1. Introduction

The Jabber community has long acknowledged the need for privacy and security features in a well-rounded instant messaging system. Unfortunately, finding a consensus solution to the problem of end-to-end encryption during the community's younger days was not easy. Eventually, early contributors created a quick solution using OpenPGP ([RFC 4880](http://tools.ietf.org/html/rfc4880) [[1](https://xmpp.org/extensions/xep-0027.html#nt-idm46467681841088)]). This specification documents the OpenPGP solution as it is used today, so that others may interoperate with clients that support it. This document is not intended to present a standard, because more complete solutions are being investigated.

All operations described here are done with standard OpenPGP software such as [GnuPG](http://www.gnupg.org/). All program output is US-ASCII armored output with the headers removed. This allows for easy transportation of the program output directly in the XML. All keys are exchanged using OpenPGP key servers, and usually are retrieved when a signed <presence/> stanza is received (key retrieval does not happen in-band).

2. Signing

Signing enables a sender to verify that they sent a certain block of text. In Jabber, signing uses the 'jabber:x:signed' namespace, and is primarily used with <presence/>, but may also be used with <message/>. The text that is signed MAY be the empty string. When signing presence, the sender SHOULD sign the XML character data of the <status> element. The sender SHOULD sign presence using the private key whose KeyID corresponds to the public key to be used in encrypting messages (see below).

**Example 1.** A signed presence stanza[¶](https://xmpp.org/extensions/xep-0027.html#example-1)

<presence from='pgmillard@jabber.org/wj\_dev2' to='jer@jabber.org'>  
  <status>Online</status>  
  <x xmlns='jabber:x:signed'>  
    iQA/AwUBOjU5dnol3d88qZ77EQI2JACfRngLJ045brNnaCX78ykKNUZaTIoAoPHI  
    2uJxPMGR73EBIvEpcv0LRSy+  
    =45f8  
  </x>  
</presence>

3. Encrypting

Encryption enables the sender to encrypt a message to a specific recipient. This is accomplished using the 'jabber:x:encrypted' namespace in conjunction with <message/> stanzas. Because a block of text is necessary in order to have something to encrypt, <message/> stanzas intended to be encrypted have the same restrictions as signing (see above). The data encrypted MUST be the XML character data of the <body> element. The sender SHOULD encrypt the message body using the public key whose KeyID corresponds to the private key used in signing presence (see above).

**Example 2.** An encrypted message stanza[¶](https://xmpp.org/extensions/xep-0027.html#example-2)

<message to='reatmon@jabber.org/jarl' from='pgmillard@jabber.org/wj\_dev2'>  
  <body>This message is encrypted.</body>  
  <x xmlns='jabber:x:encrypted'>  
    qANQR1DBwU4DX7jmYZnncmUQB/9KuKBddzQH+tZ1ZywKK0yHKnq57kWq+RFtQdCJ  
    WpdWpR0uQsuJe7+vh3NWn59/gTc5MDlX8dS9p0ovStmNcyLhxVgmqS8ZKhsblVeu  
    IpQ0JgavABqibJolc3BKrVtVV1igKiX/N7Pi8RtY1K18toaMDhdEfhBRzO/XB0+P  
    AQhYlRjNacGcslkhXqNjK5Va4tuOAPy2n1Q8UUrHbUd0g+xJ9Bm0G0LZXyvCWyKH  
    kuNEHFQiLuCY6Iv0myq6iX6tjuHehZlFSh80b5BVV9tNLwNR5Eqz1klxMhoghJOA  
    w7R61cCPt8KSd8Vcl8K+StqOMZ5wkhosVjUqvEu8uJ9RupdpB/4m9E3gOQZCBsmq  
    OsX4/jJhn2wIsfYYWdqkbNKnuYoKCnwrlmn6I+wX72p0R8tTv8peNCwK9bEtL/XS  
    mhn4bCxoUkCITv3k8a+Jdvbov9ucduKSFuCBq4/l0fpHmPhHQjkFofxmaWJveFfF  
    619NXyYyCfoLTmWk2AaTHVCjtKdf1WmwcTa0vFfk8BuFHkdah6kJJiJ7w/yNwa/E  
    O6CMymuZTr/LpcKKWrWCt+SErxqmq8ekPI8h7oNwMxZBYAa7OJ1rXWKNgL9pDtNI  
    824Mf0mXj7q5N1eMHvX1QEoKLAda/Ae3TTEevOyeUK1DEgvxfM2KRZ11RzU+XtIE  
    My/bJk7EycAw8P/QKyeNlO1fxP58VEd6Gb8NCPqKOYn/LKh1O+c20ZNVEPFM4bNV  
    XA4hB4UtFF7Ao8kpdlrUqdKyw4lEtnmdemYQ6+iIIVPEarWl9PxOMY90KAnZrSAq  
    bt9uRY/1rPgelRaWblMKvxgpRO8++Y8VjdEyGgMOXxOiE851Ve72ftGzkSxDH8mW  
    TgY3pf2aATmBp3lagQ1COkGS/xupovT5AQPA3RzbCxDvc6s6eGYKmVVQVj5vmSj1  
    WULad5MB9KT1DzCm6FOSy063nWGBYYMWiejRvGLpo1j4eAnj0qOt7rTWmgv3RkYF  
    Oin0vDOhW7aC  
    =CvnG</x>  
</message>

It is considered polite to include an unencrypted message <body/> explaining that the actual message body is encrypted. This helps if the client experiences an error while decrypting the message, or if the user's a client that does not support encryption (although generally this should not happen, since the signed presence can be used to indicate that a client accepts encrypted messages).

4. Security Considerations

The method defined herein has the following security issues:

* Key exchange relies on the web of trust model used on the OpenPGP keys network.
* There is no mechanism for checking a fingerprint or ownership of a key other than checking the user IDs on a key.
* When the recipient is not mentioned in the encrypted body, replay attacks are possible on messages.
* Replay of the signed <presence/> status is possible.
* It relies on signing or encryption of XML character data; therefore, it does not support signing or encryption of <iq/> stanzas, and it allows signing of the presence <status/> element and encryption of the message <body/> element only. Thus the method is not acceptable when signing or encryption of full stanzas is required.
* It does not enable both signing and encryption of a stanza, only signing of the presence status and encryption of the message body.

5. Other Known Issues

In addition to the security considerations listed above, there are several other known issues with this method:

* It is limited to PGP keys and does not support X.509 certificates, Kerberos, RSA keys, etc.
* It does not include feature negotiation; instead, signed <presence/> is used as an indicator of support. Because of the lack of negotiation it is possible for encrypted <message/> elements to be stored offline and then read by a client that cannot support them.
* It is verbose (the example encrypted <message/> is "Hi").

6. IANA Considerations

This document requires no interaction with the [Internet Assigned Numbers Authority (IANA)](http://www.iana.org/) [[2](https://xmpp.org/extensions/xep-0027.html#nt-idm46467681806256)].

7. XMPP Registrar Considerations

The [XMPP Registrar](https://xmpp.org/registrar/) [[3](https://xmpp.org/extensions/xep-0027.html#nt-idm46467681799776)] shall register the 'jabber:x:encrypted' and 'jabber:x:signed' namespaces as a result of this document.

8. XML Schemas

8.1 jabber:x:encrypted

<?xml version='1.0' encoding='UTF-8'?>  
  
<xs:schema  
    xmlns:xs='http://www.w3.org/2001/XMLSchema'  
    targetNamespace='jabber:x:encrypted'  
    xmlns='jabber:x:encrypted'  
    elementFormDefault='qualified'>  
  
  <xs:annotation>  
    <xs:documentation>  
      The protocol documented by this schema is defined in  
      XEP-0027: http://www.xmpp.org/extensions/xep-0027.html  
    </xs:documentation>  
  </xs:annotation>  
  
  <xs:element name='x' type='xs:string'/>  
  
</xs:schema>

8.2 jabber:x:signed

<?xml version='1.0' encoding='UTF-8'?>  
  
<xs:schema  
    xmlns:xs='http://www.w3.org/2001/XMLSchema'  
    targetNamespace='jabber:x:signed'  
    xmlns='jabber:x:signed'  
    elementFormDefault='qualified'>  
  
  <xs:annotation>  
    <xs:documentation>  
      The protocol documented by this schema is defined in  
      XEP-0027: http://www.xmpp.org/extensions/xep-0027.html  
    </xs:documentation>  
  </xs:annotation>  
  
  <xs:element name='x' type='xs:string'/>  
  
</xs:schema>

Appendices

Appendix A: Document Information

**Series**

[XEP](http://xmpp.org/extensions/)

**Number**

0027

**Publisher**

[XMPP Standards Foundation](https://xmpp.org/xsf/)

**Status**

[Obsolete](http://xmpp.org/extensions/xep-0001.html#states-Obsolete)

**Type**

[Historical](http://xmpp.org/extensions/xep-0001.html#types-Historical)

**Version**

1.4

**Last Updated**

2014-03-14

**Approving Body**

[XMPP Council](http://xmpp.org/council/)

**Dependencies**

XMPP Core, RFC 4880

**Supersedes**

None

**Superseded By**

None

**Short Name**

openpgp

**Schema**

XML Schema for the 'jabber:x:encrypted' namespace: <<http://www.xmpp.org/schemas/x-encrypted.xsd>>

XML Schema for the 'jabber:x:signed' namespace: <<http://www.xmpp.org/schemas/x-signed.xsd>>

**Source Control**

[HTML](https://github.com/xsf/xeps/blob/master/xep-0027.xml)

This document in other formats: [XML](http://xmpp.org/extensions/xep-0027.xml)  [PDF](http://xmpp.org/extensions/xep-0027.pdf)

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Appendix C: Legal Notices

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Appendix D: Relation to XMPP

The Extensible Messaging and Presence Protocol (XMPP) is defined in the XMPP Core (RFC 6120) and XMPP IM (RFC 6121) specifications contributed by the XMPP Standards Foundation to the Internet Standards Process, which is managed by the Internet Engineering Task Force in accordance with RFC 2026. Any protocol defined in this document has been developed outside the Internet Standards Process and is to be understood as an extension to XMPP rather than as an evolution, development, or modification of XMPP itself.

Appendix E: Discussion Venue

The primary venue for discussion of XMPP Extension Protocols is the <[standards@xmpp.org](http://mail.jabber.org/mailman/listinfo/standards)> discussion list.

Discussion on other xmpp.org discussion lists might also be appropriate; see <<http://xmpp.org/about/discuss.shtml>> for a complete list.

Given that this XMPP Extension Protocol normatively references IETF technologies, discussion on the <[xsf-ietf@xmpp.org](http://mail.jabber.org/mailman/listinfo/xsf-ietf)> list might also be appropriate.

Errata can be sent to <[editor@xmpp.org](mailto:editor@xmpp.org)>.

Appendix F: Requirements Conformance

The following requirements keywords as used in this document are to be interpreted as described in [RFC 2119](http://www.ietf.org/rfc/rfc2119.txt): "MUST", "SHALL", "REQUIRED"; "MUST NOT", "SHALL NOT"; "SHOULD", "RECOMMENDED"; "SHOULD NOT", "NOT RECOMMENDED"; "MAY", "OPTIONAL".

Appendix G: Notes

1. RFC 4880: OpenPGP Message Format <<http://tools.ietf.org/html/rfc4880>>.

2. The 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/>>.

3. The 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/>>.

Appendix H: Revision History

Note: Older versions of this specification might be available at <http://xmpp.org/extensions/attic/>

1. **Version 1.4 (2014-03-14)**

Per a vote of the XMPP Council, changed status from Active to Deprecated to Obsolete.

editor (mam)

1. **Version 1.3 (2006-11-29)**

Removed the unnecessary requirement that the presence status or message body must contain XML character data, since an empty string can be signed.

psa

1. **Version 1.2 (2004-03-08)**

Clarified the text in several places; added several more security considerations and known issues.

psa

1. **Version 1.1 (2004-01-06)**

Added XML schemas; added security, IANA, and XMPP Registrar considerations.

psa

1. **Version 1.0 (2002-04-23)**

Changed status to Active.

psa

1. **Version 0.2 (2002-04-11)**

Merged DW's comments on key usage as well as more known issues.

tjm

1. **Version 0.1 (2002-03-12)**

First draft.