

# FOUNDATION FOR INTELLIGENT PHYSICAL AGENTS

## FIPA Agent Message Transport Protocol for HTTP Specification

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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.

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37 specifications and upcoming meetings may be found at <http://www.fipa.org/>.

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50 **1 Scope**

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

54  
55 The transportation of messages between agents using the Hypertext Transfer Protocol (HTTP - see  
56 [RFC2616]).  
57

58

## 58 2 Message Transport Protocol for HTTP

59 This MTP is based on the transfer of data representing the entire agent message including the message envelope in a  
60 HTTP request. The HTTP data transfer is a two-step process: the sender makes a HTTP request and after receiving  
61 the data the receiver sends a HTTP response. The receiver then parses the message envelope and the message is  
62 handled according to the instructions and information given in the message envelope.  
63

### 64 2.1 Component Name

65 The name assigned to this component is:

66  
67 `fipa.mts.mtp.http.std`  
68

### 69 2.2 Interface Definition

#### 70 2.2.1 Request

71 A HTTP request comprises:

72

##### 73 Request Line

- 74 - The request method type that must be `POST`.
- 75
- 76 - The request resource identification that must be a full URI (see [RFC1630]).
- 77
- 78 - The request version that must be `HTTP/1.1`.
- 79

##### 80 Request Headers

- 81 - The mandatory parameter `Content-Type`: that must be "multipart/mixed" and must have a `boundary`  
82 parameter enclosed by double quotes. It should be anticipated that the `boundary` parameter may be "folded" as  
83 described in [RFC822] – hence parsers must be able to handle this type of encoding.
- 84
- 85 - The mandatory parameter `Host`: that must be in the form `hostname` or `hostname:portnumber`.
- 86
- 87 - The mandatory parameter `Cache-Control`: that must have the value `no-cache`.
- 88
- 89 - The mandatory parameter `MIME-Version`: that must have the value `1.0`.
- 90
- 91 - The optional parameter `Content-Length`: that contains the size of the request body<sup>1</sup>.
- 92

##### 93 Request Body

94 The request body contains the agent message. The agent message has two components (separated as defined in  
95 [RFC2046] for multipart/mixed MIME content): a FIPA message envelope and a FIPA message body (the payload).  
96

97 The encoded body must therefore contain at least two parts, the first part containing the FIPA message envelope,  
98 the second part containing the FIPA Message being sent. Each of the two parts must specify an encoding-level  
99 `ContentType` field which may be any MIME type (Implementations must assume that some parts of the multipart  
100 encoded content may contain raw binary data). Each of the two parts may contain other headers such as, for  
101 example, `Content-Transfer-Encoding` but the processing of these fields is not mandatory.  
102

103 The `charset` used in headers and the boundary delimiter of the multipart encoding must be plain ASCII.  
104

---

<sup>1</sup> See [RFC2616] which strongly recommends that this parameter is used.

Where applicable the `charset` encoding of the FIPA Message must be specified as a `charset` parameter of the `ContentType` header. This `charset` parameter value must have the same value as the value of the envelope `payload-encoding` field.

The parts encoded in the multipart message body are enclosed between boundary delimiters. The boundary delimiter is formed from the boundary value specified as parameter for the `ContentType` header. The boundary value must be a sequence of maximum 70 ASCII chars. Each MIME part is to be considered enclosed between two occurrences of the sequence "CRLF--boundary value". The last boundary delimiter must be a boundary delimiter ending line and is formed from the usual boundary delimiter followed by the sequence "--", that is, "CRLF--boundary value--".

The envelope body encoding must therefore have the following structure:

- MIME headers (at least a `MIME-Version` header and a `ContentType` header that contains the boundary value).
- An empty line delimiting the MIME headers from the MIME body.
- A boundary delimiter line that delimits the beginning of the envelope part.
- A `ContentType` header line that must have the value appropriate for the envelope representation (given in each envelope specification).
- An empty line (CRLF CRLF).
- The FIPA message envelope.
- A boundary delimiter line that delimits the FIPA envelope from the FIPA message.
- A `ContentType` header line that must have the value appropriate for the FIPA Message representation.
- A boundary delimiter line that defines the end of the FIPA Message. This boundary line MAY be a boundary delimiter ending line.

### 2.2.2 Response

A HTTP response comprises:

#### Response Line

The response version must be `HTTP/1.1`. The response status code must either be the success code or a suitable error code as defined in [RFC2616]. The success code only means that the receiving agent has succeeded in extracting the message content from the HTTP request. More detailed information about non-HTTP related issues such as envelope parsing and message handling should be sent back to the sender agent as a separate message. If a sending MTP receives an error code then the expected behaviour would be to try sending the message using another combination of target resource address and content type or give up. The reason phrase in any error response may be any string and is used only for informational purposes.

#### Response Headers

- The mandatory parameter `Content-Type`: can be any MIME type (see [RFC2045])
- The mandatory parameter `Cache-Control`: must have the value `no-cache`, and
- The optional parameter `Content-Length`: specifies the size of the response body<sup>2</sup>

<sup>2</sup> See [RFC2616] which strongly recommends that this parameter is used.

## 158 **Response Body**

159 The response body may contain a message reply and depending on the content type can be text, binary or  
160 multipart. The sender is not obliged to read or make use of such content (i.e. it should not be relied upon for  
161 message transfer).  
162

### 163 **2.2.3 Notes**

164 The default connection behaviour on HTTP version 1.1 is to have persistent connections which means that after a  
165 request-response cycle, the connection is kept open and other requests can be made. However, because this would  
166 require a more complex implementation, connection persistence is not mandatory. In the case of a simple MTP  
167 implementation that would not support persistence, the `Connection:` parameter with the value `close` must be sent in  
168 the request headers if the MTP is acting as a sender or in the response headers if the MTP is acting as a receiver.  
169

170 It should be anticipated that some of the header field values (especially the boundary parameter of the Content-Type  
171 request field) are “folded” as described in [RFC822]. So parsers must be able to handle this type of encoding.  
172

173 Compliance to the MTP described in this document does not require HTTP 1.1 features that are not explicitly mentioned  
174 here.  
175

## 176 **2.3 Envelope Syntax**

177 The syntax used for the representation of the FIPA message envelope is that defined in [FIPA00085].  
178

## 179 **2.4 Notes for Developers**

- 180 1. The boundary field is usually “folded” on a new line. So the underlying system should be able to fold/unfold encoded  
181 MIME headers and values.  
182
- 183 2. In the MIME body before each boundary delimiter there must be a new line separator that is considered to be part  
184 of the boundary delimiter. So sections are delimited by the sequence "CRLF--boundary value" (where CRLF are  
185 two octets with values of 13 and 10 representing the ASCII characters CR and LF, boundary value is the sequence  
186 specified in the `ContentType` value as parameter, and "--" are two ASCII minus characters).  
187
- 188 3. Good implementations will generate random boundary values and will check that none of the encoded parts  
189 contains the boundary delimiter sequence.  
190
- 191 4. It is possible to have some text before the first boundary delimiter line and after the ending boundary delimiter line,  
192 namely a prologue and an epilogue. This text is to be ignored and should be there only to emphasise the boundary  
193 delimiters.  
194

**194 2.5 References**

- 195 [FIPA00023] FIPA Agent Management Specification. Foundation for Intelligent Physical Agents, 2000.  
196 <http://www.fipa.org/specs/fipa00023/>
- 197 [FIPA00067] FIPA Agent Message Transport Service Specification. Foundation for Intelligent Physical Agents, 2000.  
198 <http://www.fipa.org/specs/fipa00067/>
- 199 [FIPA00085] FIPA Agent Message Transport Envelope Representation in XML. Foundation for Intelligent Physical  
200 Agents, 2000.  
201 <http://www.fipa.org/specs/fipa00085/>
- 202 [RFC822] Standard for the Format of ARPA Internet Text Messages. Request for Comments, 1982.  
203 <http://www.ietf.org/rfc/rfc0822.txt>
- 204 [RFC1630] Universal Resource Identifiers in WWW: A Unifying Syntax for the Expression of Names and  
205 Addresses of Objects on the Network as used in the World Wide Web. Request for Comments, 1994.  
206 <http://www.ietf.org/rfc/rfc1630.txt>
- 207 [RFC2045] Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies. Request  
208 for Comments, 1996.  
209 <http://www.ietf.org/rfc/rfc2045.txt>
- 210 [RFC2046] Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types. Request for Comments, 1996.  
211 <http://www.ietf.org/rfc/rfc2045.txt>
- 212 [RFC2616] Hypertext Transfer Protocol - HTTP/1.1. Request for Comments, 1999.  
213 <http://www.ietf.org/rfc/rfc2616.txt>
- 214
- 215



### 215 3 Informative Annex A — Example

216 The agent `sender@bar.com` sends a message to the agent `receiver@foo.com` which is resident on an AP that has  
 217 an ACC with an external HTTP interface. Both agents are simple implementations that do not use connection  
 218 persistence and the message encoding (see [FIPA00085]) that they use is text.

219  
 220 1. `sender@bar.com` sends a message to `receiver@foo.com`:

```
221
222 POST http://foo.com:80/acc HTTP/1.1
223 Cache-Control: no-cache
224 Host: foo.com:80
225 Mime-Version: 1.0
226 Content-Type: multipart-mixed ;
227     boundary="251D738450A171593A1583EB"
228 Content-Length: 1518
229 Connection: close3
```

230  
 231 This is not part of the MIME multipart encoded message.

```
232 --251D738450A171593A1583EB
233 Content-Type: application/xml
```

```
234
235 <?xml version="1.0"?>
236 <envelope>
237   <params index="1">
238     <to>
239       <agent-identifier>
240         <name>receiver@foo.com</name>
241         <addresses>
242           <url>http://foo.com/acc</url>
243         </addresses>
244       </agent-identifier>
245     </to>
246     <from>
247       <agent-identifier>
248         <name>sender@bar.com</name>
249         <addresses>
250           <url>http://bar.com/acc</url>
251         </addresses>
252       </agent-identifier>
253     </from>
254
255     <acl-representation>fipa.acl.rep.string.std</acl-representation>
256
257     <payload-encoding>US-ASCII</payload-encoding>
258
259     <date>20000508T042651481</date>
260
261     <encrypted>no encryption</encrypted>
262
263     <received >
264       <received-by value="http://foo.com/acc" />
265       <received-date value="20000508T042651481" />
266       <received-id value="123456789" />
267     </received>
268   </params>
269 </envelope>4
270
271 --251D738450A171593A1583EB
272 Content-Type: application/text; charset=US-ASCII
```

<sup>3</sup> Followed by an empty line.

<sup>4</sup> CRLF at the end of the XML Envelope

```

273
274 (inform
275   :sender
276     (agent-identifier
277       :name sender@bar.com
278       :addresses (sequence http://bar.com:80/acc))
279   :receiver
280     (agent-identifier
281       :name receiver@foo.com
282       :addresses (sequence http://foo.com:80/acc )) )
283   :content-length 14
284   :reply-with task1-003
285   :language FIPA-s10
286   :ontology planning-ontology-1
287   :content
288     ((done task1)))
289 --251D738450A171593A1583EB--
290

```

291 2. The ACC responds with a successful notification:

```

292
293 HTTP/1.1 200 OK
294 Content-Type: text/plain
295 Cache-Control: no-cache
296 Connection: close5

```

---

<sup>5</sup> Followed by an empty line.