



# XMPP

## XEP-0181: Jingle DTMF

Peter Saint-Andre  
<mailto:stpeter@stpeter.im>  
<xmpp:stpeter@jabber.org>  
<https://stpeter.im/>

Sean Egan  
<mailto:seanegan@google.com>  
<xmpp:seanegan@google.com>

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This specification defines an XML format for encapsulating Dual Tone Multi-Frequency (DTMF) events in informational messages sent within the context of Jingle audio sessions, e.g. to be used in the context of Interactive Voice Response (IVR) systems. Note well that this format is not to be used in the context of RTP sessions, where native RTP methods are to be used instead.

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## 1 Introduction

Traditional telephony systems such as the public switched telephone network (PSTN) use Dual Tone Multi-Frequency (DTMF) events for dialing and to issue commands such as those used in interactive voice response (IVR) applications. Internet telephony systems also use DTMF tones, usually for interoperability with the PSTN but sometimes also in native Internet services.

XMPP applications that use [Jingle \(XEP-0166\)](https://xmpp.org/extensions/xep-0166.html)<sup>1</sup> and the Real-time Transport Protocol ([RFC 3550](http://tools.ietf.org/html/rfc3550))<sup>2</sup> for voice chat as described in [Jingle RTP Sessions \(XEP-0167\)](https://xmpp.org/extensions/xep-0167.html)<sup>3</sup> MUST support and prefer native RTP methods of communicating DTMF information, in particular the "audio/telephone-event" and "audio/tone" media types. Such applications SHOULD NOT use the protocol described herein for communicating DTMF information with RTP-aware endpoints.

However, XMPP applications MAY support and use the protocol described herein for communicating DTMF information with endpoints that are not RTP-aware, such as gateways to the PSTN.

## 2 Format

The format for the representation of DTMF events over XMPP is as follows (see [Namespace Versioning](#) regarding the possibility of incrementing the version number):

```
<dtmf xmlns='urn:xmpp:jingle:dtmf:0'
      code='0-9,#,*,A-D'
      duration='milliseconds'
      volume='0-63' />
```

The <dtmf/> element MUST be empty.

The attributes of the <dtmf/> element are as follows.

---

<sup>1</sup>XEP-0166: Jingle <<https://xmpp.org/extensions/xep-0166.html>>.

<sup>2</sup>RFC 3550: RTP: A Transport Protocol for Real-Time Applications <<http://tools.ietf.org/html/rfc3550>>.

<sup>3</sup>XEP-0167: Jingle RTP Sessions <<https://xmpp.org/extensions/xep-0167.html>>.

| Attribute | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Example | Inclusion   |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------|
| code      | A single-character code that identifies the tone to be generated. The value of the 'code' attribute SHOULD be one and only one the following characters: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, #, and * (however, the characters A, B, C, and D MAY be sent as well Although A, B, C, and D were originally defined as part of DTMF, they were never deployed to telephony consumers and were used only for control purposes at private branch exchanges (PBXs) and central office operator stations; however, they are used in certain non-telephony applications of DTMF, such as ham radio.). | #       | REQUIRED    |
| duration  | The duration of the event, in milliseconds, expressed as a non-negative integer. The receiver SHOULD ignore the event if the value is zero. The default value is 100 (i.e., 100ms).                                                                                                                                                                                                                                                                                                                                                                                                      | 400     | RECOMMENDED |
| volume    | The power level of the tone, expressed in dBm0 after dropping the sign. Power levels range from 0 to -63 dBm0. Thus, a larger value denotes a lower volume.                                                                                                                                                                                                                                                                                                                                                                                                                              | 37      | OPTIONAL    |

The <dtmf> element SHOULD be sent as the payload of a Jingle session-info message as illustrated in the following example.

Listing 1: Entity sends DTMF message

```
<iq from='juliet@capulet.com/balcony'
  id='dtmf1'
  to='ivr.shakespeare.lit'
  type='set'>
  <jingle xmlns='urn:xmpp:jingle:0'
    action='session-info'
    initiator='juliet@capulet.com/balcony'
    sid='a73sjjvkl37jfea'>
    <dtmf xmlns='urn:xmpp:jingle:dtmf:0'
      code='7'
      duration='400'
      volume='42' />
  </jingle>
</iq>
```

The receiving entity MUST send an IQ result if it can process the DTMF:

Listing 2: Receiving entity acknowledges DTMF message

```
<iq from='ivr.shakespeare.lit'
  id='dtmf1'
  to='juliet@capulet.com/balcony'
  type='result' />
```

If the receiving entity does not support this protocol, it MUST return a <service-unavailable/> stanza error.

Listing 3: Receiving entity does not support DTMF protocol

```
<iq from='ivr.shakespeare.lit'
  id='dtmf1'
  to='juliet@capulet.com/balcony'
  type='error'>
  <error type='cancel'>
    <service-unavailable
      xmlns='urn:ietf:params:xml:ns:xmpp-stanzas' />
  </error>
</iq>
```

If the receiving entity supports this protocol but does not understand the specified code, it MUST return a <feature-not-implemented/> stanza error.

Listing 4: Receiving entity does not understand code

```
<iq from='ivr.shakespeare.lit'
  id='dtmf1'
  to='juliet@capulet.com/balcony'
  type='error'>
  <error type='cancel'>
    <feature-not-implemented
      xmlns='urn:ietf:params:xml:ns:xmpp-stanzas' />
    </error>
  </iq>
```

If the receiving entity is using or wishes to use a different method for exchanging DTMF events (e.g., the methods specified in RFC 2833<sup>4</sup> or its successor RFC 4733<sup>5</sup>), it MUST return a <not-acceptable/> stanza error.

Listing 5: Receiving prefers non-XMPP DTMF method

```
<iq from='ivr.shakespeare.lit'
  id='dtmf1'
  to='juliet@capulet.com/balcony'
  type='error'>
  <error type='cancel'>
    <not-acceptable
      xmlns='urn:ietf:params:xml:ns:xmpp-stanzas' />
    </error>
  </iq>
```

### 3 Determining Support

If an entity supports sending of DTMF in the XMPP signalling channel as specified herein, it MUST return a [Service Discovery \(XEP-0030\)](#)<sup>6</sup> feature of "urn:xmpp:jingle:dtmf:0" in response to service discovery information requests.

In order for an application to determine whether an entity supports this protocol, where possible it SHOULD use the dynamic, presence-based profile of service discovery defined in [Entity Capabilities \(XEP-0115\)](#)<sup>7</sup>. However, if an application has not received entity capabilities information from an entity, it SHOULD use explicit service discovery instead.

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<sup>4</sup>RFC 2833: RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals <<http://tools.ietf.org/html/rfc2833>>.

<sup>5</sup>RFC 4733: RTP Payload for DTMF Digits, Telephony Tones, and Telephony Signals <<http://tools.ietf.org/html/rfc4733>>.

<sup>6</sup>XEP-0030: Service Discovery <<https://xmpp.org/extensions/xep-0030.html>>.

<sup>7</sup>XEP-0115: Entity Capabilities <<https://xmpp.org/extensions/xep-0115.html>>.

## 4 Security Considerations

This document introduces no known security vulnerabilities.

## 5 IANA Considerations

This document requires no interaction with the [Internet Assigned Numbers Authority \(IANA\)](#)<sup>8</sup>.

## 6 XMPP Registrar Considerations

### 6.1 Protocol Namespaces

This specification defines the following XML namespace:

- urn:xmpp:jingle:dtmf:0

Upon advancement of this specification from a status of Experimental to a status of Draft, the [XMPP Registrar](#)<sup>9</sup> shall add the foregoing namespace to the registry located at [<https://xmpp.org/registrar/namespaces.html>](https://xmpp.org/registrar/namespaces.html), as described in Section 4 of [XMPP Registrar Function \(XEP-0053\)](#)<sup>10</sup>.

### 6.2 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.

## 7 XML Schema

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<sup>8</sup>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/>.

<sup>9</sup>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/>.

<sup>10</sup>XEP-0053: XMPP Registrar Function [<https://xmpp.org/extensions/xep-0053.html>](https://xmpp.org/extensions/xep-0053.html).

```

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

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

  <xs:element name='dtmf'>
    <xs:complexType>
      <xs:simpleContent>
        <xs:extension base='empty'>
          <xs:attribute name='code'
            type='DTMFString'
            use='required' />
          <xs:attribute name='duration'
            type='xs:nonNegativeInteger'
            use='optional'
            default='100' />
          <xs:attribute name='volume'
            type='VolumeDigit'
            use='optional' />
        </xs:extension>
      </xs:simpleContent>
    </xs:complexType>
  </xs:element>

  <xs:simpleType name="DTMFString">
    <xs:restriction base="xs:string">
      <xs:pattern value="(#[\*|0|1|2|3|4|5|6|7|8|9|A|B|C|D)" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="VolumeDigit">
    <xs:restriction base="xs:integer">
      <xs:minInclusive value="0"/>
      <xs:maxInclusive value="63"/>
    </xs:restriction>
  </xs:simpleType>

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

</xs:schema>

```

## 8 Acknowledgements

Thanks to Diana Cionoiu, Olivier Crête, Robert McQueen, and Paul Witty for their feedback. Several sentences were borrowed from [RFC 4733](#) <sup>11</sup>.

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<sup>11</sup>RFC 4733: RTP Payload for DTMF Digits, Telephony Tones, and Telephony Signals <<http://tools.ietf.org/html/rfc4733>>.