

# FOUNDATION FOR INTELLIGENT PHYSICAL AGENTS

## FIPA Agent Message Transport Protocol for IIOP Specification

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## 51 **1 Scope**

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

- 54
- 55 • The transport of messages between agents using the Internet Inter-Orb Protocol (IIOP - see [OMGiop]).
- 56

## 2 Message Transport Protocol for IIOP

This MTP is based on the transfer of an OMG IDL structure containing the message envelope and an octet sequence representing the ACL message body. The envelope and the message body are transferred together within a single IIOP one-way invocation [OMGiop].

Once the request has been received, the message envelope is used by the ACC to obtain the instructions and information needed to correctly handle the message body.

### 2.1 Component Name

The name assigned to this component is:

```
fipa.mts.mtp.iiop.std
```

### 2.2 Interface Definition

The following IDL specifies the message transport interface. This interface contains a single operation `message()` that requires a single argument. This argument has two attributes: a sequence of `Envelope` structures holding the message envelope and the payload, that is a sequence of octets containing the ACL message body.

```
module FIPA {
    typedef sequence<Envelope> Envelopes;
    typedef sequence<octet> Payload;
    struct FipaMessage {
        Envelopes messageEnvelopes;
        Payload    messageBody;
    };

    interface MTS {
        oneway void message(in FipaMessage aFipaMessage);
    };
};
```

### 2.3 ACC Processing of IDL Envelope

According to [FIPA00067], a FIPA compliant ACC is not allowed to modify any element of the envelope that it receives. It is however allowed to update a value in one of the envelope parameters by adding a new `Envelope` element at the end of the `messageEnvelopes` sequence. This new element is required to have only those parameter values that the ACC wishes to add or update plus a new `ReceivedObject` element as mandated in [FIPA00067].

As a consequence, an ACC that receives a message must implement the procedure described in the following pseudo-code. The procedure recomposes the full envelope structure with its latest values for each parameter. The procedure simply shows that the ACC starts from the last envelope in the sequence and continues until it has all the required values for each parameter of the envelope.

```
EnvelopeWithAllFields := new empty Envelope;

while ((EnvelopeWithAllFields does not contain values for all its fields)
    OR (all Envelopes in the sequence have been processed)) {
    // the ACC gets the next envelope in the sequence starting from the end
    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
```

```

110     }
111 }
112
113 EnvelopeWithAllFields now contains the latest values for all its fields.
114
115 For example:
116
117 Envelope(0):
118     to = tizio
119     from = caio
120     aclRepresentation = XML
121     received = ...
122
123 Envelope (1):
124     from = caio@molfetta.it
125     received = ...
126
127 Envelope (2):
128     intended-receiver = tizio@villardora.it
129     received = ...
130
131 EnvelopeWithAllFields:
132     to = tizio                                (from envelope 0)
133     from = caio@molfetta.it                  (from envelope 1)
134     intended-receiver = tizio@villardora.it  (from envelope 2)
135     date = 25 May 2000                      (from envelope 0)
136

```

## 137 2.4 Concrete Message Envelope Syntax

138 The abstract envelope syntax from [FIPA00067] maps into a set of OMG IDL structured types, all of which are enclosed  
 139 within the FIPA module.

140  
 141 The following standard convention applies for the identification of optional parameters: an empty string and an empty  
 142 sequence identify the non-presence of a parameter. In the case of the `payload-length` parameter (which is a  
 143 number) any negative value can be used to identify the non-presence of the parameter.

144  
 145 The complete IDL definition is:

```

146
147 module FIPA {
148     // No need for an URL struct, since it's only put in the
149     // message envelope for informational purposes.
150     typedef string URL;
151
152
153     // this generic type is used to represent user-defined, non FIPA-defined,
154     // properties that are added to the message envelope in the form of a
155     // keyword and value pair.
156     struct Property {
157         string keyword;
158         any value;
159     };
160
161     struct AgentID { // Agent Identifier
162         string name;
163         sequence<URL> addresses;
164         sequence<AgentID> resolvers;
165         sequence<Property> userDefinedProperties;
166     };
167
168     typedef sequence<AgentID> AgentIDs; // sequence of Agent Identifiers
169

```

```

170 // IDL struct to represent a time stamp.
171 // It is based on the ISO8601 format with extension for millisecond durations.
172 // The value of the typeDesignator must be a valid
173 // AlphaCharacter, i.e. ['a'-'z' , 'A'-'Z'], that identifies the timezone.
174 // ISO8601 reports the mapping between typeDesignator and timezone.
175 // The typeDesignator for UTC is the character 'Z'.
176 // If the value of typeDesignator is not an AlphaCharacter, it defaults
177 // to the local timezone.
178 struct DateTime {
179     short year;           // year (e.g. 2000)
180     short month;          // between 1 and 12
181     short day;            // between 1 and 31
182     short hour;           // between 0 and 23
183     short minutes;        // between 0 and 59
184     short seconds;        // between 0 and 59
185     short milliseconds;   // between 0 and 999
186     char typeDesignator; // see comment above
187 };
188
189 struct ReceivedObject {
190     URL by;
191     URL from;
192     DateTime date;
193     string id;
194     string via;
195 };
196
197 typedef sequence<Property> TransportBehaviourType;
198 typedef sequence<AgentID,1> OptAgentID;
199 typedef sequence<DateTime,1> OptDateTime;
200 typedef sequence<TransportBehaviourType,1> OptTransportBehaviourType;
201 typedef sequence<ReceivedObject,1> OptReceivedObject;
202
203 struct Envelope {
204     AgentIDs to;
205     OptAgentID from;
206     string comments;
207     string aclRepresentation;
208     long payloadLength;
209     string payloadEncoding;
210     OptDateTime date;
211     AgentIDs intendedReceiver;
212     OptReceivedObject received;
213     OptTransportBehaviourType transportBehaviour;
214     sequence<Property> userDefinedProperties; // user-defined properties
215 };
216
217 typedef sequence<Envelope> Envelopes;
218 typedef sequence<octet> Payload;
219
220 struct FipaMessage {
221     Envelopes messageEnvelopes;
222     Payload messageBody;
223 };
224
225 interface MTS {
226     oneway void message(in FipaMessage aFipaMessage);
227 };
228 };
229

```

### 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/>
- [OMGiop] OMG Internet Inter-ORB Protocol Specification, Common Object Request Broker Architecture 2.2.  
Object Management Group, 1999.
- [OMGint] ORB Interoperability Architecture, CORBA V2.3. Object Management Group, June 1999.
- [OMGnam] Common Object Services Specification, Naming Service: v1.1. Object Management Group, 00-08-07,  
2000.



## 4 Informative Annex A — URL Schemes for IIOP Addresses

Section 3.6 of OMG Naming Service specifications [OMGnam] and section 13.6 of OMG ORB Interoperability Architecture [OMGint] describe the Uniform Resource Locator (URL) schemes available to represent a CORBA object or a CORBA object bound in a Naming Service and that can be used within FIPA to represent valid IIOP addresses:

- **IOR.** The string form of an IOR (`IOR:<hex_octets>`) is a valid URL. The scheme name is **IOR** and the text after the `:` is defined in the CORBA 2.3 specification, Section 13.6.6. The IOR URL is robust and insulates the client from the encapsulated transport information and object key used to reference the object. This URL format is independent of Naming Service.
- **corbaloc.** It is difficult for humans to exchange IORs through non-electronic means because of their length and the text encoding of binary information. The `corbaloc` URL scheme provides URLs that are familiar to people and similar to `ftp` or `http` URLs. The `corbaloc` URL is described in the CORBA 2.3 Specification, Section 13.6.6. This URL format is independent of the Naming Service.
- **corbaname.** A `corbaname` URL is similar to a `corbaloc` URL. However a `corbaname` URL also contains a stringified name that identifies a binding in a naming context.

Refer to the OMG specs for how to use a CORBA Naming Resolution Service and for the complete syntax of the used URL schemes.

## 262    **5   Informative Annex B — ChangeLog**

### 263    **5.1   2002/11/01 - version F by TC X2S**

264    **Page 3, line 146:**            **Removed `strings` type definition**

265    **Page 4, line 207:**           **Removed `encrypted` parameter**

266

### 267    **5.2   2002/12/03 - version G by FIPA Architecture Board**

268    **Entire document:**            **Promoted to Standard status**

269