

FOUNDATION FOR INTELLIGENT PHYSICAL AGENTS

FIPA Agent Configuration Management Specification

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18 **Foreword**

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20 industry of intelligent agents by openly developing specifications supporting interoperability among agents and agent-
21 based applications. This occurs through open collaboration among its member organizations, which are companies and
22 universities that are active in the field of agents. FIPA makes the results of its activities available to all interested parties
23 and intends to contribute its results to the appropriate formal standards bodies.

24 The members of FIPA are individually and collectively committed to open competition in the development of agent-
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27 implement or use specific agent-based standards, recommendations and FIPA specifications by virtue of their
28 participation in FIPA.

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

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

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66 1 Scope

67 This document is part of the FIPA specifications covering agent management for inter-operable agents. This
68 specification further enhances the FIPA Agent Management Specification [FIPA00023] for use in agent configuration
69 management environments.

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71 This document contains specifications for agent configuration management including agent configuration management
72 services, an agent configuration management ontology, and, dependency and service descriptions. This document is
73 primarily concerned with defining open standard interfaces for accessing agent configuration management services.

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2 Agent Configuration Management Reference Model

When considering agent-based systems that may involve a large number of co-operating agents, it is important that facilities exist to allow these agents to be automatically handled with respect to the requirements of the operating environments. Agent configuration management is the process by which groups of interoperating agents can be configured, managed and co-ordinated automatically.

The main purpose of this specification is to provide mechanisms whereby agent configuration can be managed automatically, that is, by special configuration agents. Such an agent has to be able to create new agents, manage the life cycle of existing agents and monitor the behaviour of executing agents. Agent configuration management therefore requires three additional areas above and beyond basic agent management given in [FIPA00023]:

Agent dependency specification is the process of specifying dependency information about agents in order to determine if an agent can execute within the current environment. This is important to allow the automatic creation of agents (and hence, services) over a network.

Agent life cycle management is the process of moving an agent between states of operation.

Agent monitoring is the process of collecting, filtering and reporting alarms, errors and warnings from agents in such a way to prevent information overload.

The agent configuration management reference model (see *Figure 1*) contains the following logical elements:

A **configuration domain** that represents a collection of agents that is to be managed as a group. The main purpose of a configuration domain is to allow a group of agents to be managed consistently within or across agent platforms.

Configuration agents that support agent configuration management primitives that allows these agents to be managed by other agents.

An optional **configuration management agent** that configures and manages all agents within the configuration domain. A CMA is a logical capability set (that is, services) which does not imply any physical configuration. Additionally, the implementation details of individual configuration management agents are the design choices of the individual agent system developers.

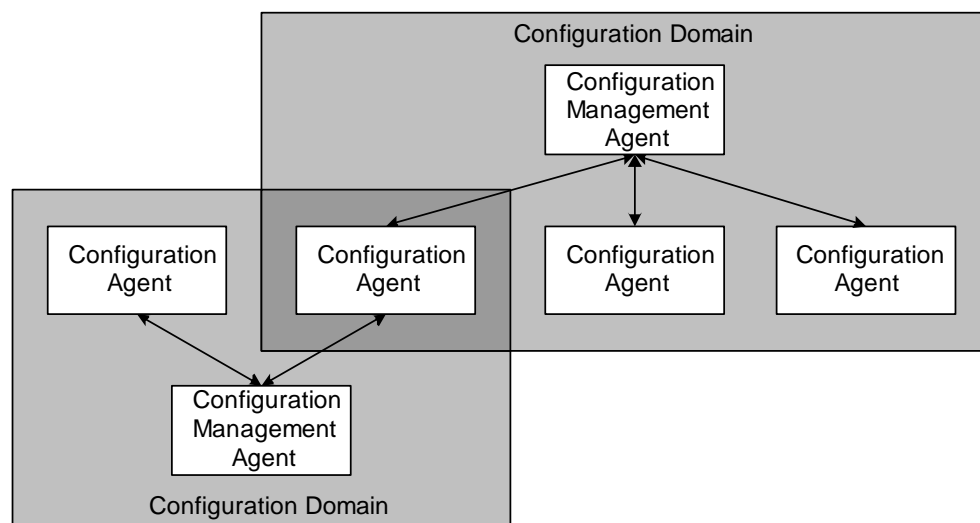


Figure 1: Agent Configuration Management Reference Model

3 Agent Configuration Management Services

3.1 Configuration Agents

3.1.1 Overview

A configuration agent is an agent that supports a number of agent management configuration primitives (see *Section 4.1, Object Descriptions*) that allows it to be managed.

3.1.2 Configuration Management Functions Supported by Configuration Agents

In order to be managed as part of a configuration domain, a configuration agent must support all or a subset of the following configuration management functions, in addition to those specified in [FIPA00023]:

monitor

ping

quit

restart

resume

start

suspend

update

3.2 Configuration Management Agent

3.2.1 Overview

A configuration management agent is a logical entity that represents a configuration domain, manages the configuration agents that are part of that domain and also provides a configuration management service interface through which it can be manipulated.

When a configuration agent wishes to be managed as part of a configuration domain, it can query the description of the domain from the configuration management agent to determine the requirements for join the domain, such as the configuration management functions that the agent should support, etc. Such requirements are represented by a `config-description` that the configuration management agent holds and maintains.

Assuming that the configuration agent can meet the requirements for joining a domain and wishes to be managed by that domain, it can **register** with the configuration management agent representing that domain. When a configuration agent registers with the domain, it sends a `config-description` that contains information about how the configuration agent wishes to be managed (see x, y), such as the configuration management functions that it supports and will accept from the configuration management agent of the domain, and its dependency information. During its association with the configuration domain, a configuration agent may **modify** its `config-description`. Finally, a configuration agent can **deregister** to remove its requirement to be managed by a domain.

The configuration management agent can invoke the configuration management functions defined in 3.1.2, depending on whether the configuration domain requires it and whether the individual configuration agent allows it.

161
162 <more>

163 **3.2.2 Configuration Management Functions Supported by Configuration Management Agents**

164
165 register
166
167 unregister
168
169 modify
170
171 get-description
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173 **3.2.3 Federated Configuration Management Agents**

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4 Agent Configuration Management Ontology

4.1 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-Agent-Config-Management` 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.

4.1.1 Configuration Description

Frame	config-description			
Ontology	FIPA-Agent-Config-Management			
Parameter	Description	Presence	Type	Reserved Values

4.2 Functions Descriptions

The following tables define usage and semantics of the functions that are part of the `FIPA-Agent-Config-Management` ontology and that are supported by the agent management services and agents on the AP.

The following terms are used to describe the functions of the `FIPA-Agent-Config-Management` 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.

4.2.1 Monitor an Agent

4.2.2 Ping an Agent

4.2.3 Terminate an Agent

4.2.4 Restart an Agent

4.2.5 Resume an Agent

4.2.6 Start an Agent

4.2.7 Suspend an Agent

4.2.8 Update an Agent

4.2.9 Register with a Configuration Domain

4.2.10 Unregister from a Configuration Domain

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263 **4.2.11 Modify a Configuration Description within a Configuration Domain**

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266 **4.2.12 Get the Configuration Description from a Configuration Domain**

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269 **4.3 Exceptions**

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272 **5 References**

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