



# XMPP

## XEP-0342: Rayo Fax

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2014-03-13

Version 0.2

Status	Type	Short Name
Experimental	Standards Track	NOT_YET_ASSIGNED

This specification defines an extension to the Rayo protocol (XEP-0327) to provide provision for sending and receiving faximilies via a call under the control of a Rayo client.

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## 1 Introduction

Rayo allows for the third-party control of media sessions such as telephone calls. A common requirement in telephony applications providing backward compatibility with legacy systems is to support sending and receiving faxes. This specification extends the core Rayo specification, to describe a protocol for this use case.

## 2 Session Flow

This section describes the form, function and order of Rayo stanzas sent across the wire, and the circumstances in which they apply and/or may arise.

### 2.1 Receiving Faxes

A Rayo client may utilise Rayo CPA to establish a fax CNG tone before initiating fax receipt using the `receivefax` component described below.

The `receivefax` component accepts a fax from a caller, stores it, and makes it available to Rayo clients. The component is created using a `<receivefax/>` command.

Listing 1: Client receives a fax

```
<iq from='juliet@capulet.lit/balcony'  
  to='9f00061@call.shakespeare.lit'  
  type='set'  
  id='h7ed2'>  
  <receivefax xmlns='urn:xmpp:rayo:fax:1' />  
</iq>
```

The server **MUST** validate that it has appropriate resources/mechanisms to receive the fax before acknowledging the component creation.

#### 2.1.1 Commands

The `receivefax` component does not implement any intermediary commands.

#### 2.1.2 Events

The `receivefax` component does not provide any intermediate events.

### 2.1.3 Completion

The receivefax completion reason MUST be one of the core Rayo reasons or [finish](#) (indicating that the document was fully received). Receivefax component completion provides a fax element only when a document was successfully received.

The server MUST present the fax for consumption by the client by way of fax meta-data on the complete reason, including a URI at which the document may be fetched. It MUST provide url, resolution, file size & page count data as specified on the [fax element](#). In cases of partial receipt of a fax, a fax element MAY be returned in addition to the error completion reason.

Listing 2: Component indicates it has completed due to being finished, providing the fax

```
<presence from='9f00061@call.shakespeare.lit/eh3u28'
  to='juliet@capulet.lit/courtyard'
  type='unavailable'>
  <complete xmlns='urn:xmpp:rayo:ext:1'>
    <finish xmlns='urn:xmpp:rayo:fax:complete:1' />
    <fax xmlns='urn:xmpp:rayo:fax:complete:1' url='http://shakespeare.
      lit/faxes/fax1.tiff' resolution='595x841' size='12287492817'
      pages='3' />
    <metadata xmlns='urn:xmpp:rayo:fax:complete:1' name="fax-transfer-
      rate" value="10000" />
  </complete>
</presence>
```

## 2.2 Sending Faxes

Sending faxes can be achieved by using the Sendfax component. A conformant server MUST support image/tiff documents, and MAY also support others. A conformant server MUST support fetching documents via an HTTP URL and MAY support other URL schemes.

Listing 3: Client sends a fax document to a call

```
<iq from='juliet@capulet.lit/balcony'
  to='9f00061@call.shakespeare.lit'
  type='set'
  id='h7ed2'>
  <sendfax xmlns='urn:xmpp:rayo:fax:1'>
    <document xmlns='urn:xmpp:rayo:fax:1' url='http://shakespeare.lit/
      my_fax.tiff' />
  </sendfax>
</iq>
```

Additionally, a sendfax component MAY include in its completion reason one or more [<meta-data/> elements](#) describing the result of transmitting the document, like so:

Listing 4: Client finishes sending a fax document to a call

```

<presence from='9f00061@call.shakespeare.lit/eh3u28'
          to='juliet@capulet.lit/courtyard'
          type='unavailable'>
  <complete xmlns='urn:xmpp:rayo:ext:1'>
    <finish xmlns='urn:xmpp:rayo:fax:complete:1' />
    <metadata xmlns='urn:xmpp:rayo:fax:complete:1' name="fax-transfer-
      rate" value="10000" />
  </complete>
</presence>

```

## 3 Formal Definition

### 3.1 Receivefax Element

Instructs the server to begin receiving a fax.  
 The <receivefax/> element MUST be empty.  
 The <receivefax/> element has no attributes.

### 3.2 Sendfax Element

Instructs the server to begin transmitting a fax.  
 The <sendfax/> element MUST be empty.  
 The <sendfax/> element has no attributes.

### 3.3 Fax Element

Provides the result of a received fax, as a reference to its location.  
 The <fax/> element MUST be empty.  
 The attributes of the <fax/> element are as follows.

Attribute	Definition	Possible Values	Inclusion
url	Indicates the URL at which the fax is made available.	A valid URI.	REQUIRED
resolution	Indicates the resolution of the received fax.	A string in MxN format, where M and N are integers in pixels.	REQUIRED
pages	Indicates the number of pages in the received fax.	An integer.	REQUIRED
size	Indicates the filesize of the received fax.	A positive integer in bytes.	REQUIRED

### 3.4 Document Element

Provides data for a document to be sent as a fax.

The <document/> element MUST be empty.

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

Attribute	Definition	Possible Values	Inclusion
url	Indicates the URL at which the document to send is available.	A valid URI.	REQUIRED
identity	Indicates the identity from which the fax should appear to be sent.	A phone number string in E.164 format.	OPTIONAL
header	The header line to add to each page of the transmitted fax.	A string.	OPTIONAL
pages	The (set of) range of pages of the document to transmit.	A string (or set of strings separated by ',') in the format M[-N], where M and N are integers and the dash and second integer are optional. The set is combinatory and dash-separated integers signify a range of pages. The index is one-based.	OPTIONAL

### 3.5 Metadata Element

Provides implementation-specific key-value pairs of metadata regarding the transmission or receipt of a fax document.

The <metadata/> element MUST be empty.

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

Attribute	Definition	Inclusion
name	A token giving the name by which the metadata may be known.	REQUIRED
value	The string value of the named metadata.	REQUIRED

### 3.6 Finish Element

Indicates that the component came to an end due to the document being received successfully. The `<finish/>` element MUST be empty. The `<finish/>` element has no attributes.

## 4 Determining Support

If a Rayo server supports Rayo Fax, it MUST advertise that fact by returning a feature of "urn:xmpp:rayo:fax:1" (see [Namespace Versioning](#) regarding the possibility of incrementing the version number) in response to a [Service Discovery \(XEP-0030\)](#)<sup>1</sup> information request.

Listing 5: Service Discovery Information Request - Client to Server

```
<iq from='kingclaudius@shakespeare.lit/castle'  
  id='disco1'  
  to='call.rayo.org'  
  type='get'>  
  <query xmlns='http://jabber.org/protocol/disco#info' />  
</iq>
```

Listing 6: Service Discovery Information Response - Client to Server

```
<iq from='call.rayo.org'  
  id='disco1'  
  to='kingclaudius@shakespeare.lit/castle'  
  type='result'>  
  <query xmlns='http://jabber.org/protocol/disco#info'>  
    <feature var='urn:xmpp:rayo:1' />  
    <feature var='urn:xmpp:rayo:fax:1' />  
  </query>  
</iq>
```

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>2</sup>. However, if an application has not received entity capabilities information from an entity, it SHOULD use explicit service discovery instead.

---

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

<sup>2</sup>XEP-0115: Entity Capabilities <<https://xmpp.org/extensions/xep-0115.html>>.



## 5 Implementation Notes

A server MUST document any cases where its behaviour differs from that in this specification (such as lack of support for particular options/components/etc) and return an error whenever a command is not understood. A server MUST NOT silently ignore any instructions.

## 6 Security Considerations

This document introduces no additional security considerations above and beyond those defined in the documents on which it depends.

## 7 IANA Considerations

This document requires no interaction with the [Internet Assigned Numbers Authority \(IANA\)](#)<sup>3</sup>.

## 8 XMPP Registrar Considerations

### 8.1 Protocol Namespaces

This specification defines the following XML namespaces:

- `urn:xmpp:rayo:fax:1`
- `urn:xmpp:rayo:fax:complete:1`

The [XMPP Registrar](#)<sup>4</sup> includes the foregoing namespaces in its registry at [<https://xmpp.org/registrar/namespaces.html>](https://xmpp.org/registrar/namespaces.html), as governed by [XMPP Registrar Function \(XEP-0053\)](#)<sup>5</sup>.

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<sup>3</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/>](http://www.iana.org/).

<sup>4</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/>](https://xmpp.org/registrar/).

<sup>5</sup>XEP-0053: XMPP Registrar Function [<https://xmpp.org/extensions/xep-0053.html>](https://xmpp.org/extensions/xep-0053.html).

## 8.2 Namespace Versioning

If the protocol defined in this specification undergoes a major revision that is not fully backward-compatible with an older version, or that contains significant new features, 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.

# 9 XML Schema

## 9.1 Rayo Fax

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema"
  targetNamespace="urn:xmpp:rayo:fax:1"
  xmlns:tns="urn:xmpp:rayo:fax:1"
  elementFormDefault="qualified"
  xmlns:core="urn:xmpp:rayo:1">

  <annotation>
    <documentation>
      The protocol documented by this schema is defined at http://rayo.org/xep
    </documentation>
  </annotation>

  <!-- Fax receipt command -->
  <element name="receivefax" type="core:empty">
    <annotation>
      <documentation>
        Instructs the server to begin receiving a fax.
      </documentation>
    </annotation>
  </element>

  <!-- Fax transmission command -->
  <element name="sendfax" type="core:empty">
    <annotation>
      <documentation>
        Instructs the server to begin transmitting a fax.
      </documentation>
    </annotation>
  </element>

  <!-- Fax document data -->
  <element name="document" type="core:empty">
    <annotation>
      <documentation>
```

```

        Provides the result of a received fax, including a reference
        to its location.
    </documentation>
</annotation>
<attribute name="url" type="anyURI" use="required">
    <annotation>
        <documentation>
            Indicates the URL at which the document to send is available
            .
        </documentation>
    </annotation>
</attribute>
<attribute name="identity" type="string" use="optional">
    <annotation>
        <documentation>
            Indicates the identity from which the fax should appear to
            be sent.
        </documentation>
    </annotation>
</attribute>
<attribute name="header" type="string" use="optional">
    <annotation>
        <documentation>
            The header line to add to each page of the transmitted fax.
        </documentation>
    </annotation>
</attribute>
<attribute name="pages" type="string" use="optional">
    <annotation>
        <documentation>
            A string (or set of strings separated by ',') in the format
            M[-N], where M and N are integers and the dash and
            second integer are optional. The set is combinatory and
            dash-separated integers signify a range of pages. The
            index is one-based.
        </documentation>
    </annotation>
</attribute>
</element>
</schema>

```

## 9.2 Rayo Fax Complete

```

<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema"
    targetNamespace="urn:xmpp:rayo:fax:complete:1"
    xmlns:tns="urn:xmpp:rayo:fax:complete:1"
    elementFormDefault="qualified"

```

```
xmlns:core="urn:xmpp:rayo:1">

<annotation>
  <documentation>
    The protocol documented by this schema is defined at http://rayo.org/xep
  </documentation>
</annotation>

<!-- Received Fax data -->
<element name="fax" type="core:empty">
  <annotation>
    <documentation>
      Provides the result of a received fax, including a reference
        to its location.
    </documentation>
  </annotation>
  <attribute name="url" type="anyURI" use="required">
    <annotation>
      <documentation>
        Indicates the URL at which the fax is made available.
      </documentation>
    </annotation>
  </attribute>
  <attribute name="resolution" type="string" use="required">
    <annotation>
      <documentation>
        Indicates the resolution of the received fax in MxN format,
          where M and N are integers in pixels.
      </documentation>
    </annotation>
  </attribute>
  <attribute name="pages" type="nonNegativeInteger" use="required">
    <annotation>
      <documentation>
        Indicates the number of pages in the received fax.
      </documentation>
    </annotation>
  </attribute>
  <attribute name="size" type="long" use="required">
    <annotation>
      <documentation>
        Indicates the filesize (in bytes) of the received fax.
      </documentation>
    </annotation>
  </attribute>
</element>

<complexType name="metadataType">
```

```
<attribute name="name" type="token" use="required">
  <annotation>
    <documentation>
      A token giving the name by which the metadata may be known.
    </documentation>
  </annotation>
</attribute>
<attribute name="value" type="string" use="required">
  <annotation>
    <documentation>
      The string value of the named metadata.
    </documentation>
  </annotation>
</attribute>
</complexType>

<!-- Finish reason -->
<element name="finish" type="core:empty">
  <annotation>
    <documentation>
      Indicates that the component came to an end due to the
      document being received successfully.
    </documentation>
  </annotation>
</element>
</schema>
```

## 10 Acknowledgements

The authors would like to acknowledge the input of teams at Mojo Lingo and Grasshopper in the development of this specification.

Specific individuals who have contributed to the specification or to software significant to its completion include:

- Ben Langfeld
- Chris Rienzo