

FOUNDATION FOR INTELLIGENT PHYSICAL AGENTS

FIPA Agent Message Transport Envelope Representation in XML Specification

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21 industry of intelligent agents by openly developing specifications supporting interoperability among agents and agent-
22 based applications. This occurs through open collaboration among its member organisations, which are companies and
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29 participation in FIPA.

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31 specification can be either Preliminary, Experimental, Standard, Deprecated or Obsolete. More detail about the process
32 of specification may be found in the FIPA Procedures for Technical Work. A complete overview of the FIPA
33 specifications and their current status may be found in the FIPA List of Specifications. A list of terms and abbreviations
34 used in the FIPA specifications may be found in the FIPA Glossary.

35 FIPA is a non-profit association registered in Geneva, Switzerland. As of January 2000, the 56 members of FIPA
36 represented 17 countries worldwide. Further information about FIPA as an organisation, membership information, FIPA
37 specifications and upcoming meetings may be found at <http://www.fipa.org/>.

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49 **1 Scope**

50 This document is part of the FIPA specifications and deals with message transportation between inter-operating agents.

51 This document also forms part of the FIPA Agent Management Specification [FIPA00023] and contains specifications
52 for:

53

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

55

55 2 XML Envelope Representation

56 This section gives the concrete syntax for the message envelope specification that must be used to transport messages
57 over a Message Transport Protocol (MTP - see [FIPA00067]). This concrete syntax is designed to complement
58 [FIPA00071] and [FIPA00084].
59

60 2.1 Component Name

61 The name assigned to this component is:

```
62  
63 fipa.mts.env.rep.xml.std  
64
```

65 2.2 Mime Type

66 Where required, the MIME type (see [RFC2046]) of items generated according to this specification is taken to be
67 application/xml. The `charset` encoding used in this section must conform to [W3Cxml].
68

69 2.3 Syntax

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

```
71 <!--  
72 Document Type: XML DTD  
73 Document Purpose: Encoding of FIPA ACL message envelopes (as in [FIPA0067]).  
74 See http://www.fipa.org  
75 Last Revised: 2000-08-16  
76 -->  
77  
78  
79 <!ELEMENT envelope ( params+ )>  
80  
81 <!ELEMENT params ( to?,  
82 from?,  
83 comments?,  
84 acl-representation?,  
85 payload-length?,  
86 payload-encoding?,  
87 date?,  
88 encrypted?,  
89 intended-receiver?,  
90 received? )>  
91  
92 <!ATTLIST params index CDATA #REQUIRED>  
93  
94 <!ELEMENT to ( agent-identifier+ )>  
95  
96 <!ELEMENT from ( agent-identifier )>  
97  
98 <!ELEMENT acl-representation ( #PCDATA )>  
99  
100 <!ELEMENT comments ( #PCDATA )>  
101  
102 <!ELEMENT payload-length ( #PCDATA )>  
103  
104 <!ELEMENT payload-encoding ( #PCDATA )>  
105  
106 <!ELEMENT date ( #PCDATA )>  
107  
108 <!ELEMENT encrypted ( #PCDATA )>  
109
```

```

110 <!ELEMENT      intended-receiver      ( agent-identifier+ )>
111
112
113 <!ELEMENT      agent-identifier      ( name,
114                                     addresses?,
115                                     resolvers? )>
116
117 <!ELEMENT      name                  ( #PCDATA )>
118
119 <!ELEMENT      addresses              ( url+ )>
120
121 <!ELEMENT      url                   ( #PCDATA )>
122
123 <!ELEMENT      resolvers              ( agent-identifier+ )>
124
125
126 <!ELEMENT      received               ( received-by,
127                                     received-from?,
128                                     received-date,
129                                     received-id?,
130                                     received-via? )>
131
132 <!ELEMENT      received-by            EMPTY>
133 <!ATTLIST      received-by           value CDATA #IMPLIED>
134
135 <!ELEMENT      received-from          EMPTY>
136 <!ATTLIST      received-from         value CDATA #IMPLIED>
137
138 <!ELEMENT      received-date          EMPTY>
139 <!ATTLIST      received-date         value CDATA #IMPLIED>
140
141 <!ELEMENT      received-id            EMPTY>
142 <!ATTLIST      received-id           value CDATA #IMPLIED>
143
144 <!ELEMENT      received-via          EMPTY>
145 <!ATTLIST      received-via         value CDATA #IMPLIED>
146

```

147 2.4 Additional Syntax Rules

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

- 150 1. [FIPA00067] requires that all changes made to a message envelope by one message processing step (for example,
 151 handling of the message by a single ACC) be attributable to the message processor that made the changes. This is
 152 achieved in the XML envelope by grouping all changes made by one message processor (ACC) at one point in time
 153 into a single PARAMS element.
- 154
 155 2. There is no need to add envelope parameter values to a new PARAMS element if the values of these parameters is
 156 not being updated. Only parameters whose value is being changed need be included. The meaning of a PARAMS
 157 statement containing two elements defining new values for the same envelope parameter is undefined.
- 158
 159 3. This specification permits multiple occurrences of unique message envelope-level parameters (:to, :from,
 160 :intended-receiver, :date, :acl-representation, :encrypted, :payload-length, :received
 161 :transport-behaviour etc.) in order to handle field value overwriting as specified in [FIPA00067]. To help
 162 obtain the latest (and currently valid) value of any parameter, the INDEX attribute of the PARAMS element is used to
 163 establish an order of the different occurrences of elements (and hence envelope parameters). The first and oldest
 164 occurrence of the element will have an INDEX value of 1, the next value of the field will have INDEX value of 2 and
 165 so on.
- 166
 167 4. When adding a new PARAMS element, the INDEX attribute will have a value with 1 higher than the largest existing
 168 INDEX of any PARAMS element currently in the envelope. The first PARAMS element will have the INDEX value of 1.

169

170

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.

171

172

173

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

174

175

```
EnvelopeWithAllFields := new empty Envelope;
```

176

177

```
while ((EnvelopeWithAllFields does not contain values for all its fields)
```

178

```
    OR (all PARAMS elements in the sequence have been processed) ) {
```

179

```
    // the processor gets the next envelope in the sequence starting with the one with
    the highest index
```

180

181

```
    tempEnvelope = getNextEnvelope;
```

182

```
    foreach field in an envelope {
```

183

```
        if ((this field has no value in envelopeWithAllFields)
```

184

```
            AND (this field has a value in tempEnvelope))
```

185

```
            then copy the value of this field from tempEnvelope to envelopeWithAllFields
```

186

```
        }
```

187

```
    }
```

188

189

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

190

191

2.5 Representation of Time

192

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:

193

194

195

196

```
19960415T083000000
```

197

198

The same time in UTC would be:

199

200

```
19960415T083000000Z
```

201

202

202 3 References

- 203 [FIPA00023] FIPA Agent Management Specification. Foundation for Intelligent Physical Agents, 2000.
204 <http://www.fipa.org/specs/fipa00023/>
- 205 [FIPA00067] FIPA Agent Message Transport Service Specification. Foundation for Intelligent Physical Agents, 2000.
206 <http://www.fipa.org/specs/fipa00067/>
- 207 [FIPA00069] FIPA ACL Message Representation in Bit-Efficient Encoding Specification. Foundation for Intelligent
208 Physical Agents, 2000.
209 <http://www.fipa.org/specs/fipa00069/>
- 210 [FIPA00070] FIPA ACL Message Representation in String Specification. Foundation for Intelligent Physical Agents,
211 2000.
212 <http://www.fipa.org/specs/fipa00070/>
- 213 [FIPA00071] FIPA ACL Message Representation in XML Specification. Foundation for Intelligent Physical Agents,
214 2000.
215 <http://www.fipa.org/specs/fipa00071/>
- 216 [FIPA00075] Agent Message Transport Protocol for IIOP. Foundation for Intelligent Physical Agents, 2000.
217 <http://www.fipa.org/specs/fipa00075/>
- 218 [FIPA00084] FIPA Agent Message Transport Protocol for HTTP Specification. Foundation for Intelligent Physical
219 Agents, 2000.
220 <http://www.fipa.org/specs/fipa00084/>
- 221 [ISO8601] Date Elements and Interchange Formats, Information Interchange-Representation of Dates and Times.
222 International Standards Organisation, 1998.
223 <http://www.iso.ch/cate/d15903.html>
- 224 [RFC2046] Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types, Freed and Borenstein,
225 November 1996.
226 <http://www.rfc-editor.org/rfc/rfc2046.txt>
- 227 [W3Cxml] Extensible Markup Language (XML) 1.0 Specification (Recommendation). World Wide Web
228 Consortium, 1998.
229 <http://www.w3c.org/TR/REC-xml/>

230

230 4 Informative Annex A — Examples

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

```

232 <?xml version="1.0"?>
233 <envelope>
234   <params index="1">
235     <to>
236       <agent-identifier>
237         <name>receiver@foo.com</name>
238         <addresses>
239           <url>http://foo.com/acc</url>
240         </addresses>
241       </agent-identifier>
242     </to>
243     <from>
244       <agent-identifier>
245         <name>sender@bar.com</name>
246         <addresses>
247           <url>http://bar.com/acc</url>
248         </addresses>
249       </agent-identifier>
250     </from>
251     <acl-representation>fipa.acl.rep.xml.std</acl-representation>
252     <date>20000508T042651481</date>
253     <encrypted>no encryption</encrypted>
254     <received >
255       <received-by value="http://foo.com/acc" />
256       <received-date value="20000508T042651481" />
257       <received-id value="123456789" />
258     </received>
259   </params>
260 </envelope>

```

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

```

262 <?xml version="1.0"?>
263 <envelope>
264   <params index="1">
265     <to>
266       <agent-identifier>
267         <name>receiver@foo.com</name>
268         <addresses>
269           <url>http://foo.com/acc</url>
270         </addresses>
271       <resolvers>
272         <agent-identifier>
273           <name>resolver@bar.com</name>
274           <addresses>
275             <url>http://bar.com/acc1</url>
276             <url>http://://bar.com/acc2</url>
277             <url>http://bar.com/acc3</url>
278           </addresses>
279         </agent-identifier>
280       </resolvers>
281     </agent-identifier>
282   </to>

```

```

291 <from>
292   <agent-identifier>
293     <name>sender@bar.com</name>
294     <addresses>
295       <url>http://bar.com/acc</url>
296     </addresses>
297     <resolvers>
298       <agent-identifier>
299         <name>resolver@foobar.com</name>
300         <addresses>
301           <url>http://foobar.com/acc1</url>
302           <url>http://foobar.com/acc2</url>
303           <url>http://foobar.com/acc3</url>
304         </addresses>
305       </agent-identifier>
306     </resolvers>
307   </agent-identifier>
308 </from>
309
310 <comments>No comments!</comments>
311
312 <acl-representation>fipa.acl.rep.xml.std</acl-representation>
313
314 <payload-encoding>US-ASCII</payload-encoding>
315
316 <date>20000508T042651481</date>
317
318 <encrypted>no encryption</encrypted>
319
320 <intended-receiver>
321   <agent-identifier>
322     <name>intendedreceiver@foobar.com</name>
323     <addresses>
324       <url>http://foobar.com/acc1</url>
325       <url>http://foobar.com/acc2</url>
326       <url>http://foobar.com/acc3</url>
327     </addresses>
328     <resolvers>
329       <agent-identifier>
330         <name>resolver@foobar.com</name>
331         <addresses>
332           <url>http://foobar.com/acc1</url>
333           <url>http://foobar.com/acc2</url>
334           <url>http://foobar.com/acc3</url>
335         </addresses>
336       <resolvers>
337         <agent-identifier>
338           <name>resolver@foobar.com</name>
339           <addresses>
340             <url>http://foobar.com/acc1</url>
341             <url>http://foobar.com/acc2</url>
342             <url>http://foobar.com/acc3</url>
343           </addresses>
344         </agent-identifier>
345       </resolvers>
346     </agent-identifier>
347   </resolvers>
348 </agent-identifier>
349 </intended-receiver>
350
351 <received>
352   <received-by value="http://foo.com/acc" />
353   <received-from value="http://foobar.com/acc" />
354   <received-date value="20000508T042651481" />

```

```

355     <received-id value="123456789" />
356     <received-via value="http://bar.com/acc" />
357 </received>
358
359 </params>
360
361 </envelope>
362

```

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

```

365 MIME-Version: 1.0
366 Content-Type: multipart-mixed ;
367     boundary="--251D738450A171593A1583EB"
368
369 This is not part of the MIME multipart encoded message.
370 --251D738450A171593A1583EB
371 Content-Type: application/xml
372
373 <?xml version="1.0"?>
374 <envelope>
375   <params index="1">
376     <to>
377       <agent-identifier>
378         <name>receiver@foo.com</name>
379         <addresses>
380           <url>http://foo.com/acc</url>
381         </addresses>
382       </agent-identifier>
383     </to>
384     <from>
385       <agent-identifier>
386         <name>sender@bar.com</name>
387         <addresses>
388           <url>http://bar.com/acc</url>
389         </addresses>
390       </agent-identifier>
391     </from>
392
393     <acl-representation>fipa.acl.rep.string.std</acl-representation>
394
395     <payload-encoding>US-ASCII</payload-encoding>
396
397     <date>20000508T042651481</date>
398
399     <encrypted>no encryption</encrypted>
400
401     <received >
402       <received-by value="http://foo.com/acc" />
403       <received-date value="20000508T042651481" />
404       <received-id value="123456789" />
405     </received>
406   </params>
407 </envelope>1
408 2
409 --251D738450A171593A1583EB
410 Content-Type: application/text; charset=US-ASCII
411
412 (inform
413   :sender
414

```

¹ CRLF at the end of the XML Envelope

² CRLF included in the boundary delimiter at the beginning

```
415     (agent-identifier
416       :name sender@bar.com
417       :addresses (sequence http://bar.com:80/acc))
418 :receiver
419   (set (agent-identifier
420     :name receiver@foo.com
421     :addresses (sequence http://foo.com:80/acc )))
422 :content-length 12
423 :reply-with task1-003
424 :language s10
425 :ontology planning-ontology-1
426 :content
427   (done task1)))
428 --251D738450A171593A1583EB--
429
```

429 **5 Informative Annex B — Notes**

430 1. Referencing

431

432

433

434

435

436

437

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.