

# FOUNDATION FOR INTELLIGENT PHYSICAL AGENTS

## FIPA Agent Message Transport Envelope Representation in String Specification

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*Geneva, Switzerland*

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## Foreword

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## 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 string form.

## 2 String Envelope Representation

This section gives the concrete syntax for the message envelope in string format. This concrete syntax and lexical analysis of messages has been inspired by [RFC822].

### 2.1 Component Name

The name assigned to this component is:

```
fipa.mts.env.rep.string.std
```

### 2.2 Lexical Analysis

Messages consist of message envelope parameters and, optionally, a message body. The message body is simply a sequence of ASCII characters representing an ACL message. The message body is separated from the message envelope by two subsequent CRLF tokens with nothing in between the tokens (that is, a line with nothing preceding the CRLF).

Each message envelope parameter can be viewed as a single, logical line of ASCII characters, comprising a parameter name and a parameter value. For convenience, the parameter value portion of this conceptual entity can be split into a multiple-line representation by inserting, at the transmitter side, a CRLF immediately followed by at least one LWSP-char (this action is called *folding*). At the receiver side, CRLF immediately followed by a LWSP-char is considered equivalent to the LWSP-char (this action is called *unfolding*).

Once a parameter has been unfolded, at the receiver side it may be viewed as being composed of a parameter name, followed by a colon (:), followed by a parameter body, and terminated by a carriage-return/line-feed (CRLF). The parameter name must be composed of printable ASCII characters (that is, characters that have values between 33 and 126 decimal, except colon). The parameter body may be composed of any ASCII characters, except CR or LF. (While CR and/or LF may be present in the actual text, they are removed by the action of unfolding the parameter.)

Except as noted, alphabetic strings may be represented in any combination of upper and lower case. However, ACCs are required to preserve case information when transporting messages.

These rules show a parameter meta-syntax, without regard for the particular type or internal syntax. Their purpose is to permit detection of parameters; also, they present to higher-level parsers an image of each parameter as fitting on one line.

```

MessageEnvelope      = Parameter+ CRLF MessageBody.

MessageBody          = Text* ( CRLF Text* )*
                      | Byte*.1

Parameter            = ParameterName ":" [ ParameterBody ] CRLF.

ParameterName        = 1* <any CHAR, excluding CTLs, SPACE, and ":">.

ParameterBody        = ParameterBodyContents [CRLF LWSP-char ParameterBody].

ParameterBodyContents = <the ASCII characters making up the ParameterBody, as defined
                        in the following section and consisting of combinations of
                        Atom, QuotedString and specials tokens or else consisting of

```

---

<sup>1</sup> Note that this cannot be transmitted over [FIPA00075].

Text> .

The following rules are used to define an underlying lexical analyser, which feeds tokens to higher level parsers.

			; ( Octal, Decimal.)
CHAR	= <any ASCII character>.		; ( 0-177, 0.-127.)
DIGIT	= <any ASCII decimal digit>.		; ( 60- 71, 48.- 57.)
CTL	= <any ASCII control character and DEL>.		; ( 0- 37, 0.- 31.) ; ( 177, 127.)
CR	= <ASCII CR, carriage return>.		; ( 15, 13.)
LF	= <ASCII LF, linefeed>.		; ( 12, 10.)
SPACE	= <ASCII SP, space>.		; ( 40, 32.)
HTAB	= <ASCII HT, horizontal-tab>.		; ( 11, 9.)
<">	= <ASCII quote mark>.		; ( 42, 34.)
CRLF	= CR LF.		
LWSPChar	= SPACE / HTAB.		; semantics = SPACE
LinearWhiteSpace	= ([CRLF] LWSPChar)+.		; semantics = SPACE ; CRLF => folding
Text	= <any CHAR including bare CR and bare LF but NOT including CRLF>.		
Atom	= <any CHAR except ">, SPACE and CTLs> <any CHAR except SPACE and CTLs> *.		
QuotedString	= "> ( QText/QuotedPair )* ">.		; Regular qtext or ; quoted chars.
QText	= <any CHAR excepting ">, "\" and CR, and including linear-white-space>.		; => may be folded
QuotedPair	= "\" CHAR.		; may quote any char
Word	= Atom / QuotedString.		
Byte	= <any 8-bit byte>.		

## 2.3 Syntax

The following rules apply after the unfolding operation, as specified in the previous section.

MessageEnvelope	= Parameter+ CRLF MessageBody.
Parameter	= ACLRepresentationParameter CRLF   CommentParameter CRLF   ContentLengthParameter CRLF

	ContentEncodingParameter	CRLF
	DateParameter	CRLF
	EncryptedParameter	CRLF
	IntendedReceiverParameter	CRLF
	ReceivedParameter	CRLF
	EnvSenderParameter	CRLF
	EnvReceiverParameter	CRLF
	TransportBehaviourParameter	CRLF
	UserDefinedParameter	CRLF.
MessageBody	= Text* ( CRLF Text* )*	
	CRLF Byte*. <sup>2</sup>	
ACLRepresentationParameter	= "ACL-representation" ":" word.	
CommentParameter	= "Comments" ":" text*.	
ContentLengthParameter	= "Content-length" ":" DIGIT+.	
ContentEncodingParameter	= "Content-encoding" ":" word.	
DateParameter	= "Date" ":" DateTime.	
DateTime	= See section 2.5.	
EncryptedParameter	= "Encrypted" ":" word [ word ].	
IntendedReceiverParameter	= "Intended-receiver" ":" AgentIdentifierList.	
AgentIdentifierList	= AgentIdentifier [ "," AgentIdentifier ]*.	
ReceivedParameter	= "Received" ":"	
	[ "from" URL ]	
	[ "by" URL ]	
	[ "id" word ]	
	[ "via" word ]	
	;" DateTime.	
EnvSenderParameter	= "From" ":" AgentIdentifier.	
EnvReceiverParameter	= "To" ":" AgentIdentifierList.	
TransportBehaviourParameter	= "Transport-behaviour" ":"	
	[ "error-messages" AgentIdentifierList ]	
	[ "delivery" word ]	
	[ "acknowledgement" AgentIdentifierList ].	
UserDefinedParameter	= <any parameter which has not been defined in this specification or published as an extension to this specifications; parameter name must be unique and may be pre-empted by published extensions.>.	

---

<sup>2</sup> Note that this cannot be transmitted over [FIPA00075].

```

AgentIdentifier          = "( " "AID"
                          " :name" Word
                          [ " :addresses" URLSequence ]
                          [ " :resolvers" AgentIdentifierSequence ]
                          ( UserDefinedParameter Expression )* )" .

AgentIdentifierSequence = "( " "sequence" AgentIdentifier* )" .3

URLSequence             = "( " "sequence" URL* )" .

URL                     = See [RFC2396]

```

## 2.4 Additional Syntax Rules

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

1. The abstract syntax of the message envelope are mandatory.
2. This specification permits multiple occurrences of message envelope parameters. For the purposes of disambiguation the first occurrence overrides any subsequent occurrence (see [RFC822] for further details).

In the future, additional parameters may be defined and added to the message envelope. Such parameters are prefixed with `X-FIPA-` and their behaviour is not specified. If an organisation wishes to add its own message envelope parameters it is suggested they prefix the new parameter name with `X-CompanyName-` to reduce the chances of conflict.

## 2.5 Representation of Time

Time tokens are based on [ISO8601], with extensions for relative time and millisecond durations. Time expressions may be absolute, or relative to the current time. Relative times are distinguished by the character `+` appearing as the first character in the construct. 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
```

While one hour, 15 minutes and 35 milliseconds from now would be:

```
+00000000T011500035
```

---

<sup>3</sup> A sequence is considered to have a left to right (first to last) ordering.

### 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/>
- [FIPA00075] FIPA Agent Message Transport Protocol for IOP Specification. Foundation for Intelligent Physical Agents, 2000.  
<http://www.fipa.org/specs/fipa00075/>
- [ISO8601] Date Elements and Interchange Formats, Information Interchange-Representation of Dates and Times. International Standards Organisation, 1998.  
<http://www.iso.ch/cate/d15903.html>
- [RFC822] Uniform Resource Identifiers: Generic Syntax. Request for Comments, 1992.  
<http://www.ietf.org/rfc/rfc0822.txt>
- [RFC2396] Standard for the Format of APRA Internet Text Messages. Request for Comments, 1998.  
<http://www.ietf.org/rfc/rfc2396.txt>