



XMPP

XEP-0395: Atomically Compare-And-Publish PubSub Items

Florian Schmaus

<mailto:flo@geekplace.eu>

<xmpp:flo@geekplace.eu>

2018-12-06

Version 0.2.0

Status	Type	Short Name
Deferred	Standards Track	cap

This specification provides a mechanism to atomically Compare-And-Publish items to a PubSub node.

Legal

Copyright

This XMPP Extension Protocol is copyright © 1999 – 2024 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).

Contents

1	Introduction	1
2	Discovering Support	1
3	Compare-And-Publish PubSub Items	1
3.1	PubSub Item Compare-And-Publish Value (CAP-V)	1
3.2	PubSub publishing using Compare-And-Publish	2
3.3	Could not publish because newest item ID did not match	3
4	Rationale	4
5	Security Considerations	4
6	IANA Considerations	4
7	XMPP Registrar Considerations	4
8	XML Schema	5
9	Acknowledgements	5

1 Introduction

This specification provides a mechanism to atomically publish items to a PubSub node depending on the item ID of the node's latest item. This allows to prevent race conditions and avoids data loss in certain situations.

2 Discovering Support

If an entity supports the Compared-And-Publish feature it MUST advertise the fact by returning a `<feature/>` with the 'var' attribute set to 'urn:xmpp:pubsub:cap:0' in response to a [Service Discovery \(XEP-0030\)](#)¹ query for information.

3 Compare-And-Publish PubSub Items

3.1 PubSub Item Compare-And-Publish Value (CAP-V)

PubSub services supporting the Compare-And-Publish PubSub extension MUST include a Compare-and-Publish value (CAP-V) for every item in every response. The CAP-V value MUST change if the content of the item changed and different item content under the same node MUST NOT yield the same CAP-V. A simple computation of the CAP-ID would be to hash the String representation of the item's content.

CAP-Vs are associated with PubSub node's items via the item ID. The mapping information is placed by the PubSub service in a `<cap-v-map/>` extension element, qualified by the 'urn:xmpp:pubsub:cap:0' namespace, as child element of the `<items/>` element. The `<cap-v-map/>` element contains one or more `<cap-v-map-entry/>` elements, of which each MUST have a 'item-id' and a 'cap-value' attribute. The former contains the PubSub item ID value and the later contains the according CAP-V of the item.

Listing 1: Service returns some items and their according CAP-Vs

```
<iq type='result'
  from='pubsub.shakespeare.lit'
  to='francisco@denmark.lit/barracks'
  id='items1'>
  <pubsub xmlns='http://jabber.org/protocol/pubsub'>
    <items node='princely_musings'>
      <item id='368866411b877c30064a5f62b917cffe'>
        <entry xmlns='http://www.w3.org/2005/Atom'>
          <title>The Uses of This World</title>
          <summary>
0, that this too too solid flesh would melt
```

¹XEP-0030: Service Discovery <https://xmpp.org/extensions/xep-0030.html>.

```

Thaw and resolve itself into a dew!
    </summary>
  </entry>
</item>
<item id='3300659945416e274474e469a1f0154c'>
  <entry xmlns='http://www.w3.org/2005/Atom'>
    <title>Ghostly Encounters</title>
    <summary>
O all you host of heaven! O earth! what else?
And shall I couple hell? O, fie! Hold, hold, my heart;
And you, my sinews, grow not instant old,
But bear me stiffly up. Remember thee!
    </summary>
  </entry>
</item>
<item id='4e30f35051b7b8b42abe083742187228'>
  <entry xmlns='http://www.w3.org/2005/Atom'>
    <title>Alone</title>
    <summary>
Now I am alone.
O, what a rogue and peasant slave am I!
    </summary>
  </entry>
</item>
<cap-v-map xmlns='urn:xmpp:pubsub:cap:0'>
  <cap-value-map-entry
    item-id='368866411b877c30064a5f62b917cffe'
    cap-value='35a204c2-5d6c-43a2-8e0d-a235a627b04a' />
  <cap-value-map-entry
    item-id='3300659945416e274474e469a1f0154c'
    cap-value='166b7c04-ed4d-4872-aa56-a58268da84e2' />
  <cap-value-map-entry
    item-id='4e30f35051b7b8b42abe083742187228'
    cap-value='67f7f792-f2ee-4918-8894-36a3c4a6dd5f' />
</cap-v-map>
</items>
</pubsub>
</iq>

```

3.2 PubSub publishing using Compare-And-Publish

In order to atomically compare-and-publish an item, a client sends a [Publish-Subscribe \(XEP-0060\)](#)² <publish/> IQ with a 'pubsub#prev_item_cap_value' precondition publishing option, set to the value of the currently assumed CAP-V of the latest item of the node. The PubSub service MUST only publish the item if the node's latest item CAP-V is equal to the CAP-V found in the 'pubsub#prev_item_cap_value' field.

²XEP-0060: Publish-Subscribe <<https://xmpp.org/extensions/xep-0060.html>>.

Listing 2: Atomically publishing with Compare-And-Publish

```

<iq type='set'
  from='hamlet@denmark.lit/blogbot'
  to='pubsub.shakespeare.lit'
  id='pub1'>
  <pubsub xmlns='http://jabber.org/protocol/pubsub'>
    <publish node='princely_musings'>
      <item id='2'>
        <entry xmlns='https://example.org'>
          <title>Soliloquy</title>
          <summary>
To be, or not to be: that is the question:
Whether 'tis nobler in the mind to suffer
The slings and arrows of outrageous fortune,
Or to take arms against a sea of troubles,
And by opposing end them?
.....</summary>
.....</entry>
.....</item>
.....</publish>
.....<publish-options>
.....<x xmlns='jabber:x:data' type='submit'>
.....<field var='FORM_TYPE' type='hidden'>
.....<value>http://jabber.org/protocol/pubsub#publish-options</
  value>
.....</field>
.....<field var='pubsub#prev_item_cap_value'>
.....<value>1</value>
.....</field>
.....</x>
.....</publish-options>
..</pubsub>
</iq>

```

3.3 Could not publish because newest item ID did not match

In case the Compare-And-Publish operation failed because the latest node id is not the same as given in the 'previd' attribute in the request, the server returns an <conflict/> error of type 'modify' which a pubsub-specific condition of <precondition-not-met/> and a <compare-and-publish-failed/> element qualified by the 'urn:xmpp:pubsub:cap:0' namespace. The element MUST have a 'cap-id' attribute with the CAP-V of the latest item.

Listing 3: Service returns IQ response notifying of failed Compare-And-Publish operation

```

<iq type='error'

```

```
    from='pubsub.shakespeare.lit'  
    to='hamlet@denmark.lit/elsinore'  
    id='retract1'>  
<error type='modify'>  
  <conflict xmlns='urn:ietf:params:xml:ns:xmpp-stanzas' />  
  <precondition-not-met xmlns='http://jabber.org/protocol/pubsub#  
    errors' />  
  <compare-and-publish-failed xmlns='urn:xmpp:pubsub:cap:0' cap-id='  
    2' />  
</error>  
</iq>
```

4 Rationale

Unfortunately it was not possible to re-use the PubSub item ID for the "Atomically Compare-And-Publish" purpose. This is mostly due XEP-0060 § 12.8 stating that:

"If a publisher publishes an item and the ItemID matches that of an existing item, the pubsub service MUST overwrite the existing item and generate a new event notification."

Which means that the content of an item could change without its ID, rendering the item ID unusable for CAP.

Injecting a "cap"-namespaced attribute carrying the item's CAP-V into PubSub's <item/> would be a very elegant approach to assign CAP-Vs to PubSub items (and the favored one of the XEP's author). But the usage of namespaces attributes within XMPP is controversial. Therefore this XEP resorts to using the <cap-v-map/> approach for now.

5 Security Considerations

This extension protocol does not add any further security considerations to the ones mentioned in XEP-0060 § 14..

6 IANA Considerations

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

7 XMPP Registrar Considerations

This specification defines the following XML namespaces:

- urn:xmpp:pubsub:cap:0

```
<var>
  <name>urn:xmpp:pubsub:cap:0</name>
  <desc>Indicates support for Compare-And-Publish</desc>
  <doc>XEP-XXXX</doc>
</var>
```

This specification defines the following <publish-options/> fields:

- pubsub#prev_item_cap_value

```
<field var='pubsub#prev_item_cap_value'
  type='text-single'
  label='Precondition: The assumed value of the latest item&
  apos; CAP-V of the node' />
```

8 XML Schema

TODO: Add after the XEP leaves the 'experimental' state.

9 Acknowledgements

Thanks to Kim Alvefur and Dave Cridland for their feedback.