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FOUNDATION FOR INTELLIGENT PHYSICAL AGENTS

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FIPA Device Ontology Specification

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33 specification can be either Preliminary, Experimental, Standard, Deprecated or Obsolete. More detail about the process
34 of specification may be found in the FIPA Document Policy [f-out-00000] and the FIPA Specifications Policy [f-out-
35 00003]. A complete overview of the FIPA specifications and their current status may be found on the FIPA Web site.

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37 represented many countries worldwide. Further information about FIPA as an organization, membership information,
38 FIPA specifications and upcoming meetings may be found on the FIPA Web site at <http://www.fipa.org/>.

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74 **1 Scope**

75 This document deals with the definition of an ontology for devices. It contains specifications for:

- 76
- 77 • Defining the properties of devices.

78

79 Additionally, it provides an example to illustrate the usage of the ontology via a profile of a hypothetical smart phone, an

80 example of using the ontology through CC/PP and other informative examples.

81

82 2 Overview

83 The capabilities of different devices are best expressed using some ontology, against which the profiles of those
84 devices are validated. This document contains specifications for a device ontology.

85

86 Provided that two devices D1 and D2 have a connection, they may exchange device profiles (either directly or through
87 a brokering agency) and acquire a list of services provided by the other device. The list of services may include both
88 hardware and software services, for example: a software component that provides access to a hardware component of
89 the device (such as microphone, headset or GPS service). The profile needs to support the identification of services for
90 various input and output capabilities, such as audio input and output. An informative example of a profile for a
91 hypothetical device is given in Section 5.

92

93 The *fipa-device* ontology can be used by agents when communicating about devices. Agents pass profiles of
94 devices to each other and validate them against the *fipa-device* ontology. The profiles come in handy for example in
95 a situation where memory- or processing-intensive actions take place; agent A1 can ask agent A2 whether device D
96 has enough capabilities to handle some task A1 has in mind. Section 6 gives a set of informative examples showing
97 how profiles based on *fipa-device* ontology can be exploited.

98

99 Related work is done both in W3C [CC/PP] and WAP Forum [UAPProf]. There is an overlap between the definitions
100 found in those documents and this specification. However, direct references to those specifications are not used here.
101 That is because, unlike the ontology presented in this specification, they rely on specific frameworks and languages,
102 namely RDF and XML. Section 7 gives an informative example on how to use the *fipa-device* ontology via CC/PP
103 descriptions.

104

105 3 Device Ontology

106 3.1 Object Descriptions

107 This section describes a set of frames that represent the classes of objects in the domain of discourse within the
108 framework of the `fipa-device` ontology.

109
110 The following terms are used to describe the objects of the domain:

- 111
- 112 • **Frame.** This is the mandatory name of this entity that must be used to represent each instance of this class.
- 113
- 114 • **Ontology.** This is the name of the ontology, whose domain of discourse includes the parameters described in the
115 table.
- 116
- 117 • **Parameter.** This is the mandatory name of a parameter of this frame.
- 118
- 119 • **Description.** This is a natural language description of the semantics of each parameter.
- 120
- 121 • **Presence.** This indicates whether each parameter is mandatory or optional.
- 122
- 123 • **Type.** This is the type of the values of the parameter: Integer, Word, String, URL, Term, Set or Sequence.
- 124
- 125 • **Reserved Values.** This is a list of FIPA-defined constants that can assume values for this parameter.
- 126

127 **3.1.1 Relationships between Frames**

128 *Figure 1* depicts the frames used in this ontology with associations among them.

129

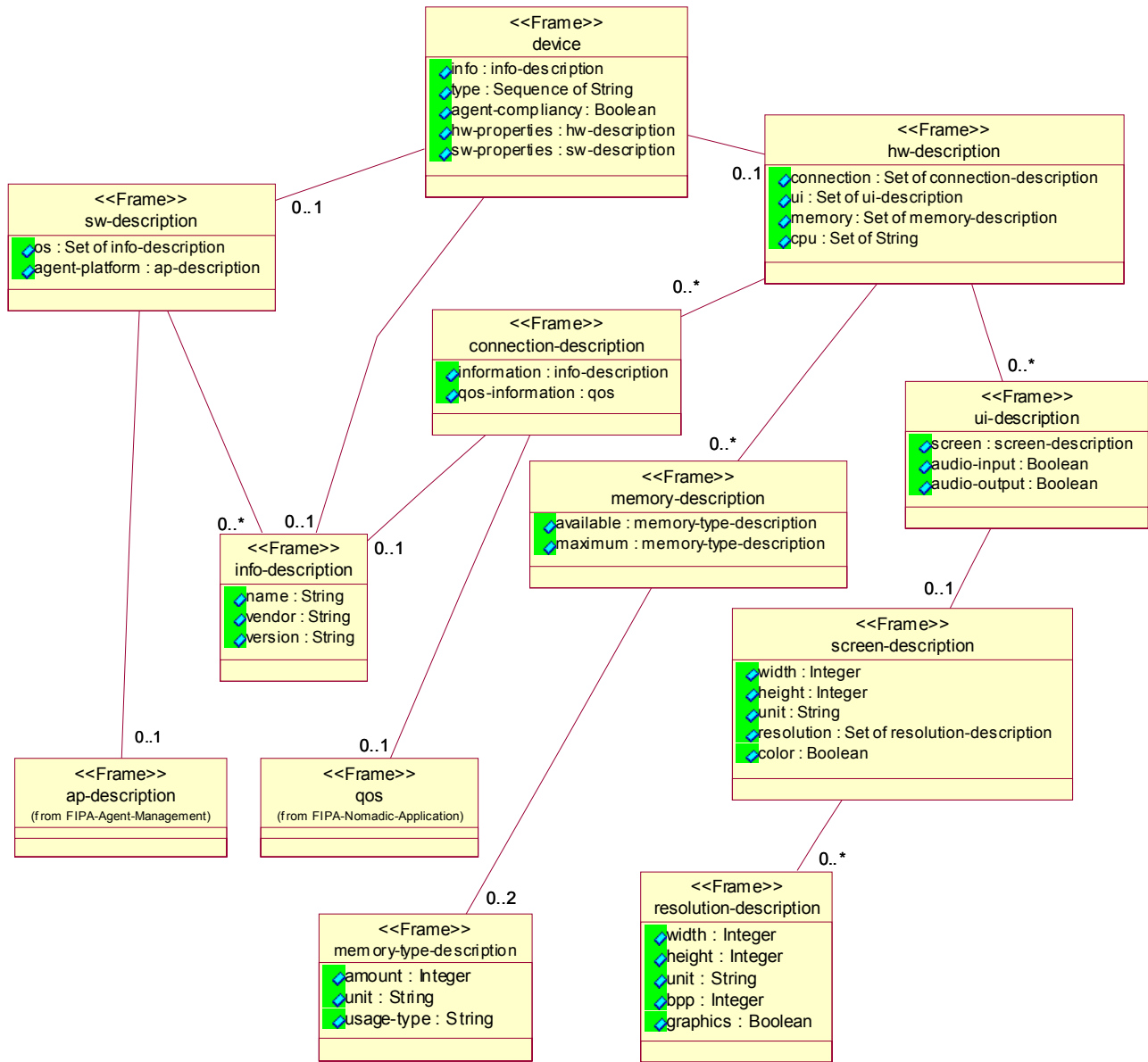


Figure 1: Relationships between Frames in the `fipa-device` Ontology

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131
132

133 **3.1.2 Device Description**

134 This type of object represents the description that can be used to define the device with its most general properties.

135

Frame Ontology	device fipa-device			
Parameter	Description	Presence	Type	Reserved Values
info	General information for the device.	Mandatory	info-description	
type	The type(s) of the device. General type(s) of devices like 3G phones, PDA's etc. To be used as a sequence from general to more specific types.	Optional	Sequence of string	
agent-compliance	Capability to host a FIPA-agent platform or participate in a distributed one.	Optional	boolean	true false
hw-properties	List of properties describing the hardware features of the device in question.	Optional	hw-description	
sw-properties	List of properties describing the software features of the device in question.	Optional	sw-description	

136

137 **3.1.3 Product Info Description**

138 This type of object represents the description that can be used to define the name, vendor and version of some product.

139

Frame Ontology	info-description fipa-device			
Parameter	Description	Presence ¹	Type	Reserved Values
name	The name of the product in question.	Optional	string	
vendor	The vendor of the product in question.	Optional	string	
version	The version of the product in question.	Optional	string	

140

¹ While all of these parameters are optional, a valid `info-description` object will contain at least one parameter.

141 **3.1.4 Hardware Description**

142 This type of object represents the description that can be used to define the hardware capabilities of a given device.

143

Frame Ontology	hw-description fipa-device			
Parameter	Description	Presence²	Type	Reserved Values
connection	The type of the connection the device uses.	Optional	Set of connection-description	
ui	List of the user interfaces that the device offers.	Optional	Set of ui-description	
memory	The amount of memory that the device has.	Optional	Set of memory-description	
cpu	The type of the central processing unit that the device has.	Optional	Set of String	

144

145 **3.1.5 Connection Type Description**

146 This type of object represents the description that can be used to define the connection-related details of a given device.

147

148

Frame Ontology	connection-description fipa-device			
Parameter	Description	Presence³	Type	Reserved Values
information	General information for the connection.	Optional	info-description	
qos-information	Detailed information about the Quality of Service of this connection type	Optional	qos ⁴	

149

² While all of these parameters are optional, a valid `hw-properties` object will contain at least one parameter.

³ While all of these parameters are optional, a valid `connection-description` object will contain at least one parameter.

⁴ The frame for `qos` is found in [FIPA00014].

150 **3.1.6 User Interface Description**

151 This type of object represents the description that can be used to define the user interface(s) of a given device.

152

Frame Ontology	ui-description fipa-device			
Parameter	Description	Presence ⁵	Type	Reserved Values
screen	Information characterizing the screen of the device.	Optional	screen-description	
audio-input	Specifies whether the device in question is capable of receiving audio input.	Optional	boolean	true false
audio-output	Specifies whether the device in question is capable of producing audio output.	Optional	boolean	true false

153

154 **3.1.7 Screen Description**

155 This type of object represents the description that can be used to define the screen of a given device.

156

Frame Ontology	screen-description fipa-device			
Parameter	Description	Presence ⁶	Type	Reserved Values
width	The width of the screen. This value must be positive.	Optional	integer	
height	The height of the screen. This value must be positive.	Optional	integer	
unit	The unit for the width and height parameters of this frame.	Optional	string	mm cm inch
resolution	The resolution description for the screen.	Optional	Set of resolution-description	
color	Has the value true if the device has a color screen; false if it has a monochrome screen.	Optional	boolean	true false

157

⁵ While all of these parameters are optional, a valid ui-description object will contain at least one parameter.

⁶ While all of these parameters are optional, a valid user-interface object will contain at least one parameter.

158 **3.1.8 Resolution Description**

159 This type of object represents the description that can be used to define the resolution details of a given display.

160

Frame Ontology	resolution-description fipa-device			
Parameter	Description	Presence⁷	Type	Reserved Values
width	Number of resolution units horizontally. This value must be positive.	Optional	integer	
height	Number of resolution units vertically. This value must be positive.	Optional	integer	
unit	The unit for the resolution.	Optional	string	pixels characters
bpp	Bits per pixel.	Optional	integer	
graphics	Has the value <code>true</code> if the device is capable of displaying graphics; <code>false</code> if the device is capable of displaying only characters.	Optional	boolean	true false

161

162 **3.1.9 Memory Description**163 This type of object represents the description that can be used to define the maximum memory of a given device, as
164 well as the memory available at the time of query.

165

Frame Ontology	memory-description fipa-device			
Parameter	Description	Presence⁸	Type	Reserved Values
available	The amount of memory available.	Optional	memory-type-description	
maximum	The maximum amount of memory.	Optional	memory-type-description	

166

167 **3.1.10 Memory Type Description**168 This type of object represents the description that can be used to define the amount, unit, and usage type of some
169 memory.

170

Frame Ontology	memory-type-description fipa-device			
Parameter	Description	Presence⁹	Type	Reserved Values
amount	The amount of memory. This value must not be negative.	Optional	integer	
unit	The unit used to express the amount of memory.	Optional	string	B KB MB
usage-type	The usage type of the memory. Either application, storage, or both.	Optional	Set of string	application storage

171

⁷ While all of these parameters are optional, a valid `user-interface` object will contain at least one parameter.

⁸ While all of these parameters are optional, a valid `memory-description` object will contain at least one parameter.

⁹ While all of these parameters are optional, a valid `user-interface` object will contain at least one parameter.

172
173
174

3.1.11 Software Properties Description

This type of object represents the description that can be used to define the software capabilities of a given device.

Frame Ontology	sw-description fipa-device			
Parameter	Description	Presence ¹⁰	Type	Reserved Values
os	Details of the operating system that the device has.	Optional	Set of info-description	
agent-platform	Description of the agent platform the device in question has. Can be used only if agent-compliance of device level is either true or unspecified.	Optional	Set of ap-description ¹¹	

175

176

3.2 Function Descriptions

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The following tables define usage and semantics of the functions that are part of the fipa-device ontology.

179
180

The following terms are used to describe the functions of the fipa-device domain:

181
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198

- **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.

199

3.2.1 Request Device Information

Function	device-information
Ontology	fipa-device
Description	An agent can make a query in order to request the device information.
Domain	None
Range	device
Arity	0

200

201

3.3 Exceptions

202
203

The exceptions for the fipa-device ontology follow the same form and rules as specified in [FIPA00023].

¹⁰ While all of these parameters are optional, a valid sw-properties object will contain at least one parameter.

¹¹ The frame for ap-description is found in [FIPA00023].

204 **3.3.1 Not Understood Exception Propositions**

205 The same set of not understood exception propositions as in the `fipa-agent-management` ontology is used in the
 206 `fipa-device` ontology (see [FIPA00023]).
 207

208 **3.3.2 Refusal Exception Propositions**

209 The same set of refusal exception propositions as defined in the `fipa-agent-management` ontology is used in
 210 `fipa-device` ontology (see [FIPA00023]).
 211

212 **3.3.3 Failure Exception Propositions**

Communicative Act Ontology	failure fipa-agent-management	
Predicate symbol	Arguments	Description
internal-error	string	See [FIPA00023]
not-available	string	Getting the device information failed; the string identifies the failure reason.

213

214 **4 References**

215 [CC/PP] Composite Capabilities/Preference Profiles, World Wide Web Consortium, 2001.
216 <http://www.w3.org/Mobile/CCPP/>

217 [FIPA00014] FIPA Nomadic Application Support Specification. Foundation for Intelligent Physical Agents, 2000.
218 <http://www.fipa.org/specs/fipa00014/>

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

221 [UAProf] User Agent Profile Specification. Wireless Application Protocol Forum, 1999.
222 <http://www.wapforum.org/>
223

224 5 Informative Annex A — Profile of a Hypothetical Smart Phone

225 5.1 Profile Description

226 This section describes a profile that represents the hypothetical smart phone. The validation of this profile is based on
227 the `fipa-device` ontology.

228
229 The following terms are used to describe the objects of the domain:

- 230 • **Profile.** This is the mandatory name of this entity that must be used to represent each instance of this class.
- 231
- 232 • **Ontology.** This is the name of the ontology, whose domain of discourse includes the parameters described in the
233 table.
- 234
- 235 • **Parameter.** This is the mandatory name of a parameter of this profile.
- 236
- 237 • **Value.** This is the value given to a parameter.
- 238
- 239

240 **5.1.1 SmartPhone xyz**
 241 Here the profile of the hypothetical SmartPhone xyz is presented.
 242

Profile Ontology		fipa.profiles.device.smartphonexyz fipa-device			
Parameter			Value		
info-description	name		SmartPhone		
	vendor		Smartphones Ltd		
	version		xyz		
type			mobile-phone PDA GPS		
agent-compliance			true		
hw-description	connection-description	info-description	name	Bluetooth	
			version	x.x	
	connection-description	info-description	name	Infrared Data Association	
			version	y.y	
	connection-description	info-description	name	High Speed Circuit Switched Data	
			version	z.z	
	ui-description	screen-description	width		500
			height		800
			unit		mm
			resolution-description	width	1024
				height	768
		unit		pixels	
		bpp		32	
		graphics		true	
		color		true	
audio-input		true			
audio-output		true			
memory-description	memory-type-description	amount	8		
		unit	MB		
		usage-type	storage		
	memory-type-description	amount	3856		
		unit	KB		
		usage-type	storage		
cpu			64-bit ARM9-based RISC		
sw-description	info-description		name	SmartOS abc	
			vendor	ABCVendor Corp.	
			version	8.1	
	agent-platform ¹²		name	FIPA-OS v2.1.1	

243
 244 The values on the rightmost column can change at any time. For example, if extra memory is inserted to the device or if
 245 another version of operating system is installed, the values for those parameters change. The parameters themselves,
 246 however, are more static. They stay the same despite the changes in single device profiles, since they are defined in
 247 the fipa-device ontology that is independent of them.
 248

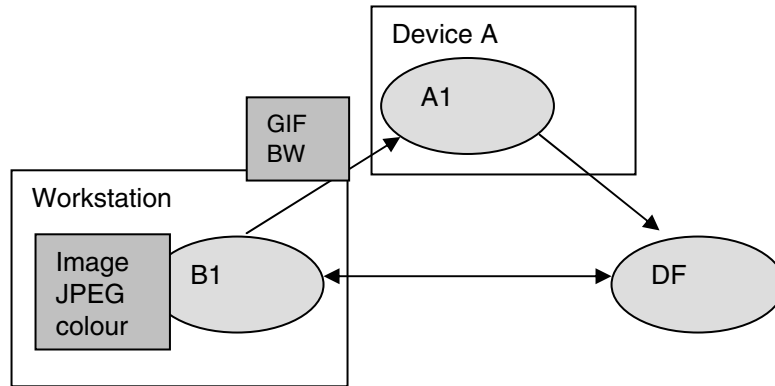
249 The values for parameters can be further divided into static and dynamic depending on the ability to change them in
 250 runtime. For example agent-compliance and memory-type-description describing the memory available can
 251 change without booting the device. Hence they are dynamic information. On the other hand, screen-description
 252 and cpu are static information; they cannot change while the machine is running.
 253

¹² The ontology against which this parameter is validated is found in [FIPA00023].

6 Informative Annex B — Examples

This section presents examples and use cases for device profiles based on the device ontology. The term agent is used to depict any software entity capable of reasoning over the profile, and the term Directory Facilitator (DF) is used to depict a general directory service.

6.1 Content Adaptation I



Agent A1 sends its device profile to DF and registers to the system. Agent B1 interacts with agent A1 residing on device A. Agent B1 queries A's device profile either from the DF or directly from device A. Agent B1, which aims to send an image (640x480x24bits) to the user, analyses the device profile user interface capabilities:

hw-description	ui-description	screen-description	width		2.26
			height		3.02
			unit		inch
			resolution-description	width	320
				height	240
				unit	pixels
				bpp	4
		color		false	
audio-input		true			
audio-output		true			

sw-description	supported-mime-types	text/html image/gif image/wbmp text/ascii
----------------	----------------------	--

The device operating system (or browser) is capable of handling ACSII text, html and also supports the GIF and Windows BMP mime-types. The agent reads from the device profile that the target device has a greyscale display and reduces the colours of the image to 4 greyscales (dithering), because it is not reasonable to send large images with excess unusable bits. The image size is reduced from 640x480 to 320x240 to fit the device's small screen.

In order to adapt the dialogue between agents, the dialogue service needs knowledge about the human-agent interface, especially information about the input and output capabilities of devices. For instance, if the user is using pen based input or touch-screen, the service may rely more on image maps to trigger actions, and if the user is interacting with keyboard, the service might use more text based input.

Now the same example is presented in more detail and using FIPA ACL. However, mime-type treatment is excluded.

1. The agent residing at a mobile device named *dummy* (A1 in the picture above) registers with the DF:

```

294
295 (request
296   :sender
297     (agent-identifier
298       :name dummy@foo.com :addresses (sequence iiop://foo.com/acc))
299   :receiver (set
300     (agent-identifier
301       :name df@foo.com :addresses (sequence iiop://foo.com/acc)))
302   :language fipa-sl
303   :protocol fipa-request
304   :ontology fipa-agent-management
305   :content "(
306     (action
307       (agent-identifier
308         :name df@foo.com :addresses (sequence iiop://foo.com/acc))
309       (register
310         (df-agent-description
311           :name
312             (agent-identifier
313               :name dummy@foo.com
314               :addresses (sequence iiop://foo.com/acc))
315             :protocol (set fipa-request fipa-query)
316             :ontology (set fipa-device)
317             :language (set fipa-sl kif)
318             :services (set
319               (service-description
320                 :name device
321                 :type device-stuff
322                 :ontology (set fipa-device))))))))))"
323

```

2. Then, the agent *velmu* (B1 in the picture above) searches with the DF for a list of agents that support fipa-device ontology:

```

326
327 (request
328   :sender
329     (agent-identifier
330       :name dummy@helluli.com
331       :addresses (sequence iiop://helluli.com/acc))
332   :receiver (set
333     (agent-identifier
334       :name df@foo.com
335       :addresses (sequence iiop://foo.com/acc)))
336   :language fipa-sl
337   :protocol fipa-request
338   :ontology fipa-agent-management
339   :content "(
340     (action
341       (agent-identifier
342         :name df@foo.com
343         :addresses (sequence iiop://foo.com/acc))
344       (search
345         (df-agent-description
346           :ontology (set fipa-device)
347           :language (set fipa-sl))
348         (search-constraint :max-depth 2))))))"
349

```

3. *velmu* gets an answer, that dummy at foo.com supports fipa-device ontology:

```

351
352 (inform
353   :sender
354     (agent-identifier
355       :name df@foo.com
356       :addresses (sequence iiop://foo.com/acc))

```

```

357 :receiver (set
358   (agent-identifier
359     :name velmu@foo.com
360     :addresses (sequence iiop://foo.com/acc)))
361 :language fipa-sl
362 :protocol fipa-request
363 :ontology fipa-agent-management
364 :content "(
365   (result
366     (action
367       (agent-identifier
368         :name df@foo.com
369         :addresses (sequence iiop://foo.com/acc))
370       (search
371         (df-agent-description
372           :ontology (set fipa-device)
373           :language (set fipa-sl))
374         (search-constraint :max-depth 2))))
375   (set
376     (df-agent-description
377       :name
378         (agent-identifier
379           :name dummy@foo.com
380           :addresses (sequence iiop://foo.com/acc))
381         :ontology (set fipa-device)
382         :languages (set fipa-sl kif)
383         :protocol (set fipa-request fipa-query)
384         :services (set
385           (service-description
386             :name device
387             :type device-stuff
388             :ontology (set fipa-device))))))))))")
389

```

4. *velmu* aims to send an image (640 x 480 x 24 bit) to the device where *dummy* is located: *velmu* queries the *dummy* in order to find out the capabilities of device in which *dummy* is located:

```

393 (request
394   :sender
395     (agent-identifier
396       :name velmu@foo.com
397       :addresses (sequence iiop://helluli.com/acc))
398   :receiver (set
399     (agent-identifier
400       :name dummy@foo.com
401       :addresses (sequence iiop://foo.com/acc)))
402   :language fipa-sl
403   :protocol fipa-request
404   :ontology fipa-device
405   :content "(
406     (action
407       (agent-identifier :name dummy@foo.com)
408       (device-information))))")
409

```

5. *dummy* sends appropriate information:

```

411 (inform
412   :sender
413     (agent-identifier
414       :name dummy@foo.com
415       :addresses (sequence iiop://foo.com/acc))
416   :receiver (set
417     (agent-identifier
418       :name velmu@foo.com

```

```

420         :addresses (sequence iiop://helluli.com/acc))
421 :language fipa-sl
422 :protocol fipa-query
423 :ontology fipa-device
424 :content "(
425   (result
426     (action
427       (agent-identifier :name dummy@foo.com)
428       (device-information))
429     (device
430       :hw-properties
431       (hw-description
432         :cpu "i286"
433         :ui (set
434           (ui-description
435             :screen
436               (screen-description
437                 :width 57
438                 :height 78
439                 :unit mm
440                 :color false
441                 :resolution (set
442                   (resolution-description
443                     :width 320
444                     :height 240
445                     :unit pixels
446                     :bpp 4
447                     :graphics true)))
448                 :audio-input true
449                 :audio-output true))))))")

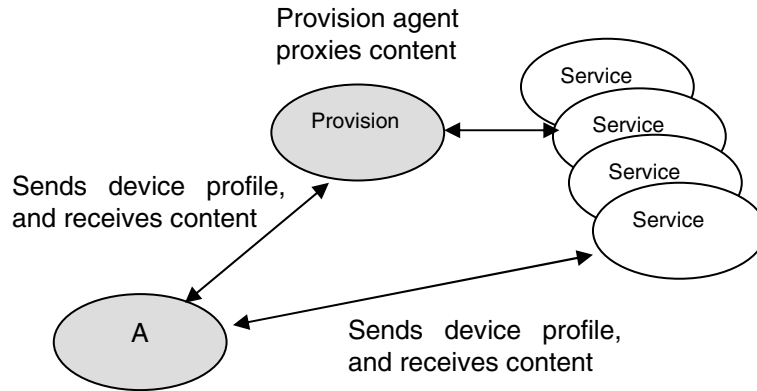
```

450

451 *velmu* analyses the information, and finds that the target device has a greyscale display and reduces the colours of the
 452 image to four greyscales (dithering), because it is not reasonable to send large images with excess unusable bits.
 453 Furthermore, the image size is reduced from 640 x 480 to 320 x 240 to fit the device's screen.

454

6.2 Content Adaptation II



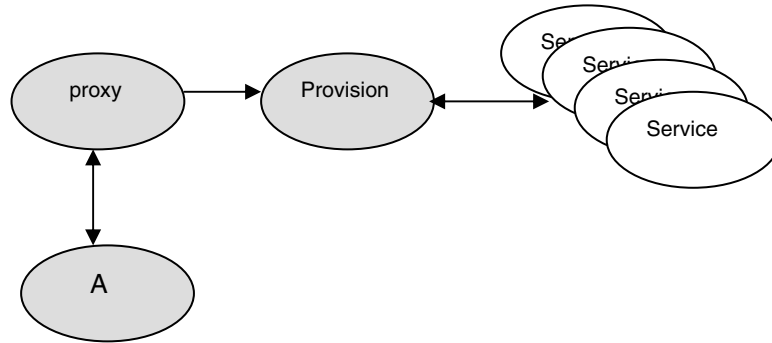
A new client logs in to an agent service domain providing tourism services. The service provision agent receives the device profile from the device software system accessing the agent-based services using ACL. The provision agent first stores the profile into a local cache (for example, CC/PP caching) and then checks the services available for this particular type of client. The device profile indicates that the device is part of an agent platform, which makes it eligible to access directly all of the agent based services, depending on whether or not it hosts or is capable of hosting the correct interface agents or layers. The agent on the device may contact the service agents directly and send the device profile for adaptation.

type				PDA GPS
agent-compliance				true
hw-description	connection-description	info-description	name	GPRS
			version	x.x
	memory-description	memory-type-description	amount	8000
			unit	KB
			usage-type	application
	memory-type-description	amount	4000	
		unit	KB	
sw-description	agent-platform	usage-type	application	
		name	FIPA-OS v2.0	

However, the client profile does not specify any streaming codecs in the sw-description frame that the services support, so the provision agent excludes all streaming services from the service list when the client requests it.

483 **6.3 Content Adaptation III**

484
485
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495



496 Another client is not capable of hosting an agent platform or being a part of an existing platform, but hosts browser
497 software that supports html content with streaming audio. The specific output capabilities of the browser are extracted
498 from the `sw-description` extension fields.

499 The client contacts the provision agent through a proxy that, using some proprietary format, accepts the device profile.
501 Now, the provision agent has to exclude those services that cannot be accessed using proxies that mediate between
502 non-agent and agent based resources.
503

504 **6.4 Service Advertisement and Software Updates**

505 The Provision agent may detect that a new service, which is compatible with a new XYZ Communicator, has become
506 available. The new product is based on Java Midlet technology, and supports the downloading of new software (jar-
507 files). Now, when clients using the XYZ device log into the system, they are displayed (if their user profile allows it)
508 information about the new service. The system checks the `sw-description` frame extension fields for Java
509 environment and the device name and version from the `info-description` frame.
510

info-description	name	XYZ Communicator
	vendor	Smartphones Ltd
	version	xyz

511

sw-description	java-env	configuration	CLDC-1.0
		profile	MIDP-1.0
		locale	en-US
	supported-mime-types	text/vnd.sun.j2me.app-descriptor	

512

513 7 Informative Annex C — Usage of FIPA Device Ontology through CC/PP

514 A technology called CC/PP (Composite Capabilities/Preference Profiles) is developed in W3C [CC/PP]. The frames in
515 this specification received some of their concepts from CC/PP specifications. There are, however, differences and this
516 is mainly due to the different goals of FIPA and W3C.

517
518 For example, in CC/PP the ontology is divided into three following categories at the highest level: Terminal Hardware,
519 Terminal Software and Terminal Browser. Of these only Terminal Hardware and Terminal Software were adopted here.
520 Terminal Browser was left out because FIPA is not as focused to www as W3C is. On the other hand, in this
521 specification there is a parameter called agent-compliance that is not found in [CC/PP]. The value of agent-compliance
522 parameter informs whether the device in question is capable of hosting one or more FIPA agents or not.

523
524 Despite the differences between the approaches the `fipa-device` ontology could be used in a CC/PP profile. This
525 can be accomplished in a similar fashion as with UAProf (see [CC/PP]). So, if a developer wants to inform that some
526 device is FIPA-compliant, then it can be achieved with a CC/PP profile as follows:

```
527 <RDF xmlns="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
528     xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
529     xmlns:ccpp="http://www.w3.org/2000/07/04-ccpp#"
530     xmlns:fipa="http://www.fipa.org/profiles/device-20010202#">
531     xmlns:uaprof="http://www.wapforum.org/UAPROF/ccppschem-19991014#">
532
533     <Description about="http://www.foo.com/profiles/ProfileX">
534         <ccpp:component>
535             <Description about="http://www.foo.com/TerminalHardware">
536                 <type resource="http://www.foo.com/Schema#HardwarePlatform"/>
537                 <ccpp:Defaults rdf:resource="http://www.foo.com/profiles/hwproperties"/>
538                 <fipa:compliance>true</fipa:compliance>
539             </Description>
540         </ccpp:component>
541
542         <ccpp:component>
543             <Description about="http://www.foo.com/TerminalSoftware">
544                 <type resource="http://www.foo.com/Schema#SoftwarePlatform"/>
545                 <ccpp:Defaults rdf:resource="http://www.foo.com/profiles/swproperties"/>
546                 <fipa:ap-description><name>FIPA-OS v2.1.1</name></fipa:ap-description>
547             </Description>
548         </ccpp:component>
549
550         <ccpp:component>
551             <Description about="http://www.foo.com/Browser">
552                 <type resource="http://www.foo.com/Schema#BrowserUA"/>
553                 <ccpp:Defaults rdf:resource="http://www.foo.com/profiles/browserproperties"/>
554                 <uaprof:BrowserName>Internet Explorer</uaprof:BrowserName>
555                 <uaprof:BrowserVersion>5.0</uaprof:BrowserVersion>
556             </Description>
557         </ccpp:component>
558     </Description>
559 </RDF>
```

560
561 Here the `fipa-namespace` is used to refer that the device characterized in ProfileX is FIPA-compliant and that the
562 agent platform it has is the same FIPA-OS v2.1.1 used earlier as an example. Other CC/PP –defined properties are
563 (supposedly) found in the URI's declared in `rdf:resource` attributes of the `ccpp:Defaults` elements. Agent
564 compliance seems to be the property that most clearly distinguishes the ontology and profiles presented in this paper
565 from the comparable ones defined in W3C and WAP Forum.

566
567 The namespace declaration in the fourth row defines a URI that should contain a CC/PP schema
568 (`http://www.fipa.org/profiles/device-20010202#`). The schema in that location corresponds to the
569

570 ontology presented in this paper, but in CC/PP terms. More specifically, there are specified only those elements that are
571 not found in CC/PP schema itself. FIPA agent-compliance is naturally an example of these.
572

573 **8 Informative Annex D — ChangeLog**

574 **8.1 2002/11/01 - version D by TC X2S**

- 575 **Entire document:** All symbols changed to lower case
- 576 **Page 9, line 165:** Added Section 3.2 and a function called `device-information`
- 577 **Page 9: line 165:** Added Section 3,3 and appropriate exception cases
- 578 Page 13, lines 244-393: Changed Content Adaptation I example to use `device-information` function
- 579 Page 15, lines 359-393: Changed Content Adaptation I example message 5 updated to properly reply to message 4
- 580

581 **8.2 2002/12/03 - version E by FIPA Architecture Board**

- 582 **Entire document:** Promoted to Standard status
- 583