FOUNDATION FOR INTELLIGENT PHYSICAL AGENTS

FIPA Nomadic Application Support Control Agent Specification

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Foreword

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1 Scope

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

Control Agent (CA) functionality.

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.

Frame **Ontology**	service-description 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	

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

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 `:name` parameter or the `:target-addr` parameter must be present. The agent may also supply additional communication channel information by using the `:options` 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

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 `:name` parameter or the `:target-addr` 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

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`

Arity	1

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

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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

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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-channnel
          :name GPRS
          :target-addr wap://wap-gateway.com:1234/acc))))
```

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

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

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

```
(request
  :sender
    (agent-identifier
      :name agent@foo.com
      :addresses (sequence http://foo.com/acc))
  :receiver (set
    (agent-identifier
      :name ca@bar.com
      :addresses (sequence http://bar.com/acc)))
  :language FIPA-SL0
  :ontology FIPA-Nomadic-Application
  :protocol FIPA-Request
  :content
    (action
      (agent-identifier
        :name ca@bar.com
        :addresses (sequence http://bar.com/acc))
      (activate (sequence
        (transport-protocol
          :name fipa.mts.mtp.wap.std
          :gw-addr wap://wap-gateway.com:1234/acc)))))
```

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

```
(request
  :sender
    (agent-identifier
      :name agent@foo.com
      :addresses (sequence http://foo.com/acc))
  :receiver (set
    (agent-identifier
      :name ca@bar.com
      :addresses (sequence http://bar.com/acc)))
  :language FIPA-SL0
  :ontology FIPA-Nomadic-Application
  :protocol FIPA-Request
  :content
    (action
      (agent-identifier
        :name ca@bar.com
        :addresses (sequence http://bar.com/acc))
      (deactivate
        (transport-protocol
          :name fipa.mts.mtp.wap.std
          :gw-addr wap://wap-gateway.com:1234/acc))))
```

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

```
(request
  :sender
    (agent-identifier
      :name ca@foo.com
      :addresses (sequence http://foo.com/))
  :receiver (set
    (agent-identifier
      :name ca@bar.com
      :addresses (sequence http://bar.com/)))
  :language FIPA-SL0
  :ontology FIPA-Nomadic-Application
  :protocol FIPA-Propose
  :content
    (action
      (agent-identifier
        :name ca@bar.com
        :addresses (sequence http://bar.com/))
      (use
        (transports
          :send (sequence
            (transport-protocol
              :name fipa.mts.mtp.wap.std)
            (transport-protocol
              :name x-uh-mdcp))
          :recv (sequence
            (transport-protocol
              :name fipa.mts.mtp.wap.std)
            (transport-protocol
              :name x-uh-mdcp))))))
```

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/