



XMPP

XEP-0282: DMUC2: Distributed MUC

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

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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.

```

BigCheese ----> vesa.yeggmaex.irc ----> wallops MUC ----> killrc.
  oulobox.irc ----> Wumpus
                                     killrc.
                                     oulobox.
                                     irc
                                     ---->
                                     Phaedrus
                                     killrc.
                                     oulobox.
                                     irc
                                     ---->
                                     Valdis
wallops MUC ----> eris.dclxvii
  .irc ----> WiZ
                                     eris.dclxvii
                                     .irc
                                     ---->
                                     Troy
wallops MUC ----> vesa.
  yeggmaex.irc ---->
  BigCheese
                                     vesa.
                                     yeggmaex
                                     .irc
                                     ---->
                                     Efchen

```

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:

| Room Nickname | Full JID | Role |
|---------------|-----------------------------------|-------------|
| Wumpus | argl@killrc.oulubox.irc/laptop | Moderator |
| Valdis | valdis@killrc.oulubox.irc/desktop | Participant |
| Phaedrus | phaedrus@killrc.oulubox.irc/phone | Participant |
| WiZ | squit@eris.dclxvii.irc/jupiter | Moderator |
| Troy | troy@eris.dclxvii.irc/screwdriver | Moderator |
| BigCheese | rubenro@vesa.yeggmaex.irc/shaver | Participant |
| Efchen | msa@vesa.yeggmaex.irc/bicycle | Participant |

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

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

```

<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>
<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>
<presence
  from='wallops@channel.avalon.irc/BigCheese'
  to='slave@vesa.yeggmaex.irc'>
  ...
</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'
  type='groupchat'>
  <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'>

```

```

<delay xmlns='urn:xmpp:delay'
  from='wallops@channel.avalon.irc/BigCheese'
  stamp='1990-10-13T23:58:37Z' />
</x>
</message>
<message
  from='wallops@channel.avalon.irc/BigCheese'
  to='slave@eris.dclxvii.irc'
  type='groupchat'>
  <body>Phaedrus, we're all having a truly rotten time.</body>
  <x xmlns='urn:xmpp:tmp:dmuc:0'>
    <delay xmlns='urn:xmpp:delay'
      from='wallops@channel.avalon.irc/BigCheese'
      stamp='1990-10-13T23:58:37Z' />
    </x>
  </message>
<message
  from='wallops@channel.avalon.irc/BigCheese'
  to='slave@vesa.yeggmaex.irc'
  type='groupchat'>
  <body>Phaedrus, we're all having a truly rotten time.</body>
  <x xmlns='urn:xmpp:tmp:dmuc:0'>
    <delay xmlns='urn:xmpp:delay'
      from='wallops@channel.avalon.irc/BigCheese'
      stamp='1990-10-13T23:58:37Z' />
    </x>
  </message>

```

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:

- mark the slave as 'split', making sure that any further broadcasts are not sent to the affected slave
- start sending pings to the slave with a higher frequency to get a timely notification if the slave reappears
- resync when the slave reappears as described below

In addition, the master MAY send a presence update for each user on the affected slave, marking them as away.

If the slave receives a stanza with type=error from the master's JID, it MUST:

- stop submitting messages to the master
- react to people sending presence updates or leaving the room and broadcast those changes to local users

In addition, the slave MAY (and be careful when using this):

- enable local participants to continue their in-room conversation with other local participants
- enable local participants to continue 1-1 messaging in the context of a room (such as private chat or vcard retrieval)
- enable local users to enter the room (DANGER!!!)
- enable moderators (as designated by the master) to kick participants
- mark non-local users as away

4.11.2 Netjoin

to follow

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>
<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>
<presence
  from='wallops@channel.avalon.irc/BigCheese'
  to='slave@vesa.yeggmaex.irc'>
  ...
</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='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>
<presence
  from='wallops@channel.avalon.irc/BigCheese'
  to='valdis@killrc.oulubox.irc/desktop'>
  ...
</presence>
<presence
  from='wallops@channel.avalon.irc/BigCheese'
  to='phaedrus@killrc.oulubox.irc/phone'>
  ...
</presence>

```

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

```

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

```

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

```

The master then informs the slave of the entered user about a new occupant:

Listing 12: Master Informs Slave of New Occupant

```
<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

```
<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'>
```

```

    <item affiliation='participant' role='moderator' />
  </x>
</presence>
<presence
  from='wallops@channel.avalon.irc/Efchen'
  to='rubenro@vesa.yeggmaex.irc/shaver'>
  <x xmlns='http://jabber.org/protocol/muc#user'>
    <item affiliation='none' role='participant' />
  </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'
  to='rubenro@vesa.yeggmaex.irc/shaver'
  ...
</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'
  to='rubenro@vesa.yeggmaex.irc/shaver'
  type='groupchat'>
  <body>Honest! He did!!</body>
  <delay xmlns='urn:xmpp:delay'
    from='wallops@channel.avalon.irc/Trillian'
    stamp='1990-01-23T19:50:01Z' />
</message>
<message from='wallops@channel.avalon.irc/BlondeBoy'
  to='rubenro@vesa.yeggmaex.irc/shaver'
  type='groupchat'>
  <body>Was that absolutely necessary?????????</body>
  <delay xmlns='urn:xmpp:delay'
    from='wallops@channel.avalon.irc/BlondeBoy'
    stamp='1990-01-23T19:50:30Z' />
</message>
<message from='wallops@channel.avalon.irc/DCLXVI'
  to='rubenro@vesa.yeggmaex.irc/shaver'
  type='groupchat'>
  <body>SUUUUUUUURE he did</body>
  <delay xmlns='urn:xmpp:delay'
    from='wallops@channel.avalon.irc/DCLXVI'
    stamp='1990-01-23T19:50:51Z' />
</message>

```

```

<message from='wallops@channel.avalon.irc/Cerebus'
  to='rubenro@vesa.yeggmaex.irc/shaver'
  type='groupchat'>
  <body>He did. really truly he did.</body>
  <delay xmlns='urn:xmpp:delay'
    from='wallops@channel.avalon.irc/Cerebus'
    stamp='1990-01-23T19:51:20Z' />
</message>

```

5.2 Sending a Message to All Occupants

Listing 16: Occupant Sends a Message to All Occupants

```

<message
  from='rubenro@vesa.yeggmaex.irc/shaver'
  to='wallops@channel.avalon.irc'
  type='groupchat'>
  <body>Phaedrus, we're all having a truly rotten time.</body>
</message>

```

The master will broadcast this message to all slaves:

Listing 17: Master Distributes Message 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'>
    <delay xmlns='urn:xmpp:delay'
      from='wallops@channel.avalon.irc/BigCheese'
      stamp='1990-10-13T23:58:37Z' />
  </x>
</message>
<message
  from='wallops@channel.avalon.irc/BigCheese'
  to='slave@eris.dclxvii.irc'
  type='groupchat'>
  <body>Phaedrus, we're all having a truly rotten time.</body>
  <x xmlns='urn:xmpp:tmp:dmuc:0'>
    <delay xmlns='urn:xmpp:delay'
      from='wallops@channel.avalon.irc/BigCheese'
      stamp='1990-10-13T23:58:37Z' />
  </x>
</message>
<message
  from='wallops@channel.avalon.irc/BigCheese'

```



```

    to='slave@vesa.yeggmaex.irc'
    type='groupchat'>
    <body>Phaedrus, we're all having a truly rotten time.</body>
  </x xmlns='urn:xmpp:tmp:dmuc:0'>
  <delay xmlns='urn:xmpp:delay'
  <from='wallops@channel.avalon.irc/BigCheese'
  <stamp='1990-10-13T23:58:37Z' />
</x>
</message>

```

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

```
<message
  from='wallops@channel.avalon.irc/BigCheese'
  to='rubenro@vesa.yeggmaex.irc/shaver'
  type='groupchat'>
  <body>Phaedrus, we're_all_having_a_truly_rotten_time.</body>
</message>
<message
  from='wallops@channel.avalon.irc/BigCheese'
  to='msa@vesa.yeggmaex.irc/bicycle'
  type='groupchat'>
  <body>Phaedrus, we're all having a truly rotten time.</body>
</message>
```

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/>.