XEP-0247: Jingle XML Streams

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This specification defines a Jingle application type for establishing direct or mediated XML streams between two entities over any streaming transport. This technology thus enables two entities to establish a trusted connection for end-to-end encryption or for bypassing server limits on large volumes of XMPP traffic.

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Contents

1 Introduction

The standard client-server architecture for XMPP communication provides a stable infrastructure for real-time communication. However, there are certain situations in which it is desirable to bypass the standard client-server architecture, including:

- Two endpoints cannot access an XMPP server
- Two endpoints want to enforce end-to-end encryption
- Two endpoints want to send a high volume of XMPP traffic but the intermediate servers enforce rate limits

The first situation is addressed by Link-Local Messaging (XEP-0174) [1]. However, if the endpoints already have client-to-server connections but wish to bypass those connections or leverage those streams for a higher-level application such as end-to-end encryption, it is desirable for the two endpoints to negotiate an end-to-end XML stream. This specification defines methods for doing so, where the application format is an XML stream and the transport method is any direct or mediated streaming transport, such as Jingle In-Band Bytestreams Transport Method (XEP-0261) [2] (mediated), Jingle SOCKS5 Bytestreams Transport Method (XEP-0260) [3] (direct or mediated), or a future ice-tcp Jingle transport (direct or mediated) based on RFC 6544 [4].

2 Protocol

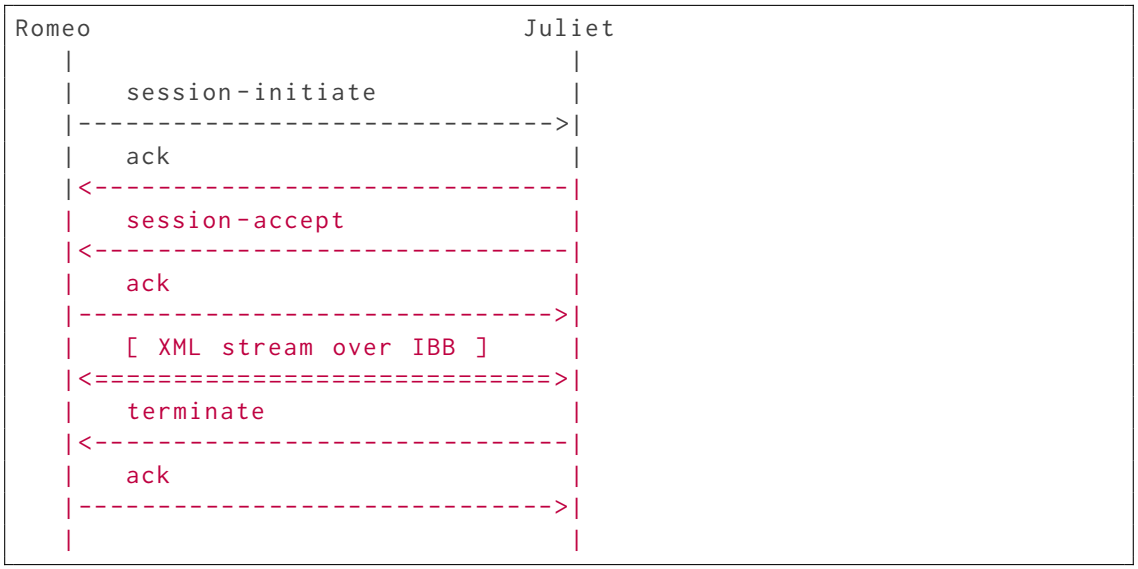
This section provides a friendly introduction to Jingle XML streams.
First, the party that wishes to initiate the stream determines the responder's capabilities (via Service Discovery (XEP-0030) [5] or Entity Capabilities (XEP-0115) [6]). Here we assume that the responder supports a service discovery feature of 'urn:xmpp:jingle:apps:xmlstream:0' (see Namespace Versioning regarding the possibility of incrementing the version number) corresponding to the Jingle XML stream functionality defined herein, as well as the 'urn:xmpp:jingle:transports:ibb:0' feature.
The initiator then sends a Jingle session-initiation request to the responder. The content-type of the request specifies three things:

1. An application type of "urn:xmpp:jingle:apps:xmlstream:0".

[1] XEP-0174: Link-Local Messaging <https://xmpp.org/extensions/xep-0174.html>.
[2] XEP-0261: Jingle In-Band Bytestreams Transport Method <https://xmpp.org/extensions/xep-0261.html>.
[3] XEP-0260: Jingle SOCKS5 Bytestreams Transport Method <https://xmpp.org/extensions/xep-0260.html>.
[4] RFC 6544: TCP Candidates with Interactive Connectivity Establishment (ICE) <http://tools.ietf.org/html/rfc6544>.
[5] XEP-0030: Service Discovery <https://xmpp.org/extensions/xep-0030.html>.
[6] XEP-0115: Entity Capabilities <https://xmpp.org/extensions/xep-0115.html>.

2. Options for the streaming transport method, such as In-Band Bytestreams (”IBB”) as defined in Jingle In-Band Bytestreams Transport Method (XEP-0261) [7] or SOCKS5 Bytestreams (”S5B”) as defined in XEP-0260.

Note: It is STRONGLY RECOMMENDED to encrypt all end-to-end XML streams as described in Jingle-XTLS (currently located at <http://xmpp.org/extensions/inbox/jingle-xtls.html>). Those security flows are NOT described here.
In this example, the initiator is <romeo@montague.lit>, the responder is <juliet@capulet.lit>, and the initiation request specifies a transport method of ”jingle-ibb” (i.e., Jingle In-Band Bytestreams Transport Method (XEP-0261) [8]).
The flow is as follows.



First the initiator sends a Jingle session-initiate.

Listing 1: Initiator sends session-initiate

```
<iq from='romeo@montague.lit/orchard'
    id='ty1bf726'
    to='juliet@capulet.lit/balcony'
    type='set'>
  <jingle xmlns='urn:xmpp:jingle:0'
          action='session-initiate'
          initiator='romeo@montague.lit/orchard'
          sid='851ba2'>
    <content creator='initiator' name='xmlstream'>
      <description xmlns='urn:xmpp:jingle:apps:xmlstream:0'/>
```

[7] XEP-0261: Jingle In-Band Bytestreams Transport Method <https://xmpp.org/extensions/xep-0261.html>.
[8] XEP-0261: Jingle In-Band Bytestreams Transport Method <https://xmpp.org/extensions/xep-0261.html>.

```
      <transport xmlns='urn:xmpp:jingle:transports:ibb:0'
                 block-size='4096'
                 sid='vj3hs98y'/>
    </content>
  </jingle>
</iq>
```

The responder immediately acknowledges receipt of the Jingle session-initiate.

Listing 2: Responder acknowledges session-initiate

```
<iq from='juliet@capulet.lit/balcony'
    id='ty1bf726'
    to='romeo@montague.lit/orchard'
    type='result'/>
```

If the responding user accepts the session then her client sends a session-accept.

Listing 3: Responder sends session-accept

```
<iq from='juliet@capulet.lit/balcony'
    id='hwd987h'
    to='romeo@montague.lit/orchard'
    type='set'>
  <jingle xmlns='urn:xmpp:jingle:0'
          action='session-accept'
          initiator='romeo@montague.lit/orchard'
          sid='a73sjjvkla37jfea'>
    <content creator='initiator' name='stub'>
      <description xmlns='urn:xmpp:jingle:apps:stub:0'/>
      <transport xmlns='urn:xmpp:jingle:transports:ibb:0'
                 block-size='4096'
                 sid='vj3hs98y'/>
    </content>
  </jingle>
</iq>
```

The initiator acknowledges receipt.

Listing 4: Initiator acknowledges session-accept

```
<iq from='romeo@montague.lit/orchard'
    id='hwd987h'
    to='juliet@capulet.lit/balcony'
    type='result'/>
```

The clients can then begin to exchange XMPP data over the in-band bytestream. Because the transport is an in-band bytestream, the XMPP data is prepared as described in In-Band

Bytestreams (XEP-0047) [9] (i.e., Base64-encoded).
First the initiator sends an initial stream header to the responder.

Listing 5: Initial stream header (unencoded)

```
<stream:stream
        xmlns='jabber:client'
        xmlns:stream='http://etherx.jabber.org/streams'
        from='romeo@montague.lit/orchard'
        to='juliet@capulet.lit/balcony'
        version='1.0'>
```

Note: In accordance with XMPP IM [10], the initial stream header SHOULD include the 'to' and 'from' attributes, which SHOULD specify the full JIDs of the clients. If the initiator supports stream features and the other stream-related aspects of XMPP 1.0 as specified in RFC 3920 [11], then it SHOULD include the version='1.0' flag as shown in the previous example.

Listing 6: Initial stream header (encoded in IBB) and IQ-result

```
<iq from='romeo@montague.net/orchard'
    id='ur73n153'
    to='juliet@capulet.com/balcony'
    type='set'>
  <data xmlns='http://jabber.org/protocol/ibb' seq='0' sid='vj3hs98y'>
    PHN0cmVhbTpzdHJlYW0geG1sbnM9J2phYmJlcjpjbGllbnQnIHhtbG5zOnN0cmVh
    bT0naHR0cDovL2V0aGVyeC5qYWJiZXIub3JnL3N0cmVhbXMnIGZyb209J3JvbWVv
    QG1vbnRhZ3VlLmxpdC9vcmNoYXJkJyB0bz0nanVsaWV0QGNhcHVsZXQubGl0L2Jh
    bGNvbnknIHZlcnNpb249JzEuMCc+
  </data>
</iq>

<iq from='juliet@capulet.com/balcony'
    id='ur73n153'
    to='romeo@montague.net/orchard'
    type='result'/>
```

The responder then sends a response stream header back to the initiator (because this stream header is sent in the other direction, the IBB 'seq' attribute has a value of zero, not 1).

Listing 7: Response stream header

```
<stream:stream
        xmlns='jabber:client'
        xmlns:stream='http://etherx.jabber.org/streams'
```

[9] XEP-0047: In-Band Bytestreams <https://xmpp.org/extensions/xep-0047.html>.
[10] RFC 6121: Extensible Messaging and Presence Protocol (XMPP): Instant Messaging and Presence <http://tools.ietf.org/html/rfc6121>.
[11] RFC 3920: Extensible Messaging and Presence Protocol (XMPP): Core <http://tools.ietf.org/html/rfc3920>.

```
        from='juliet@capulet.lit/balcony'
        id='hs91gh1836d8s717'
        to='romeo@montague.lit/orchard'
        version='1.0'>
```

Listing 8: Response stream header (encoded in IBB) and IQ-result

```
<iq from='juliet@capulet.com/balcony'
    id='pd61g397'
    to='romeo@montague.net/orchard'
    type='set'>
  <data xmlns='http://jabber.org/protocol/ibb' seq='1' sid='vj3hs98y'>
    PHN0cmVhbTpzdHJlYW0geG1sbnM9J2phYmJlcjpjbGllbnQnIHhtbG5zOnN0cmVh
    bT0naHR0cDovL2V0aGVyeC5qYWJiZXIub3JnL3N0cmVhbXMnIGZyb209J2p1bGll
    dEBjYXB1bGV0LmxpdC9iYWxjb255JyBpZD0naHM5MWdoMTgzNmQ4czcxNycgdG89
    J3JvbWVvQG1vbnRhZ3VlLmxpdC9vcmNoYXJkJyB2ZXJzaW9uPScxLjAnPg==
  </data>
</iq>

<iq from='romeo@montague.net/orchard'
    id='pd61g397'
    to='juliet@capulet.com/balcony'
    type='result'/>
```

Once the streams are established, either entity then can send XMPP message, presence, and IQ stanzas, with or without 'to' and 'from' addresses.

Listing 9: A message (unencoded)

```
<message from='romeo@montague.lit/orchard' to='juliet@capulet.lit/
   balcony'>
  <body>M&apos;lady, I would be pleased to make your acquaintance.</
     body>
</message>
```

Listing 10: A message (encoded in IBB) and IQ-result

```
<iq from='romeo@montague.net/orchard'
    id='iq7dh294'
    to='juliet@capulet.com/balcony'
    type='set'>
  <data xmlns='http://jabber.org/protocol/ibb' seq='1' sid='vj3hs98y'>
    PG1lc3NhZ2UgZnJvbT0ncm9tZW9AbW9udGFndWUubGl0L29yY2hhcmQnIHRvPSdq
    dWxpZXRAY2FwdWxldC5saXQvYmFsY29ueSc+PGJvZHk+TSZhcG9zO2xhZHksIEkg
    d291bGQgYmUgcGxlYXNlZCB0byBtYWtlIHlvdXIgYWNxdWFpbnRhbmNlLjwvYm9k
    eT48L21lc3NhZ2U+
  </data>
</iq>
```

```
<iq from='juliet@capulet.com/balcony'
    id='iq7dh294'
    to='romeo@montague.net/orchard'
    type='result'/>
```

The responder could then send a reply.

Listing 11: A reply (unencoded)

```
<message from='juliet@capulet.lit/balcony' to='romeo@montague.lit/
   orchard'>
  <body>Art thou not Romeo, and a Montague?</body>
</message>
```

Listing 12: A reply (encoded in IBB) and IQ-result

```
<iq from='juliet@capulet.com/balcony'
    id='hr91hd63'
    to='romeo@montague.net/orchard'
    type='set'>
  <data xmlns='http://jabber.org/protocol/ibb' seq='1' sid='vj3hs98y'>
    PG1lc3NhZ2UgZnJvbT0nanVsaWV0QGNhcHVsZXQubGl0L2JhbGNvbnknIHRvPSdy
    b21lb0Btb250YWd1ZS5saXQvb3JjaGFyZCc+PGJvZHk+QXJ0IHRob3Ugbm90IFJv
    bWVvLCBhbmQgYSBNb250YWd1ZT88L2JvZHk+PC9tZXNzYWdlPg==
  </data>
</iq>

<iq from='romeo@montague.net/orchard'
    id='kr91n475'
    to='juliet@capulet.com/balcony'
    type='result'/>
```

To end the XML stream, either party sends a closing </stream:stream> element.

Listing 13: Stream close (unencoded)

```
</stream:stream>
```

Listing 14: Stream close (encoded in IBB) and IQ-result

```
<iq from='juliet@capulet.com/balcony'
    id='kr91n475'
    to='romeo@montague.net/orchard'
    type='set'>
  <data xmlns='http://jabber.org/protocol/ibb' seq='2' sid='vj3hs98y'>
    PC9zdHJlYW06c3RyZWFtPg==
  </data>
</iq>
```

```
<iq from='romeo@montague.net/orchard'
    id='kr91n475'
    to='juliet@capulet.com/balcony'
    type='result'/>
```

However, even after the application-level XML stream is terminated, the negotiated Jingle transport (here in-band bytestream) continues and could be re-used. To completely terminate the Jingle session, the terminating party would then also send a Jingle session-terminate message.

Listing 15: Responder terminates the stream and session

```
<iq from='juliet@capulet.lit/balcony'
    id='psy617r4'
    to='romeo@montague.lit/orchard'
    type='set'>
  <jingle xmlns='urn:xmpp:jingle:0'
          action='session-terminate'
          initiator='romeo@montague.lit/orchard'
          sid='851ba2'/>
</iq>
```

The other party then acknowledges the Jingle session-terminate.

Listing 16: Initiator acks session-terminate

```
<iq from='romeo@montague.lit/orchard'
    id='psy617r4'
    to='juliet@capulet.lit/balcony'
    type='result'/>
```

3 Implementation Notes

3.1 Mandatory to Implement Technologies

An implementations MUST support the Jingle IBB Transport Method (Jingle In-Band Bytestreams Transport Method (XEP-0261) [12]) as a dependable method of last resort. An implementation SHOULD support other streaming transport methods as well, such as the Jingle S5B Transport Method (XEP-0260).

3.2 Preference Order of Transport Methods

An application MAY present transport methods in any order, except that the Jingle IBB Transport Method MUST be the lowest preference.

[12] XEP-0261: Jingle In-Band Bytestreams Transport Method <https://xmpp.org/extensions/xep-0261.html>.

4 IANA Considerations

No interaction with the Internet Assigned Numbers Authority (IANA) [13] is required as a result of this document.

5 XMPP Registrar Considerations

5.1 Protocol Namespaces

This specification defines the following XML namespace:

- urn:xmpp:jingle:apps:xmlstream:0

Upon advancement of this specification from a status of Experimental to a status of Draft, the XMPP Registrar [14] shall add the foregoing namespaces to the registry located at <https://xmpp.org/registrar/namespaces.html>, as described in Section 4 of XMPP Registrar Function (XEP-0053) [15].

5.2 Protocol Versioning

If the protocol defined in this specification undergoes a revision that is not fully backwards-compatible with an older version, the XMPP Registrar shall increment the protocol version number found at the end of the XML namespaces defined herein, as described in Section 4 of XEP-0053.

5.3 Jingle Application Formats

The XMPP Registrar shall include ”xmlstream” in its registry of Jingle application formats. The registry submission is as follows:

[13] 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/>.

[14] 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/>.

[15] XEP-0053: XMPP Registrar Function <https://xmpp.org/extensions/xep-0053.html>.

```
<application>
  <name>xmlstream</name>
  <desc>Jingle sessions for an end-to-end XML stream</desc>
  <transport>streaming</transport>
  <doc>XEP-0247</doc>
</application>
```

6 XML Schema

```
<?xml version='1.0' encoding='UTF-8'?>

<xs:schema
    xmlns:xs='http://www.w3.org/2001/XMLSchema'
    targetNamespace='urn:xmpp:jingle:apps:xmlstream:0'
    xmlns='urn:xmpp:jingle:apps:xmlstream:0'
    elementFormDefault='qualified'>

  <xs:element name='description' type='empty'/>

  <xs:simpleType name='empty'>
    <xs:restriction base='xs:string'>
      <xs:enumeration value=''/>
    </xs:restriction>
  </xs:simpleType>

</xs:schema>
```