XEP-0341: Rayo CPA

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This specification defines an extension to the Rayo protocol (XEP-0327) to provide provision for performing Call Progress Analysis on a call under the control of a Rayo client.

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Contents

1 Introduction

Rayo allows for the third-party control of media sessions such as telephone calls. A common requirement in telephony applications is to establish the progress characteristics of the session, such as dtmf, fax or modem tones, or to differentiate between a human and an answering machine. This specification extends the core Rayo specification, and specifically its Input component to describe a protocol for establishing such progress analysis and gathering its results.

2 Terminology

2.1 Glossary

CPA Call progress analysis.

3 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.

CPA is achieved as a special case of the core input component. All rules regarding component execution and the input component in particular apply from the core specification. When a call's controlling party wishes to begin detection of signals from the suported set, it SHOULD begin an input component with the mode attribute set as 'cpa'.

The grammars supplied determine the types of signal detected and parameters applied to their detection. The grammars MUST be referenced by URI in the format described below. If a Rayo server supports this specification, it MUST invoke its supported CPA function using the parameters provided from the grammars; if it does not support this specification or any of the supplied parameters within the grammar, it MUST raise an error according to the rules in the core specification.

Listing 1: Client requests CPA from a call, indicating interest in speech detection and DTMF

```
<iq from='juliet@capulet.lit/balcony'
    to='9f00061@call.shakespeare.lit'
    type='set'
    id='h7ed2'>
  <input xmlns='urn:xmpp:rayo:input:1' mode='cpa'>
    <grammar url="urn:xmpp:rayo:cpa:speech:1?maxTime=4000;
        minSpeechDuration=4000;minVolume=10;finalSilence=2000;
        terminate=true" />
    <grammar url="urn:xmpp:rayo:cpa:dtmf:1" />
  </input>
</iq>
```

The server MUST validate that it has appropriate resources/mechanisms to collect the requested signals before acknowledging the component creation.

3.1 Events

If the meta-attribute named 'terminate' is set to true in the grammar, the component MUST terminate on the first signal match it detects. If it is set to false, signals MUST be reported as events until the component is instructed to stop.

Listing 2: Component indicates that a signal was detected

```
<presence from='9f00061@call.shakespeare.lit/eh3u28' to='
    juliet@capulet.lit/courtyard'>
  <signal xmlns="urn:xmpp:rayo:cpa:1" type="urn:xmpp:rayo:cpa:dtmf:1"
      duration="4690" value="1"/>
</presence>
```

3.2 Completion

The input completion reason MUST be one of the supported reasons from the core specification or a signal, indicating that the CPA engine detected one of the requested signals. Any signals other than those requested by the input grammar should be ignored.

Listing 3: Component indicates it has completed due to one of the grammars matching a detected signal

```
<presence from='9f00061@call.shakespeare.lit/eh3u28'
      to='juliet@capulet.lit/courtyard'
      type='unavailable'>
  <complete xmlns='urn:xmpp:rayo:ext:1'>
    <signal xmlns="urn:xmpp:rayo:cpa:1" type="
        urn:xmpp:rayo:cpa:speech:1" duration="4690" value="machine"/>
  </complete>
</presence>
```

4 Formal Definition

4.1 Grammar Format

The grammar URI declares the signal type of interest and the parameters which apply to their detection. The URI should be composed of a URN from the following list of allowed signal types, and parameters to modify their detection as a query string. The names and allowed values of these parameters are implementation specific. Servers MUST support one reserved parameter named 'terminate', whose value indicates the termination behaviour of

the component on signal detection as described above.

4.2 Signal Element

Describes a detected signal.
The attributes of the <grammar/> element are as follows.

Attribute	Definition	Possible Values	Default	Inclusion
type	Indicates the type of signal detected.	Any URI value from the listed signal types	none	REQUIRED
duration	Indicates the duration of the received signal in milliseconds	An integer value in milliseconds.	none	OPTIONAL
value	Indicates the value of the signal received if applicable.	For dtmf tones it is the digit detected, for speech may be human|machine|notsure and for beeps may be a frequency in Hz.	none	OPTIONAL

4.3 Signal Types

Signal types may be one of the following:

URI	Description
urn:xmpp:rayo:cpa:beep:1	Detect a beep.
urn:xmpp:rayo:cpa:dtmf:1	Detect DTMF tones.
urn:xmpp:rayo:cpa:vad:1	Detect voice activity.
urn:xmpp:rayo:cpa:speech:1	Detect speech and decide human or machine.
urn:xmpp:rayo:cpa:fax-ced:1	Detect a fax CED tone.
urn:xmpp:rayo:cpa:fax-cng:1	Detect a fax CNG tone.
urn:xmpp:rayo:cpa:ring:1	Detect a ringing tone.
urn:xmpp:rayo:cpa:busy:1	Detect a busy tone.
urn:xmpp:rayo:cpa:congestion:1	Detect a congestion tone.
urn:xmpp:rayo:cpa:sit:1	Detect a Special Information Tone.

URI	Description
urn:xmpp:rayo:cpa:modem:1	Detect a modem tone.
urn:xmpp:rayo:cpa:offhook:1	Detect an off-hook tone.

5 Determining Support

If a Rayo server supports Rayo CPA, it MUST advertise that fact by returning a feature of
"urn:xmpp:rayo|cpa:0" (see Namespace Versioning regarding the possibility of incrementing
the version number) in response to a Service Discovery (XEP-0030) [1] information request.

Listing 4: 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 5: 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:0'/>
    <feature var='urn:xmpp:rayo:cpa:0'/>
  </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) [2]. However, if an application has not received entity capabilities
information from an entity, it SHOULD use explicit service discovery instead.

6 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

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[1]XEP-0030: Service Discovery <https://xmpp.org/extensions/xep-0030.html>.
[2]XEP-0115: Entity Capabilities <https://xmpp.org/extensions/xep-0115.html>.

a command is not understood. A server MUST NOT silently ignore any instructions.

7 Security Considerations

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

8 IANA Considerations

This document requires no interaction with the Internet Assigned Numbers Authority (IANA) [3].

9 XMPP Registrar Considerations

9.1 Protocol Namespaces

This specification defines the following XML namespaces:

- urn:xmpp:rayo:cpa:1

- urn:xmpp:rayo:cpa:beep:1

- urn:xmpp:rayo:cpa:dtmf:1

- urn:xmpp:rayo:cpa:vad:1

- urn:xmpp:rayo:cpa:speech:1

- urn:xmpp:rayo:cpa:fax-ced:1

- urn:xmpp:rayo:cpa:fax-cng:1

- urn:xmpp:rayo:cpa:ring:1

- urn:xmpp:rayo:cpa:busy:1

- urn:xmpp:rayo:cpa:congestion:1

- urn:xmpp:rayo:cpa:sit:1

---

[3]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/>.

- urn:xmpp:rayo:cpa:modem:1

- urn:xmpp:rayo:cpa:offhook:1

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

9.2 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 XMPP Registrar Function (XEP-0053) [6].

10 XML Schema

10.1 Rayo CPA

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

  <!-- Signal element -->
  <element name="signal">
    <annotation>
      <documentation>
        Describes a detected signal.
      </documentation>
    </annotation>
```

---

[4]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/>.
[5]XEP-0053: XMPP Registrar Function <https://xmpp.org/extensions/xep-0053.html>.
[6]XEP-0053: XMPP Registrar Function <https://xmpp.org/extensions/xep-0053.html>.

```xml
      <complexType>
        <simpleContent>
          <attribute name="type" use="required">
            <annotation>
              <documentation>
                Indicates the type of signal detected.
              </documentation>
            </annotation>
            <simpleType>
              <restriction base="token">
                <enumeration value="urn:xmpp:rayo:cpa:beep:1" />
                <enumeration value="urn:xmpp:rayo:cpa:dtmf:1" />
                <enumeration value="urn:xmpp:rayo:cpa:vad:1" />
                <enumeration value="urn:xmpp:rayo:cpa:speech:1" />
                <enumeration value="urn:xmpp:rayo:cpa:fax-ced:1" />
                <enumeration value="urn:xmpp:rayo:cpa:fax-cng:1" />
                <enumeration value="urn:xmpp:rayo:cpa:ring:1" />
                <enumeration value="urn:xmpp:rayo:cpa:busy:1" />
                <enumeration value="urn:xmpp:rayo:cpa:congestion:1" />
                <enumeration value="urn:xmpp:rayo:cpa:sit:1" />
                <enumeration value="urn:xmpp:rayo:cpa:modem:1" />
                <enumeration value="urn:xmpp:rayo:cpa:offhook:1" />
              </restriction>
            </simpleType>
          </attribute>
          <attribute name="duration" type="core:durationType" use="
              optional" default="">
            <annotation>
              <documentation>
                Indicates the duration of the received signal in
                    milliseconds
              </documentation>
            </annotation>
          </attribute>
          <attribute name="value" type="token" use="optional" default=""
              >
            <annotation>
              <documentation>
                Indicates the value of the signal received if applicable
                    . For dtmf tones it is the digit detected, for
                    speech may be human|machine|notsure and for beeps
                    may be a frequency in Hz.
              </documentation>
            </annotation>
          </attribute>
        </simpleContent>
      </complexType>
    </element>
</schema>
```

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