

FOUNDATION FOR INTELLIGENT PHYSICAL AGENTS

FIPA Nomadic Application Support Control Agent 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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36 represented 17 countries worldwide. Further information about FIPA as an organization, membership information, FIPA
37 specifications and upcoming meetings may be found at <http://www.fipa.org/>.

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51 **1 Scope**

52 This document is part of the FIPA specifications and deals with agent middleware to support applications in nomadic
53 environment. This specification also forms part of the FIPA Nomadic Application Support Specification [FIPA00066] and
54 contains specifications for:

55

56 Control Agent (CA) functionality.

57

57 **2 Control Agent Ontology**

58 **2.1 Object Descriptions**

59 This section describes a set of frames that represent the classes of objects in the domain of discourse within the
60 framework of the FIPA-Nomadic-Application ontology.

61
62 The following terms are used to describe the objects of the domain:

63
64 **Frame.** This is the mandatory name of this entity that must be used to represent each instance of this class.

65
66 **Ontology.** This is the name of the ontology, whose domain of discourse includes the parameters described in the
67 table.

68
69 **Parameter.** This is the mandatory name of a parameter of this frame.

70
71 **Description.** This is a natural language description of the semantics of each parameter.

72
73 **Presence.** This indicates whether each parameter is mandatory or optional.

74
75 **Type.** This is the type of the values of the parameter: Integer, Word, String, URL, Term, Set or Sequence.

76
77 **Reserved Values.** This is a list of FIPA-defined constants that can assume values for this parameter.
78

79 **2.1.1 Service Description**

80 This type of object represents the description of each service registered with the DF.
81

Frame	service-description			
Ontology	FIPA-Nomadic-Application			
Parameter	Description	Presence	Type	Reserved Values
name	The name of the service.	Mandatory	String	fipa-mts-control
type	The type of the service.	Mandatory	String	fipa-ca
ontology	A list of ontologies supported by the service.	Optional	Set of String	FIPA-Nomadic-Application
protocol	A list of interaction protocols supported by the service.	Optional	Set of String	
properties	A list of properties that discriminate the service.	Optional	Set of property	

82

83 **2.2 Function Descriptions**

84 The following tables define usage and semantics of the functions that are part of the FIPA-Nomadic-Application
85 ontology.

86
87 The following terms are used to describe the functions of the FIPA-Nomadic-Application domain:

88
89 **Function.** This is the symbol that identifies the function in the ontology.

90
91 **Ontology.** This is the name of the ontology, whose domain of discourse includes the function described in the
92 table.

93
94 **Supported by.** This is the type of agent that supports this function.

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Description. This is a natural language description of the semantics of the function.

Domain. This indicates the domain over which the function is defined. The arguments passed to the function must belong to the set identified by the domain.

Range. This indicates the range to which the function maps the symbols of the domain. The result of the function is a symbol belonging to the set identified by the range.

Arity. This indicates the number of arguments that a function takes. If a function can take an arbitrary number of arguments, then its arity is undefined.

2.2.1 Open Communication Channel

Function	open-comm-channel
Ontology	FIPA-Nomadic-Application
Supported by	CA
Description	An agent can request that a CA opens a communication channel. The communication channel description should contain enough information for a CA to be able to choose the right communication channel, that is, either the <code>:name</code> parameter or the <code>:target-addr</code> parameter must be present. The agent may also supply additional communication channel information by using the <code>:options</code> parameter.
Domain	comm-channel (see [FIPA00065])
Range	The execution of this function results in a change of the state, but it has no explicit result. Therefore there is no range set.
Arity	1

108

2.2.2 Close Communication Channel

Function	close-comm-channel
Ontology	FIPA-Nomadic-Application
Supported by	CA
Description	An agent can request that a CA closes a communication channel. The communication channel description should contain enough information for a CA to be able to choose the right communication channel, that is, either the <code>:name</code> parameter or the <code>:target-addr</code> parameter must be present.
Domain	comm-channel
Range	The execution of this function results in a change of the state, but it has no explicit result. Therefore there is no range set.
Arity	1

110

2.2.3 Activate a Message Transport Protocol

Function	activate
Ontology	FIPA-Nomadic-Application
Supported by	CA
Description	An agent can request that a CA activates a Message Transport Protocol (MTP). The transport protocol description should contain enough information to allow the CA to identify the correct transport protocol. Additionally, the agent may supply address information to where the transport protocol connection should be opened. It is possible to give the address of the gateway and/or the address of the destination AP.
Domain	Sequence of transport-protocol (see [FIPA00065])
Range	transport-protocol

111

Arity	1
--------------	---

112
113

113 **2.2.4 Deactivate a Message Transport Protocol**

Function	deactivate
Ontology	FIPA-Nomadic-Application
Supported by	CA
Description	An agent can request that a CA deactivates an MTP.
Domain	transport-protocol
Range	The execution of this function results in a change of the state, but it has no explicit result. Therefore there is no range set.
Arity	1

114

115 **2.2.5 Select a Message Transport Protocol**

Function	use
Ontology	FIPA-Nomadic-Application
Supported by	CA
Description	An CA can request another CA to select an MTP for use between Agent Communication Channels (ACCs) using the FIPA-Propose interaction protocol (see [FIPA00036]). The requesting CA shall provide enough information to establish a working MTP connection. The direction of communication (either send, receive or both) and the list of MTPs must be present. The list of MTPs is an ordered list where the highest priority is the first item and the lowest priority is the last item in the list. The receiving CA shall select at most one MTP for the proposed direction of communication (either send, receive or both)
Domain	transports (see [FIPA00065])
Range	transports
Arity	1

116

117

3 Examples

1. A CA registers with a DF (see [FIPA00023]):

```

117 (request
118   :sender
119     (agent-identifier
120      :name ca@foo.com
121      :addresses (sequence http://foo.com/acc))
122   :receiver (set
123     (agent-identifier
124      :name df@foo.com
125      :addresses (sequence http://foo.com/acc)))
126   :language FIPA-SL0
127   :protocol FIPA-Request
128   :ontology FIPA-Agent-Management
129   :content
130     (action
131      (agent-identifier
132       :name df@foo.com
133       :addresses (sequence http://foo.com/acc))
134      (register
135       (df-agent-description
136        :name
137          (agent-identifier
138           :name ca@foo.com
139           :addresses (sequence http://foo.com/acc))
140         :services (set
141          (service-description
142           :name fipa-mts-control
143           :type fipa-ca
144           :ontology (set FIPA-Nomadic-Application))))))))))

```

2. An agent asks a CA to open a communication channel:

```

148 (request
149   :sender
150     (agent-identifier
151      :name agent@foo.com
152      :addresses (sequence http://foo.com/acc))
153   :receiver (set
154     (agent-identifier
155      :name ca@mobile.com
156      :addresses (sequence http://mobile.com/acc)))
157   :language FIPA-SL0
158   :ontology FIPA-Nomadic-Application
159   :protocol FIPA-Request
160   :content
161     (action
162      (agent-identifier
163       :name ca@mobile.com
164       :addresses (sequence http://mobile.com/acc))
165      (open-comm-channel
166       (comm-channel
167        :name GPRS
168        :target-addr wap://wap-gateway.com:1234/acc))))))

```

173 3. An agent asks a CA to close a communication channel:

```

174
175 (request
176   :sender
177     (agent-identifier
178      :name agent@foo.com
179      :addresses (sequence http://foo.com/acc))
180   :receiver (set
181     (agent-identifier
182      :name ca@bar.com
183      :addresses (sequence http://bar.com/acc)))
184   :language FIPA-SL0
185   :ontology FIPA-Nomadic-Application
186   :protocol FIPA-Request
187   :content
188     (action
189      (agent-identifier
190       :name ca@bar.com
191       :addresses (sequence http://bar.com/acc))
192      (close-comm-channel
193       (comm-channel
194        :target-addr wap://wap-gateway.com:1234/acc))))))
195

```

196 4. An agent asks a CA to activate an MTP:

```

197
198 (request
199   :sender
200     (agent-identifier
201      :name agent@foo.com
202      :addresses (sequence http://foo.com/acc))
203   :receiver (set
204     (agent-identifier
205      :name ca@bar.com
206      :addresses (sequence http://bar.com/acc)))
207   :language FIPA-SL0
208   :ontology FIPA-Nomadic-Application
209   :protocol FIPA-Request
210   :content
211     (action
212      (agent-identifier
213       :name ca@bar.com
214       :addresses (sequence http://bar.com/acc))
215      (activate (sequence
216        (transport-protocol
217         :name fipa.mts.mtp.wap.std
218         :gw-addr wap://wap-gateway.com:1234/acc))))))
219
220

```

220 5. An agent asks a CA to deactivate an MTP:

```

221 (request
222   :sender
223     (agent-identifier
224      :name agent@foo.com
225      :addresses (sequence http://foo.com/acc))
226   :receiver (set
227     (agent-identifier
228      :name ca@bar.com
229      :addresses (sequence http://bar.com/acc)))
230   :language FIPA-SL0
231   :ontology FIPA-Nomadic-Application
232   :protocol FIPA-Request
233   :content
234     (action
235      (agent-identifier
236       :name ca@bar.com
237       :addresses (sequence http://bar.com/acc))
238      (deactivate
239       (transport-protocol
240        :name fipa.mts.mtp.wap.std
241        :gw-addr wap://wap-gateway.com:1234/acc))))
242
243
```

244 6. A CA asks another CA to use one of the specified MTPs as the communication mechanism between ACCs:

```

245 (request
246   :sender
247     (agent-identifier
248      :name ca@foo.com
249      :addresses (sequence http://foo.com/))
250   :receiver (set
251     (agent-identifier
252      :name ca@bar.com
253      :addresses (sequence http://bar.com/)))
254   :language FIPA-SL0
255   :ontology FIPA-Nomadic-Application
256   :protocol FIPA-Propose
257   :content
258     (action
259      (agent-identifier
260       :name ca@bar.com
261       :addresses (sequence http://bar.com/))
262      (use
263       (transports
264        :send (sequence
265              (transport-protocol
266               :name fipa.mts.mtp.wap.std)
267              (transport-protocol
268               :name x-uh-mdcp))
269        :recv (sequence
270              (transport-protocol
271               :name fipa.mts.mtp.wap.std)
272              (transport-protocol
273               :name x-uh-mdcp))))))
274
275
```

276

276 **4 References**

277 [FIPA00023] FIPA Agent Management Specification. Foundation for Intelligent Physical Agents, 2000.
278 <http://www.fipa.org/specs/fipa00023/>

279 [FIPA00036] FIPA Propose Interaction Protocol Specification. Foundation for Intelligent Physical Agents, 2000.
280 <http://www.fipa.org/specs/fipa00036/>

281 [FIPA00066] FIPA Nomadic Application Support Specification. Foundation for Intelligent Physical Agents, 2000.
282 <http://www.fipa.org/specs/fipa00066/>

283 [FIPA00076] FIPA Agent Message Transport Protocol for WAP Specification. Foundation for Intelligent Physical
284 Agents, 2000.
285 <http://www.fipa.org/specs/fipa00076/>