participant'/>  
  </x>
</presence>
```
to='argl@killrc.oulubox.irc/laptop'>
<x xmlns='http://jabber.org/protocol/muc#user'>
  <item affiliation='none'
      jid='rubenro@vesa.yeggmaex.irc/shaver'
      role='participant'/>
</x>
...
</presence>

Listing 10: Slaves Distribute Presence Update to Users - eris Slave

<x xmlns='http://jabber.org/protocol/muc#user'>
  <item affiliation='none'
      jid='rubenro@vesa.yeggmaex.irc/shaver'
      role='participant'/>
</x>
...
</presence>

Listing 11: Slaves Distribute Presence Update to Users - vesa Slave

<x xmlns='http://jabber.org/protocol/muc#user'>
  <item affiliation='none'
      jid='rubenro@vesa.yeggmaex.irc/shaver'
      role='participant'/>
</x>
...
The master then informs the slave of the entered user about a new occupant:

Listing 12: Master Informs Slave of New Occupant

```xml
<presence
   from='wallops@channel.avalon.irc/BigCheese'
   to='slave@vesa.yeggmaex.irc'>
  <x xmlns='urn:xmpp:tmp:dmuc:0'>
    <enter
      jid='rubenro@vesa.yeggmaex.irc/shaver'/>  
  </x>
</presence>
```

The slave sends presence from existing occupants to new occupant:

Listing 13: Slave Sends Presence from Existing Occupants to New Occupant

```xml
<presence
   from='wallops@channel.avalon.irc/Wumpus'
   to='rubenro@vesa.yeggmaex.irc/shaver'>
  <x xmlns='http://jabber.org/protocol/muc#user'>
    <item affiliation='owner' role='moderator'/>
  </x>
</presence>

<presence
   from='wallops@channel.avalon.irc/Valdis'
   to='rubenro@vesa.yeggmaex.irc/shaver'>
  <x xmlns='http://jabber.org/protocol/muc#user'>
    <item affiliation='none' role='participant'/>
  </x>
</presence>

<presence
   from='wallops@channel.avalon.irc/Phaedrus'
   to='rubenro@vesa.yeggmaex.irc/shaver'>
  <x xmlns='http://jabber.org/protocol/muc#user'>
    <item affiliation='none' role='participant'/>
  </x>
</presence>

<presence
   from='wallops@channel.avalon.irc/WiZ'
   to='rubenro@vesa.yeggmaex.irc/shaver'>
  <x xmlns='http://jabber.org/protocol/muc#user'>
    <item affiliation='admin' role='moderator'/>
  </x>
</presence>

<presence
   from='wallops@channel.avalon.irc/Troy'
   to='rubenro@vesa.yeggmaex.irc/shaver'>
  <x xmlns='http://jabber.org/protocol/muc#user'>
    ...  
  </x>
</presence>
```
and concludes the room roster by sending the new occupant’s presence to the new occupant:

Listing 14: Slave Sends New Occupant’s Presence to New Occupant

```
<presence>
  <from>wallops@channel.avalon.irc/BigCheese</from>
  <to>rubenro@vesa.yeggmaex.irc/shaver</to>
</presence>
```

After that, the slave will send the discussion history to the new occupant:

Listing 15: Slave Sends Discussion History to New Occupant

```
<message>
  <from>wallops@channel.avalon.irc/Trillian</from>
  <to>rubenro@vesa.yeggmaex.irc/shaver</to>
  <type>groupchat</type>
  <body>Honest! He did!!</body>
  <delay>
    <from>wallops@channel.avalon.irc/Trillian</from>
    <stamp>1990-01-23T19:50:01Z</stamp>
  </delay>
</message>

<message>
  <from>wallops@channel.avalon.irc/BlondeBoy</from>
  <to>rubenro@vesa.yeggmaex.irc/shaver</to>
  <type>groupchat</type>
  <body>Was that absolutely necessary????????</body>
  <delay>
    <from>wallops@channel.avalon.irc/BlondeBoy</from>
    <stamp>1990-01-23T19:50:30Z</stamp>
  </delay>
</message>

<message>
  <from>wallops@channel.avalon.irc/DCLXVI</from>
  <to>rubenro@vesa.yeggmaex.irc/shaver</to>
  <type>groupchat</type>
  <body>SUUUUUUURE he did</body>
  <delay>
    <from>wallops@channel.avalon.irc/DCLXVI</from>
    <stamp>1990-01-23T19:50:51Z</stamp>
  </delay>
</message>
```
5 USE-CASES

Listing 16: Occupant Sends a Message to All Occupants

Listing 17: Master Distributes Message to all Slaves

The master will broadcast this message to all slaves:

5.2 Sending a Message to All Occupants
And each slave distributes to local occupants

Listing 18: Slave Distributes Message to Occupants - killrc Slave

```
<message
    from='wallops@channel.avalon.irc/BigCheese'
    to='argl@killrc.oulubox.irc/laptop'
    type='groupchat'>
    <body>Phaedrus, we're all having a truly rotten time.</body>
</message>
```

```
<message
    from='wallops@channel.avalon.irc/BigCheese'
    to='valdis@killrc.oulubox.irc/desktop'
    type='groupchat'>
    <body>Phaedrus, we're all having a truly rotten time.</body>
</message>
```

```
<message
    from='wallops@channel.avalon.irc/BigCheese'
    to='phaedrus@killrc.oulubox.irc/phone'
    type='groupchat'>
    <body>Phaedrus, we're all having a truly rotten time.</body>
</message>
```

Listing 19: Slave Distributes Message to Occupants - eris Slave

```
<message
    from='wallops@channel.avalon.irc/BigCheese'
    to='squit@eris.dclxvii.irc/jupiter'
    type='groupchat'>
    <body>Phaedrus, we're all having a truly rotten time.</body>
</message>
```

```
<message
    from='wallops@channel.avalon.irc/BigCheese'
    to='troy@eris.dclxvii.irc/screwdriver'
    type='groupchat'>
    <body>Phaedrus, we're all having a truly rotten time.</body>
</message>
```

Listing 20: Slave Distributes Message to Occupants - vesa Slave
6 Security Considerations

to follow
Careful with channel overtakes :-)  

7 IANA Considerations

This document requires no interaction with the Internet Assigned Numbers Authority (IANA) 1.

8 XMPP Registrar Considerations

This document requires no interaction with the XMPP Registrar 2.

9 XML Schema

to follow

---

1The Internet Assigned Numbers Authority (IANA) is the central coordinator for the assignment of unique parameter values for Internet protocols, such as port numbers and URI schemes. For further information, see <http://www.iana.org/>.

2The XMPP Registrar maintains a list of reserved protocol namespaces as well as registries of parameters used in the context of XMPP extension protocols approved by the XMPP Standards Foundation. For further information, see <https://xmpp.org/registrar/>.