

FOUNDATION FOR INTELLIGENT PHYSICAL AGENTS

FIPA Agent Configuration Management Specification

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18 **Foreword**

19 The Foundation for Intelligent Physical Agents (FIPA) is an international organization that is dedicated to promoting the
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-
25 based applications, services and equipment. Membership in FIPA is open to any corporation and individual firm,
26 partnership, governmental body or international organization without restriction. In particular, members are not bound to
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.

70

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.

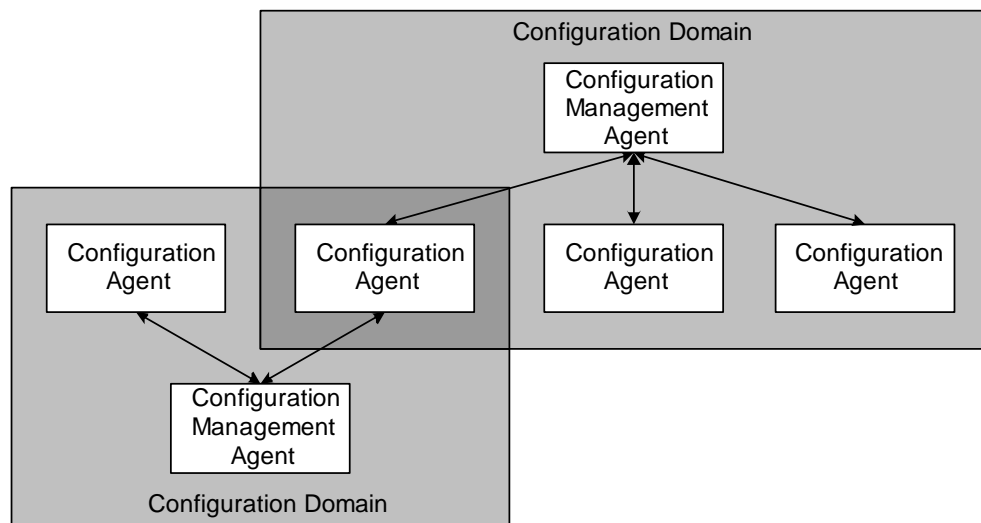


Figure 1: Agent Configuration Management Reference Model

114 3 Agent Configuration Management Services

115 3.1 Configuration Agents

116 3.1.1 Overview

117 A configuration agent is an agent that supports a number of agent management configuration primitives (see *Section*
118 *4.1, Object Descriptions*) that allows it to be managed.

120 3.1.2 Configuration Management Functions Supported by Configuration Agents

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

123 monitor

124 ping

125 quit

126 restart

127 resume

128 start

129 suspend

130 update

131

132

133

134

135

136

140 3.2 Configuration Management Agent

141 3.2.1 Overview

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

145
146 When a configuration agent wishes to be managed as part of a configuration domain, it can query the description of the
147 domain from the configuration management agent to determine the requirements for join the domain, such as the
148 configuration management functions that the agent should support, etc. Such requirements are represented by a
149 `config-description` that the configuration management agent holds and maintains.

150
151 Assuming that the configuration agent can meet the requirements for joining a domain and wishes to be managed by
152 that domain, it can **register** with the configuration management agent representing that domain. When a configuration
153 agent registers with the domain, it sends a `config-description` that contains information about how the
154 configuration agent wishes to be managed (see `x`, `y`), such as the configuration management functions that it supports
155 and will accept from the configuration management agent of the domain, and its dependency information. During its
156 association with the configuration domain, a configuration agent may **modify** its `config-description`. Finally, a
157 configuration agent can **deregister** to remove its requirement to be managed by a domain.

158
159 The configuration management agent can invoke the configuration management functions defined in 3.1.2, depending
160 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

172

173 **3.2.3 Federated Configuration Management Agents**

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175 4 Agent Configuration Management Ontology

176 4.1 Object Descriptions

177 This section describes a set of frames that represent the classes of objects in the domain of discourse within the
 178 framework of the FIPA-Agent-Config-Management ontology.

179 The following terms are used to describe the objects of the domain:
 180

181 **Frame.** This is the mandatory name of this entity that must be used to represent each instance of this class.
 182

183 **Ontology.** This is the name of the ontology, whose domain of discourse includes the parameters described in the
 184 table.
 185

186 **Parameter.** This is the mandatory name of a parameter of this frame.
 187

188 **Description.** This is a natural language description of the semantics of each parameter.
 189

190 **Presence.** This indicates whether each parameter is mandatory or optional.
 191

192 **Type.** This is the type of the values of the parameter: Integer, Word, String, URL, Term, Set or Sequence.
 193

194 **Reserved Values.** This is a list of FIPA-defined constants that can assume values for this parameter.
 195
 196

197 4.1.1 Configuration Description

198

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

199

200 4.2 Functions Descriptions

201 The following tables define usage and semantics of the functions that are part of the FIPA-Agent-Config-
 202 Management ontology and that are supported by the agent management services and agents on the AP.
 203

204 The following terms are used to describe the functions of the FIPA-Agent-Config-Management domain:
 205

206 **Function.** This is the symbol that identifies the function in the ontology.
 207

208 **Ontology.** This is the name of the ontology, whose domain of discourse includes the function described in the
 209 table.
 210

211 **Supported by.** This is the type of agent that supports this function.
 212

213 **Description.** This is a natural language description of the semantics of the function.
 214

215 **Domain.** This indicates the domain over which the function is defined. The arguments passed to the function must
 216 belong to the set identified by the domain.
 217

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

220

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

223

224 **4.2.1 Monitor an Agent**

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228 **4.2.2 Ping an Agent**

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232 **4.2.3 Terminate an Agent**

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236 **4.2.4 Restart an Agent**

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240 **4.2.5 Resume an Agent**

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244 **4.2.6 Start an Agent**

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248 **4.2.7 Suspend an Agent**

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252 **4.2.8 Update an Agent**

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257 **4.2.9 Register with a Configuration Domain**

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260 **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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265

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

267

268

269 **4.3 Exceptions**

270

271

272

272 **5 References**

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