FOUNDATION FOR INTELLIGENT PHYSICAL AGENTS

FIPA Nomadic Application Support Monitor Agent Specification

Document title	FIPA Nomadic Application Support Monitor Agent Specification		
Document number	OC00062D	**Document source**	FIPA Nomadic Application Support
Document status	Obsolete	**Date of this status**	2001/08/10
Supersedes	None		
Contact	fab@fipa.org		
Change history			
2000/08/04	Document made obsolete by FIPA00014		
2001/08/10	Line numbering added		

Geneva, Switzerland

Foreword

The Foundation for Intelligent Physical Agents (FIPA) is an international organization that is dedicated to promoting the industry of intelligent agents by openly developing specifications supporting interoperability among agents and agent-based applications. This occurs through open collaboration among its member organizations, which are companies and universities that are active in the field of agents. FIPA makes the results of its activities available to all interested parties and intends to contribute its results to the appropriate formal standards bodies.

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The FIPA specifications are developed through direct involvement of the FIPA membership. The status of a specification can be either Preliminary, Experimental, Standard, Deprecated or Obsolete. More detail about the process of specification may be found in the FIPA Procedures for Technical Work. A complete overview of the FIPA specifications and their current status may be found in the FIPA List of Specifications. A list of terms and abbreviations used in the FIPA specifications may be found in the FIPA Glossary.

FIPA is a non-profit association registered in Geneva, Switzerland. As of January 2000, the 56 members of FIPA represented 17 countries worldwide. Further information about FIPA as an organization, membership information, FIPA specifications and upcoming meetings may be found at http://www.fipa.org/.

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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:

Monitor Agent (MA) functionality.

2 Monitor 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-monitor`
`type`	The type of the service.	Mandatory	`String`	`fipa-ma`
`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 Request Monitoring Information

Function	`qos-information`
Ontology	`FIPA-Nomadic-Application`
Supported by	MA
Description	An agent asks for quality of service information from an MA using the `FIPA-Query` interaction protocol (see [FIPA00027]). The agent may specify either a communication channel or transport protocol to request quality of service information from.
Domain	`comm-channel` / `transport-protocol`, `qos` (see [FIPA00065])
Range	`qos`
Arity	2

2.2.2 Subscribe to Changes

Function	`qos-notification`
Ontology	`FIPA-Nomadic-Application`
Supported by	MA
Description	An agent subscribes to notifications about changes to the quality of service from an MA using the `FIPA-Subscribe` interaction protocol (see [FIPA00035]).
Domain	`comm-channel`, `qos`, `change-constraints` / `time-constraints`
Range	`qos`
Arity	3

3 Examples

1. An MA registers with a DF (see [FIPA00023]):

```
(request
  :sender
    (agent-identifier
      :name ma@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 ma@foo.com
              :addresses (sequence http://foo.com/acc))
          :services (set
            (service-description
              :name fipa-mts-monitor
              :type fipa-ma
              :ontology (set FIPA-Nomadic-Application)))))))
```

2. An agent wants to know the current round-trip time of communication channel named GPRS:

```
(query-ref
  :sender
    (agent-identifier
      :name agent@foo.com
      :addresses (sequence http://foo.com/acc))
  :receiver (set
    (agent-identifier
      :name ma@bar.com
      :addresses (sequence http://bar.com/acc)))
  :ontology FIPA-Nomadic-Application
  :language FIPA-SL2
  :protocol FIPA-Query
  :content
    (iota ?x
      (qos-information
        (comm-channel
          :name GPRS)
        (qos
          :rtt
            (time-value
              :direction Inbound
              :value ?x)))))
```

3. An agent wants to know the current throughput of WAP MTP (see [FIPA00076]):

```
(query-ref
  :sender
    (agent-identifier
      :name agent@foo.com
      :addresses (sequence http://foo.com/acc))
  :receiver (set
    (agent-identifier
      :name ma@bar.com
      :addresses (sequence http://bar.com/acc)))
  :ontology FIPA-Nomadic-Application
  :language FIPA-SL2
  :protocol FIPA-Query
  :content
    (iota ?x
      (qos-information
        (transport-protocol
          :name fipa.mts.mtp.wap.std)
        (qos
          :throughput
            (rate-value
              :direction Outbound
              :value ?x))))
```

4. An agent wants to get notifications about the quality of service every time the throughput drops below 1 Mbits/s or goes above 2 Mbits/s:

```
(subscribe
  :sender
    (agent-identifier
      :name ma@bar.com
      :addresses (sequence http://bar.com/acc))
  :receiver (set
    (agent-identifier
      :name agent@foo.com
      :addresses (sequence http://foo.com/acc)))
  :ontology FIPA-Nomadic-Application
  :protocol FIPA-Subscribe
  :language FIPA-SL2
  :content
    (iota ?x
      (qos-notification
        (comm-channel
          :name GSM)
        (qos
          :throughput
            (rate-value
              :direction Outbound
              :value ?x))
        (change-constraint
          :value
            (or
              (<
                (qos
                  :throughput
                    (rate-value
                      :unit Mbits/s
                      :value 1
                      :direction Outbound)))
              (>
                (qos
                  :throughput
```

```
                        (rate-value
                          :unit Mbits/s
                          :value 2
                          :direction outbound))))))))
```

4 References

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

[FIPA00027] FIPA Query Interaction Protocol Specification. Foundation for Intelligent Physical Agents, 2000. http://www.fipa.org/specs/fipa00027/

[FIPA00035] FIPA Subscribe Interaction Protocol Specification. Foundation for Intelligent Physical Agents, 2000. http://www.fipa.org/specs/fipa00035/

[FIPA00065] FIPA Nomadic Application Support Ontology Specification. Foundation for Intelligent Physical Agents, 2000. http://www.fipa.org/specs/fipa00065/

[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/