FOUNDATION FOR INTELLIGENT PHYSICAL AGENTS

FIPA Agent Message Transport Envelope Representation in XML Specification

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Contents

1 Scope

This document is part of the FIPA specifications and deals with message transportation between inter-operating agents. This document also forms part of the FIPA Agent Management Specification [FIPA00023] and contains specifications for:

- Syntactic representation of a message envelope in XML form (see [W3Cxml]).

2 XML Envelope Representation

This section gives the concrete syntax for the message envelope specification that must be used to transport messages over a Message Transport Protocol (MTP - see [FIPA00067]). This concrete syntax is designed to complement [FIPA00071] and [FIPA00084].

2.1 Component Name

The name assigned to this component is:

```
fipa.mts.env.rep.xml.std
```

2.2 Mime Type

Where required, the MIME type (see [RFC2046]) of items generated according to this specification is taken to be application/xml. The `charset` encoding used in this section must conform to [W3Cxml].

2.3 Syntax

The following DTD specifies the encoding of the abstract FIPA specification as an XML message:

```
<!--
Document Type: XML DTD
Document Purpose: Encoding of FIPA ACL message envelopes (as in [FIPA0067]).
See http://www.fipa.org
Last Revised: 2000-08-16
-->

<!ELEMENT    envelope              ( params+ )>

<!ELEMENT    params                ( to?,
                                     from?,
                                     comments?,
                                     acl-representation?,
                                     payload-length?,
                                     payload-encoding?,
                                     date?,
                                     encrypted?,
                                     intended-receiver?,
                                     received? )>

<!ATTLIST    params                  index CDATA #REQUIRED>

<!ELEMENT    to                    ( agent-identifier+ )>

<!ELEMENT    from                  ( agent-identifier )>

<!ELEMENT    acl-representation    ( #PCDATA )>

<!ELEMENT    comments              ( #PCDATA )>

<!ELEMENT    payload-length        ( #PCDATA )>

<!ELEMENT    payload-encoding      ( #PCDATA )>
```

```
<!ELEMENT     date                    ( #PCDATA )>

<!ELEMENT     encrypted               ( #PCDATA )>

<!ELEMENT     intended-receiver       ( agent-identifier+ )>


<!ELEMENT     agent-identifier        ( name,
                                        addresses?,
                                        resolvers? )>

<!ELEMENT     name                    ( #PCDATA )>

<!ELEMENT     addresses               ( url+ )>

<!ELEMENT     url                     ( #PCDATA )>

<!ELEMENT     resolvers               ( agent-identifier+ )>


<!ELEMENT     received                ( received-by,
                                        received-from?,
                                        received-date,
                                        received-id?,
                                        received-via? )>

<!ELEMENT     received-by               EMPTY>
<!ATTLIST     received-by               value CDATA #IMPLIED>

<!ELEMENT     received-from             EMPTY>
<!ATTLIST     received-from             value CDATA #IMPLIED>

<!ELEMENT     received-date             EMPTY>
<!ATTLIST     received-date             value CDATA #IMPLIED>

<!ELEMENT     received-id               EMPTY>
<!ATTLIST     received-id               value CDATA #IMPLIED>

<!ELEMENT     received-via              EMPTY>
<!ATTLIST     received-via              value CDATA #IMPLIED>
```

2.4 Additional Syntax Rules

The following additional rules not specified in the DTD also apply:

1. [FIPA00067] requires that all changes made to a message envelope by one message processing step (for example, handling of the message by a single ACC) be attributable to the message processor that made the changes. This is achieved in the XML envelope by grouping all changes made by one message processor (ACC) at one point in time into a single PARAMS element.

2. There is no need to add envelope parameter values to a new PARAMS element if the values of these parameters is not being updated. Only parameters whose value is being changed need be included. The meaning of a PARAMS statement containing two elements defining new values for the same envelope parameter is undefined.

3. This specification permits multiple occurrences of unique message envelope-level parameters (:to, :from, :intended-receiver, :date, :acl-representation, :encrypted, :payload-length, :received :transport-behaviour etc.) in order to handle field value overwriting as specified in [FIPA00067]. To help obtain the latest (and currently valid) value of any parameter, the INDEX attribute of the PARAMS element is used to establish an order of the different occurrences of elements (and hence envelope parameters). The first and oldest occurrence of the element will have an INDEX value of 1, the next value of the field will have INDEX value of 2 and so on.

4. When adding a new PARAMS element, the INDEX attribute will have a value with 1 higher than the largest existing INDEX of any PARAMS element currently in the envelope. The first PARAMS element will have the INDEX value of 1.

5. The current value of any envelope-level field will be given by the value of the field as it appears in the newest PARAMS element that contains that field.

6. The following pseudo code algorithm may be used to obtain the latest values for each of the envelope parameters:

```
EnvelopeWithAllFields := new empty Envelope;

while ((EnvelopeWithAllFields does not contain values for all its fields)
        OR (all PARAMS elements in the sequence have been processed) ) {
 // the processor gets the next envelope in the sequence starting with the one with
the highest index
 tempEnvelope = getNextEnvelope;
 foreach field in an envelope {
   if ((this field has no value in envelopeWithAllFields)
       AND (this field has a value in tempEnvelope))
   then copy the value of this field from tempEnvelope to envelopeWithAllFields
 }
}
```

   EnvelopeWithAllFields contains now the latest values for all its fields set in the envelope.

2.5 Representation of Time

Time tokens are based on [ISO8601], with extensions for relative time and millisecond duration's. Time expressions may be absolute, or relative to the current time. If no type designator is given, the local time zone is used. The type designator for UTC is the character Z. UTC is preferred to prevent time zone ambiguities. Note that years must be encoded in four digits. As examples, 8:30am on April 15th, 1996 local time would be encoded as:

```
19960415T083000000
```

The same time in UTC would be:

```
19960415T083000000Z
```

3 References

[FIPA00023] FIPA Agent Management Specification. Foundation for Intelligent Physical Agents, 2000.
`http://www.fipa.org/specs/fipa00023/`

[FIPA00067] FIPA Agent Message Transport Service Specification. Foundation for Intelligent Physical Agents, 2000.
`http://www.fipa.org/specs/fipa00067/`

[FIPA00069] FIPA ACL Message Representation in Bit-Efficient Encoding Specification. Foundation for Intelligent Physical Agents, 2000.
`http://www.fipa.org/specs/fipa00069/`

[FIPA00070] FIPA ACL Message Representation in String Specification. Foundation for Intelligent Physical Agents, 2000.
`http://www.fipa.org/specs/fipa00070/`

[FIPA00071] FIPA ACL Message Representation in XML Specification. Foundation for Intelligent Physical Agents, 2000.
`http://www.fipa.org/specs/fipa00071/`

[FIPA00075] Agent Message Transport Protocol for IIOP. Foundation for Intelligent Physical Agents, 2000.
`http://www.fipa.org/specs/fipa00075/`

[FIPA00084] FIPA Agent Message Transport Protocol for HTTP Specification. Foundation for Intelligent Physical Agents, 2000.
`http://www.fipa.org/specs/fipa00084/`

[ISO8601] Date Elements and Interchange Formats, Information Interchange-Representation of Dates and Times. International Standards Organisation, 1998.
`http://www.iso.ch/cate/d15903.html`

[RFC2046] Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types, Freed and Borenstein, November 1996.
`http://www.rfc-editor.org/rfc/rfc2046.txt`

[W3Cxml] Extensible Markup Language (XML) 1.0 Specification (Recommendation). World Wide Web Consortium, 1998.
`http://www.w3c.org/TR/REC-xml/`

4 Informative Annex A — Examples

1. Here is a simple example of an envelope conforming to the DTD described in Section 2.3:

```
<?xml version="1.0"?>
<envelope>
  <params index="1">
    <to>
      <agent-identifier>
        <name>receiver@foo.com</name>
        <addresses>
          <url>http://foo.com/acc</url>
        </addresses>
      </agent-identifier>
    </to>
    <from>
      <agent-identifier>
        <name>sender@bar.com</name>
        <addresses>
          <url>http://bar.com/acc</url>
        </addresses>
      </agent-identifier>
    </from>

    <acl-representation>fipa.acl.rep.xml.std</acl-representation>

    <date>20000508T042651481</date>

    <encrypted>no encryption</encrypted>

    <received >
      <received-by value="http://foo.com/acc" />
      <received-date value="20000508T042651481" />
      <received-id value="123456789" />
    </received>
  </params>
</envelope>
```

2. Here is an example which covers all the aspects described in Section 2.3:

```
<?xml version="1.0"?>
<envelope>
  <params index="1">
  <to>
    <agent-identifier>
      <name>receiver@foo.com</name>
      <addresses>
        <url>http://foo.com/acc</url>
      </addresses>
      <resolvers>
        <agent-identifier>
          <name>resolver@bar.com</name>
          <addresses>
            <url>http://bar.com/acc1</url>
            <url>http://://bar.com/acc2</url>
            <url>http://bar.com/acc3</url>
          </addresses>
        </agent-identifier>
      </resolvers>
    </agent-identifier>
  </to>

  <from>
    <agent-identifier>
      <name>sender@bar.com</name>
      <addresses>
        <url>http://bar.com/acc</url>
      </addresses>
      <resolvers>
        <agent-identifier>
          <name>resolver@foobar.com</name>
          <addresses>
            <url>http://foobar.com/acc1</url>
            <url>http://foobar.com/acc2</url>
            <url>http://foobar.com/acc3</url>
          </addresses>
        </agent-identifier>
      </resolvers>
    </agent-identifier>
  </from>

  <comments>No comments!</comments>

  <acl-representation>fipa.acl.rep.xml.std</acl-representation>

  <payload-encoding>US-ASCII</payload-encoding>

  <date>20000508T042651481</date>

  <encrypted>no encryption</encrypted>

  <intended-receiver>
    <agent-identifier>
      <name>intendedreceiver@foobar.com</name>
      <addresses>
        <url>http://foobar.com/acc1</url>
        <url>http://foobar.com/acc2</url>
        <url>http://foobar.com/acc3</url>
      </addresses>
      <resolvers>
        <agent-identifier>
          <name>resolver@foobar.com</name>
          <addresses>
            <url>http://foobar.com/acc1</url>
            <url>http://foobar.com/acc2</url>
            <url>http://foobar.com/acc3</url>
          </addresses>
          <resolvers>
            <agent-identifier>
              <name>resolver@foobar.com</name>
              <addresses>
```

```
                <url>http://foobar.com/acc1</url>
                <url>http://foobar.com/acc2</url>
                <url>http://foobar.com/acc3</url>
              </addresses>
            </agent-identifier>
          </resolvers>
        </agent-identifier>
      </resolvers>
    </agent-identifier>
  </intended-receiver>

  <received>
    <received-by value="http://foo.com/acc" />
    <received-from value="http://foobar.com/acc" />
    <received-date value="20000508T042651481" />
    <received-id value="123456789" />
    <received-via value="http://bar.com/acc" />
  </received>

  </params>

</envelope>
```

3. Here is an example which also includes the MIME multipart encapsulation which might be used over HTTP (see [FIPA00084]*:*

```
MIME-Version: 1.0
Content-Type: multipart-mixed ;
      boundary=”--251D738450A171593A1583EB”

This is not part of the MIME multipart encoded  message.
--251D738450A171593A1583EB
Content-Type: application/xml

<?xml version="1.0"?>
<envelope>
  <params index="1">
    <to>
      <agent-identifier>
        <name>receiver@foo.com</name>
        <addresses>
          <url>http://foo.com/acc</url>
        </addresses>
      </agent-identifier>
    </to>
    <from>
      <agent-identifier>
        <name>sender@bar.com</name>
        <addresses>
          <url>http://bar.com/acc</url>
        </addresses>
      </agent-identifier>
    </from>

    <acl-representation>fipa.acl.rep.string.std</acl-representation>
    <payload-encoding>US-ASCII</payload-encoding>

    <date>20000508T042651481</date>

    <encrypted>no encryption</encrypted>

    <received >
      <received-by value="http://foo.com/acc" />
      <received-date value="20000508T042651481" />
      <received-id value="123456789" />
    </received>
  </params>
</envelope>[1]
[2]
--251D738450A171593A1583EB
Content-Type: application/text; charset=US-ASCII

(inform
  :sender
    (agent-identifier
      :name sender@bar.com
      :addresses (sequence http://bar.com:80/acc))
  :receiver
    (set (agent-identifier
      :name receiver@foo.com
      :addresses (sequence http://foo.com:80/acc ))))
  :content-length 12
  :reply-with task1-003
  :language sl0
  :ontology planning-ontology-1
  :content
    (done task1)))
--251D738450A171593A1583EB--
```

[1] CRLF at the end of the XML Envelope

[2] CRLF included in the boundary delimiter at the beginning

5 Informative Annex B — Notes

1. Referencing

   There is no specific reference in the FIPA XML envelope reference to the DTD specified in the in section *2.3, Syntax.* This is due to the fact that tests have shown that there is no consistent behaviour of most common parser in handling a DOCTYPE specification. The most inconvenient fact is that even in the case of non-validation the parsers are trying to download the DTD from the specified URI.