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

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This specification provides a mechanism to atomically Compare-And-Publish items to a PubSub node.
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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:xml:pubsub:cap:0' in response to a Service Discovery (XEP-0030) 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:xml: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

```xml
<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>
                    O, that this too too solid flesh would melt
                    </summary>
            </item>
        </items>
    </pubsub>
</iq>
```


### 3.2 PubSub publishing using Compare-And-Publish

In order to atomically compare-and-publish an item, a client sends a XEP-0060 `<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.
3 COMPARE-AND-PUBLISH PUBSUB ITEMS

Listing 2: Atomically publishing with Compare-And-Publish

```xml
<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>
    </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 lastest item.

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

```xml
<iq type='error'
    from='pubsub.shakespeare.lit'
    to='hamlet@denmark.lit/elsinore'>
</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
This specification defines the following `<publish-options/>` fields:

- `pubsub#prev_item_cap_value`

```xml
<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.