

# FOUNDATION FOR INTELLIGENT PHYSICAL AGENTS

## FIPA Agent Message Transport Protocol for HTTP Specification

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38 FIPA specifications and upcoming meetings may be found on the FIPA Web site at <http://www.fipa.org/>.

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53 **1 Scope**

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

- 56
- 57 • The transport of messages between agents using the Hypertext Transfer Protocol (HTTP - see [RFC2616]).
- 58

## 59 2 Message Transport Protocol for HTTP

60 This MTP is based on the transfer of data representing the entire agent message including the message envelope in a  
 61 HTTP request. The HTTP data transfer is a two-step process: the sender makes a HTTP request and after receiving  
 62 the data the receiver sends a HTTP response. The receiver then parses the message envelope and the message is  
 63 handled according to the instructions and information given in the message envelope.  
 64

### 65 2.1 Component Name

66 The name assigned to this component is:

67  
 68 `fipa.mts.mtp.http.std`  
 69

### 70 2.2 Interface Definition

#### 71 2.2.1 Request

72 A HTTP request comprises:

- 73
- 74 • **Request Line**
  - 75 - The request method type that must be `POST`.
  - 76
  - 77 - The request resource identification that must be a full URI (see [RFC1630]).
  - 78
  - 79 - The request version that must be `HTTP/1.1`.
  - 80
- 81 • **Request Headers**
  - 82 - The mandatory parameter `Content-Type`: that must be `multipart/mixed` and must have a boundary
  - 83 parameter enclosed by double quotes. It should be anticipated that the boundary parameter may be “folded” as
  - 84 described in [RFC2822] – hence parsers must be able to handle this type of encoding.
  - 85
  - 86 - The mandatory parameter `Host`: that must be in the form `hostname` or `hostname:portnumber`.
  - 87
  - 88 - The mandatory parameter `Cache-Control`: that must have the value `no-cache`.
  - 89
  - 90 - The mandatory parameter `MIME-Version`: that must have the value `1.0`.
  - 91
  - 92 - The optional parameter `Content-Length`: that contains the size of the request body<sup>1</sup>.
  - 93

- 94 • **Request Body**

95 The request body contains the agent message. The agent message has two components (separated as defined in  
 96 [RFC2046] for multipart/mixed MIME content): a FIPA message envelope and a FIPA message body (the payload).  
 97

98 The encoded body must therefore contain at least two parts, the first part containing the FIPA message envelope,  
 99 the second part containing the FIPA message being sent. Each of the two parts must specify an encoding-level  
 100 `Content-Type` field which may be any MIME type (Implementations must assume that some parts of the multipart  
 101 encoded content may contain raw binary data). Each of the two parts may contain other headers such as, for  
 102 example, `Content-Transfer-Encoding` but the processing of these fields is not mandatory.  
 103

104 The `charset` used in headers and the boundary delimiter of the multipart encoding must be plain ASCII.  
 105

---

<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 `Content-Type` header. This `charset` parameter value must have the same value as the value of the envelope `payload-encoding` field.

The envelope body encoding must therefore have the following structure:

- MIME headers (at least a `MIME-Version` header and a `Content-Type` 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 `Content-Type` header line that must have the value appropriate for the envelope representation: `"application" "/" <string>`, where the string is the component name 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 `Content-Type` header line that must have the value appropriate for the FIPA message: `"application" "/" <string>`, where the string is the component name given in each message encoding specification.
- 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>.

- **Response Body**

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

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

**158 2.2.3 Notes**

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

165 It should be anticipated that some of the header field values (especially the boundary parameter of the Content-Type  
166 request field) are “folded” as described in [RFC2822]. So parsers must be able to handle this type of encoding.  
167

168 Compliance to the MTP described in this document does not require HTTP 1.1 features that are not explicitly mentioned  
169 here.  
170

### 171 3 References

- 172 [FIPA00023] FIPA Agent Management Specification. Foundation for Intelligent Physical Agents, 2000.  
173 <http://www.fipa.org/specs/fipa00023/>
- 174 [FIPA00067] FIPA Agent Message Transport Service Specification. Foundation for Intelligent Physical Agents, 2000.  
175 <http://www.fipa.org/specs/fipa00067/>
- 176 [RFC2822] Standard for the Format of ARPA Internet Text Messages. Request for Comments, 2001.  
177 <http://www.ietf.org/rfc/rfc2822.txt>
- 178 [RFC1630] Universal Resource Identifiers in WWW: A Unifying Syntax for the Expression of Names and  
179 Addresses of Objects on the Network as used in the World Wide Web. Request for Comments, 1994.  
180 <http://www.ietf.org/rfc/rfc1630.txt>
- 181 [RFC2045] Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies. Request  
182 for Comments, 1996.  
183 <http://www.ietf.org/rfc/rfc2045.txt>
- 184 [RFC2046] Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types. Request for Comments, 1996.  
185 <http://www.ietf.org/rfc/rfc2045.txt>
- 186 [RFC2616] Hypertext Transfer Protocol - HTTP/1.1. Request for Comments, 1999.  
187 <http://www.ietf.org/rfc/rfc2616.txt>  
188



## 189 4 Informative Annex A — Example

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

193  
 194 1. `sender@bar.com` sends a message to `receiver@foo.com`:

```

195 POST http://foo.com:80/acc HTTP/1.1
196 Cache-Control: no-cache
197 Host: foo.com:80
198 Mime-Version: 1.0
199 Content-Type: multipart-mixed ;
200     boundary="251D738450A171593A1583EB"
201 Content-Length: 1518
202 Connection: close3
203
204 This is not part of the MIME multipart encoded message.
205 --251D738450A171593A1583EB
206
207 Content-Type: application/fipa.mts.env.rep.xml.std
208
209 <?xml version="1.0"?>
210 <envelope>
211   <params index="1">
212     <to>
213       <agent-identifier>
214         <name>receiver@foo.com</name>
215         <addresses>
216           <url>http://foo.com/acc</url>
217         </addresses>
218       </agent-identifier>
219     </to>
220     <from>
221       <agent-identifier>
222         <name>sender@bar.com</name>
223         <addresses>
224           <url>http://bar.com/acc</url>
225         </addresses>
226       </agent-identifier>
227     </from>
228
229     <acl-representation>fipa.acl.rep.string.std</acl-representation>
230
231     <payload-encoding>US-ASCII</payload-encoding>
232
233     <date>20000508T042651481</date>
234
235     <received >
236       <received-by value="http://foo.com/acc"/>
237       <received-date value="20000508T042651481"/>
238       <received-id value="123456789"/>
239     </received>
240   </params>
241 </envelope>4
242
243 --251D738450A171593A1583EB
244 Content-Type: application/fipa.acl.rep.string.std; charset=US-ASCII
245
```

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

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

```
246 (inform
247   :sender
248     (agent-identifier
249       :name sender@bar.com
250       :addresses (sequence http://bar.com:80/acc))
251   :receiver
252     (agent-identifier
253       :name receiver@foo.com
254       :addresses (sequence http://foo.com:80/acc ) ) )
255   :content-length 14
256   :reply-with task1-003
257   :language fipa-sl0
258   :ontology planning-ontology-1
259   :content
260     "((done task1)))"
261
262   --251D738450A171593A1583EB--
263
```

264 2. The ACC responds with a successful notification:

```
265
266 HTTP/1.1 200 OK
267 Content-Type: text/plain
268 Cache-Control: no-cache
269 Connection: close5
270
```

---

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

## 5 Informative Annex B — Notes for Developers

1. The boundary field is usually “folded” on a new line. So the underlying system should be able to fold/unfold encoded MIME headers and values.
2. In the MIME body before each boundary delimiter there must be a new line separator that is considered to be part of the boundary delimiter. So sections are delimited by the sequence “CRLF--boundary value” (where CRLF are two octets with values of 13 and 10 representing the ASCII characters CR and LF, boundary value is the sequence specified in the `Content-Type` value as parameter, and -- are two ASCII minus characters).
3. Good implementations will generate random boundary values and will check that none of the encoded parts contains the boundary delimiter sequence.
4. It is possible to have some text before the first boundary delimiter line and after the ending boundary delimiter line, namely a prologue and an epilogue. This text is to be ignored and should be there only to emphasise the boundary delimiters.
5. [RFC2616]: “In the interest of robustness, servers SHOULD ignore any empty line(s) received where a Request-Line is expected. In other words, if the server is reading the protocol stream at the beginning of a message and receives a CRLF first, it should ignore the CRLF.

Certain buggy HTTP/1.0 client implementations generate extra CRLF's after a POST request. To restate what is explicitly forbidden by the BNF, an HTTP/1.1 client MUST NOT preface or follow a request with an extra CRLF.”

6. In order to facilitate the dynamic discovery of remote platforms, it is recommended, but not strictly mandated, to launch the HTTP MTP server at the following URL (that is, using port 80 and `fipa.mts` as target):

`http://<host name>:80/fipa.mts`

## 299 6 Informative Annex C — ChangeLog

### 300 6.1 2002/11/01 - version E by TC X2S

301 Entire document: Changed `ContentType` header field to `Content-Type`  
302 Page 3, lines 109-114: Removed paragraph related to MIME boundaries  
303 **Page 3, line 118: Changed the envelope part `Content-Type` to enable use of any FIPA specified envelope**  
304 **encoding**  
305 Page 3, line 134: Clarification of the message part of the `Content-Type` definition  
306 Page 4, lines 176-177: Removed Section 2.3 about envelope encoding  
307 Page 4, lines 179-193: Moved Section 2.4 to Informative Appendix B  
308 Page 4, line 194: Added section from RFC2616 on robustness of processing empty lines  
309 **Page 4, line 194: Added note on recommended URL for HTTP MTP**  
310 Page 5, lines 199-201: Removed unused reference to FIPA00085  
311 Page 6, line 261: Removed encrypted envelope header field from example  
312 Page 6, line 233: Corrected the `Content-Type` header field value  
313 Page 6, line 272: Corrected the `Content-Type` header field value  
314 Page 7, line 288: Added quotes to ACL content  
315

### 316 6.2 2002/12/03 - version F by FIPA Architecture Board

317 Entire document: Promoted to Standard status  
318