

# 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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## 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.

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## 2 Control Agent Ontology

### 2.1 Object Descriptions

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

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

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

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

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

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

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

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

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

#### 2.1.1 Service Description

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

<b>Frame</b>	service-description			
<b>Ontology</b>	FIPA-Nomadic-Application			
<b>Parameter</b>	<b>Description</b>	<b>Presence</b>	<b>Type</b>	<b>Reserved Values</b>
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	

### 2.2 Function Descriptions

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

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

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

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

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

**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

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

### 2.2.2 Close Communication Channel

<b>Function</b>	close-comm-channel
<b>Ontology</b>	FIPA-Nomadic-Application
<b>Supported by</b>	CA
<b>Description</b>	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 :name parameter or the :target-addr parameter must be present.
<b>Domain</b>	comm-channel
<b>Range</b>	The execution of this function results in a change of the state, but it has no explicit result. Therefore there is no range set.
<b>Arity</b>	1

### 2.2.3 Activate a Message Transport Protocol

<b>Function</b>	activate
<b>Ontology</b>	FIPA-Nomadic-Application
<b>Supported by</b>	CA
<b>Description</b>	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.
<b>Domain</b>	Sequence of transport-protocol (see [FIPA00065])
<b>Range</b>	transport-protocol

<b>Arity</b>	1
--------------	---

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**2.2.4 Deactivate a Message Transport Protocol**

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

**2.2.5 Select a Message Transport Protocol**

<b>Function</b>	use
<b>Ontology</b>	FIPA-Nomadic-Application
<b>Supported by</b>	CA
<b>Description</b>	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)
<b>Domain</b>	transports (see [FIPA00065])
<b>Range</b>	transports
<b>Arity</b>	1



### 3 Examples

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

```
(request
  :sender
    (agent-identifier
      :name ca@foo.com
      :addresses (sequence http://foo.com/acc))
  :receiver (set
    (agent-identifier
      :name df@foo.com
      :addresses (sequence http://foo.com/acc)))
  :language FIPA-SL0
  :protocol FIPA-Request
  :ontology FIPA-Agent-Management
  :content
    (action
      (agent-identifier
        :name df@foo.com
        :addresses (sequence http://foo.com/acc))
      (register
        (df-agent-description
          :name
            (agent-identifier
              :name ca@foo.com
              :addresses (sequence http://foo.com/acc))
          :services (set
            (service-description
              :name fipa-mts-control
              :type fipa-ca
              :ontology (set FIPA-Nomadic-Application))))))))
```

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

```
(request
  :sender
    (agent-identifier
      :name agent@foo.com
      :addresses (sequence http://foo.com/acc))
  :receiver (set
    (agent-identifier
      :name ca@mobile.com
      :addresses (sequence http://mobile.com/acc)))
  :language FIPA-SL0
  :ontology FIPA-Nomadic-Application
  :protocol FIPA-Request
  :content
    (action
      (agent-identifier
        :name ca@mobile.com
        :addresses (sequence http://mobile.com/acc))
      (open-comm-channel
        (comm-channel
          :name GPRS
          :target-addr wap://wap-gateway.com:1234/acc))))
```

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

```

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

```

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

```

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

```

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

```

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

```

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

```

244 (request
245   :sender
246     (agent-identifier
247       :name ca@foo.com
248       :addresses (sequence http://foo.com/))
249   :receiver (set
250     (agent-identifier
251       :name ca@bar.com
252       :addresses (sequence http://bar.com/)))
253   :language FIPA-SL0
254   :ontology FIPA-Nomadic-Application
255   :protocol FIPA-Propose
256   :content
257     (action
258       (agent-identifier
259         :name ca@bar.com
260         :addresses (sequence http://bar.com/))
261       (use
262         (transports
263           :send (sequence
264             (transport-protocol
265               :name fipa.mts.mtp.wap.std)
266             (transport-protocol
267               :name x-uh-mdcp))
268           :recv (sequence
269             (transport-protocol
270               :name fipa.mts.mtp.wap.std)
271             (transport-protocol
272               :name x-uh-mdcp))))))
273
274
275
276

```

## 4 References

- [FIPA00023] FIPA Agent Management Specification. Foundation for Intelligent Physical Agents, 2000.  
<http://www.fipa.org/specs/fipa00023/>
- [FIPA00036] FIPA Propose Interaction Protocol Specification. Foundation for Intelligent Physical Agents, 2000.  
<http://www.fipa.org/specs/fipa00036/>
- [FIPA00066] FIPA Nomadic Application Support Specification. Foundation for Intelligent Physical Agents, 2000.  
<http://www.fipa.org/specs/fipa00066/>
- [FIPA00076] FIPA Agent Message Transport Protocol for WAP Specification. Foundation for Intelligent Physical Agents, 2000.  
<http://www.fipa.org/specs/fipa00076/>