

OCF Wi-Fi Easy Setup Specification

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112 **1 Scope**

113 This document defines functional extensions to the capabilities defined in ISO/IEC 30118-1:2018
114 to meet the requirements of Wi-Fi Easy Setup. It specifies new Resource Types to enable the
115 functionality and any extensions to the existing capabilities defined in ISO/IEC 30118-1:2018.

116 **2 Normative references**

117 The following documents are referred to in the text in such a way that some or all of their content
118 constitutes requirements of this document. For dated references, only the edition cited applies. For
119 undated references, the latest edition of the referenced document (including any amendments)
120 applies.

121 ISO/IEC 30118-1:2018 Information technology -- Open Connectivity Foundation (OCF)
122 Specification -- Part 1: Core specification
123 <https://www.iso.org/standard/53238.html>
124 Latest version available at: https://openconnectivity.org/specs/OCF_Core_Specification.pdf

125 ISO/IEC 30118-2:2018 Information technology -- Open Connectivity Foundation (OCF)
126 Specification -- Part 2: Security specification
127 <https://www.iso.org/standard/74239.html>
128 Latest version available at: https://openconnectivity.org/specs/OCF_Security_Specification.pdf

129 ISO/IEC 30118-5:2018 Information technology -- Open Connectivity Foundation (OCF)
130 Specification -- Part 5: Smart home device specification
131 <https://www.iso.org/standard/74242.html>
132 Latest version available at: https://openconnectivity.org/specs/OCF_Device_Specification.pdf

133 IEEE 802.11:2016, IEEE Standard for Information technology—Telecommunications and
134 information exchange between systems Local and metropolitan area networks—Specific
135 requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY)
136 Specifications, December 2016
137 <https://standards.ieee.org/findstds/standard/802.11-2016.html>

138 IETF RFC 5646, *Tags for Identifying Languages*, September 2009
139 <https://www.rfc-editor.org/info/rfc5646>

140 OpenAPI specification, aka *Swagger RESTful API Documentation Specification*, Version 2.0
141 <https://github.com/OAI/OpenAPI-Specification/blob/master/versions/2.0.md>

142

143 **3 Terms, definitions, and abbreviated terms**

144 **3.1 Terms and definitions**

145 For the purposes of this document, the terms and definitions given in ISO/IEC 30118-1:2018 and
146 the following apply.

147 ISO and IEC maintain terminological databases for use in standardization at the following
148 addresses:

- 149 – ISO Online browsing platform: available at <https://www.iso.org/obp>
- 150 – IEC Electropedia: available at <http://www.electropedia.org/>

151 **3.1.1**

152 **Easy Setup**

153 process of configuring an Enrollee (3.1.3) using a Mediator (3.1.5) by transferring of essential
154 information to the Enrollee (3.1.3)

155 **3.1.2**

156 **Easy Setup Enrollment**

157 step during Easy Setup in which the Enrollee (3.1.3) is contacted by the Mediator (3.1.5) to
158 configure the Enroller's (3.1.4) information by means of accessing Easy Setup (3.1.1) Resources

159 **3.1.3**

160 **Enrollee**

161 device that needs to be configured and connected. E.g. Air-conditioner, Printer

162 **3.1.4**

163 **Enroller**

164 target network entity to which the Enrollee (3.1.3) connects. E.g. Wi-Fi AP

165 **3.1.5**

166 **Mediator**

167 logical function that enables the Enrollee (3.1.3) to connect to the target network (i.e. Enroller
168 (3.1.4))

169 Note 1 to Entry: The Mediator transfers configuration information to the Enrollee. E.g. Mobile Phone

170 **3.2 Abbreviated terms**

171 **3.2.1**

172 **CID**

173 Company Identifier (ID)

174 **3.2.2**

175 **IE**

176 Information Element

177 **3.2.3**

178 **Soft AP**

179 Software Enabled Access Point

180 **3.2.4**

181 **TLV**

182 type-length-value

183 **4 Document conventions and organization**

184 **4.1 Conventions**

185 In this document a number of terms, conditions, mechanisms, sequences, parameters, events,
186 states, or similar terms are printed with the first letter of each word in uppercase and the rest
187 lowercase (e.g., Network Architecture). Any lowercase uses of these words have the normal
188 technical English meaning.

189 **4.2 Notation**

190 In this document, features are described as required, recommended, allowed or DEPRECATED as
191 follows:

192 Required (or shall or mandatory)(M).

193 – These basic features shall be implemented to comply with Core Architecture. The phrases "shall
194 not", and "PROHIBITED" indicate behaviour that is prohibited, i.e. that if performed means the
195 implementation is not in compliance.

196 Recommended (or should)(S).

197 – These features add functionality supported by Core Architecture and should be implemented.
198 Recommended features take advantage of the capabilities Core Architecture, usually without
199 imposing major increase of complexity. Notice that for compliance testing, if a recommended
200 feature is implemented, it shall meet the specified requirements to be in compliance with these
201 guidelines. Some recommended features could become requirements in the future. The phrase
202 "should not" indicates behaviour that is permitted but not recommended.

203 Allowed (may or allowed)(O).

204 – These features are neither required nor recommended by Core Architecture, but if the feature
205 is implemented, it shall meet the specified requirements to be in compliance with these
206 guidelines.

207 DEPRECATED.

208 – Although these features are still described in this document, they should not be implemented
209 except for backward compatibility. The occurrence of a deprecated feature during operation of
210 an implementation compliant with the current document has no effect on the implementation's
211 operation and does not produce any error conditions. Backward compatibility may require that
212 a feature is implemented and functions as specified but it shall never be used by
213 implementations compliant with this document.

214 Conditionally allowed (CA)

215 – The definition or behaviour depends on a condition. If the specified condition is met, then the
216 definition or behaviour is allowed, otherwise it is not allowed.

217 Conditionally required (CR)

218 – The definition or behaviour depends on a condition. If the specified condition is met, then the
219 definition or behaviour is required. Otherwise the definition or behaviour is allowed as default
220 unless specifically defined as not allowed.

221

222 Strings that are to be taken literally are enclosed in "double quotes".

223 Words that are emphasized are printed in italic.

224 **5 Overview**

225 **5.1 Introduction**

226 This document describes a way to setup and configure a new OCF Device, using an already
227 configured OCF Device or onboarding tool.

228 The described setup and configure mechanism is optional and other mechanisms are allowed to
229 be used.

230 Specifically, this method allows the transferring of essential information to the new Device, which
231 includes:

- 232 – Local network connection information, e.g. in case of Wi-Fi it will be Wi-Fi access point
233 information.
- 234 – Device Configuration: Additional Device configuration information.

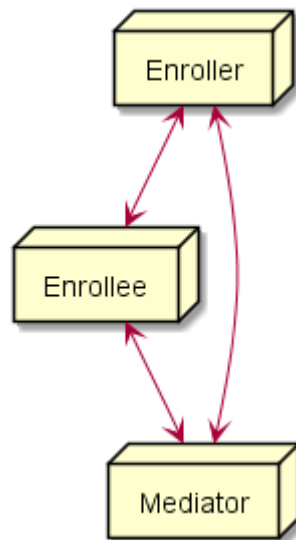
235 Easy Setup can be enhanced in future by incorporating other suitable technologies.

236 Annex A specifies the Resource Type definitions using the schema defined in the OpenAPI
237 specification as the API definition language that shall be followed by an OCF Device realizing the
238 Resources specified in this document.

239 **5.2 Architecture**

240 Figure 1 shows the deployment architectural approach.

241



242

243

Figure 1 – Easy Setup deployment architecture

244 Easy Setup defines the following roles: Enrollee, Enroller, and Mediator. Please refer to clause 3
245 for the definitions thereof.

246 **5.3 Example Scenario**

247 The following scenario presents a typical setup case.

248 The configuration information and steps taken may vary depending on the Device's type and status.

- 249 1) The Enrollee enters Easy Setup mode (when the Device is unboxed for the first time, it may be
 250 in this mode by default).
- 251 2) The Mediator discovers and connects to the Enrollee.
- 252 3) The Mediator performs Security Provisioning of the Enrollee.
- 253 4) The Mediator transmits Wi-Fi Setting Information to the Enrollee.
- 254 5) Using the information received from the Mediator, the Enrollee connects to the Enroller (Wi-Fi
 255 AP).

256 **6 Resource model**

257 **6.1 Introduction**

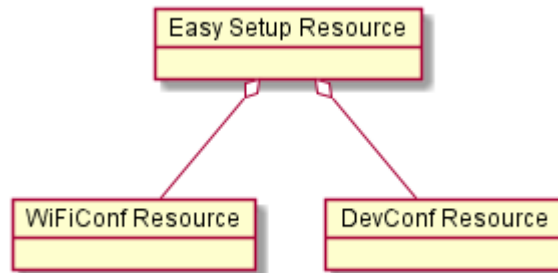
258 Devices capable of Easy Setup shall support the following Resource Types.

- 259 1) EasySetup Resource Type
- 260 2) WiFiConf Resource Type
- 261 3) DevConf Resource Type

262 Instances of these Resources Type (Resources) shall be excluded in the IDD for the Introspection
 263 Resource (see clause 11.4 in ISO/IEC 30118-1:2018).

264 The EasySetup Resource Type is a Collection Resource and shall contain Links to instances of at
 265 least WiFiConf and DevConf. A vendor may add links to other Resource Types. The relationship
 266 between the EasySetup Resource Type and linked Resources is shown in Figure 2.

267 NOTE The EasySetup Resource Type supports the batch Interface (oic.if.b) which allows for efficient data delivery with
 268 a single request rather than multiple requests to each linked Resource.



269
 270

Figure 2 – Easy Setup Resource Types

271 **6.2 EasySetup Resource**

272 **6.2.1 Overview**

273 The EasySetup Resource stores useful information including current status of Enrollee and last
 274 error code which was produced in the process of Easy Setup.

275 **6.2.2 Resource**

276 The Easy Setup Resource Type is as defined in Table 1.

Table 1 – EasySetup Resource Type

Example URI	Resource Type Title	Resource Type ID ("rt" value)	Interfaces	Description	Related Functional Interaction
/example/EasySetupResURI	EasySetup	oic.r.easyssetup, oic.wk.col	oic.if.baseline, oic.if.ll, oic.if.b	Top level Resource for Easy Setup. Indicates easy setup status. The Resource properties exposed are listed in Table 2.	N/A

279 Table 2 defines the details for the "oic.r.easyssetup" Resource Type.

Table 2 – "oic.r.easyssetup" Resource Type definition

Property title	Property name	Value type	Value rule	Unit	Access mode	Mandatory	Description
Easy Setup Provisioning Status	ps	integer	enum	N/A	R	Yes	Easy setup provisioning status of the Device 0: Need to Setup, 1: Connecting to Enroller, 2: Connected to Enroller, 3: Failed to Connect to Enroller, 4~254: Reserved, 255: EOF
Last Error Code	lec	integer	enum	N/A	R	Yes	Indicates a failure reason if it fails to connect to Enroller 0: No error, 1: Given SSID is not found, 2: Wi-Fi password is wrong, 3: IP address is not allocated, 4: NO internet connection, 5: Timeout, 6: Wi-Fi Auth Type is not supported by the Enrollee, 7: Wi-Fi Encryption Type is not supported by the Enrollee, 8: Wi-Fi Auth Type is wrong (failure while connecting to the Enroller), 9: Wi-Fi Encryption Type is wrong (failure while connecting to the Enroller), 10~254: Reserved, 255: Unknown error.
Connect	cn	array of integer	N/A	N/A	RW	Yes	Array of connection types to trigger Enrollee to initiate connection: 1: Wi-Fi,

							2: Other transport to be added in a future (e.g. BLE))
Links	links	array	N/A	N/A	R	Yes	Array of links that are WiFiConf and DevConf Resource.

- 281
- 282 Enrollee shall set the following as default values (for example, when Device is unboxed first time):
- 283 – "ps" equal to 0.
- 284 – "lec" equal to 0.
- 285 – "cn" equal to an empty array.

286 6.3 WiFiConf Resource Type

287 6.3.1 Introduction

288 The WiFiConf Resource Type stores information to help an Enrollee to connect to an existing Wi-Fi AP.

290 6.3.2 Resource Type

291 The WiFiConf Resource Type is as defined in Table 3.

292 **Table 3 – WiFiConf Resource Type**

Example URI	Resource Type Title	Resource Type ID ("rt" value)	Interfaces	Description	Related Functional Interaction
/example/WiFiConfResURI	WiFiConf	oic.r.wificonf	oic.if.baseline+ oic.if.rw	Contains Wi-Fi related properties The Resource properties exposed are listed in Table 4.	N/A

293

294 Table 4 defines the details for the "oic.r.wificonf" Resource Type.

295 **Table 4 – "oic.r.wificonf" Resource Type definition**

Property title	Property name	Value type	Value rule	Unit	Access mode	Mandatory	Description
Supported Wi-Fi Mode Type	swmt	array of string	enum	N/A	R	Yes	Supported Wi-Fi modes by Enrollee. Can be multiple. ("A", "B", "G", "N", "AC")
Supported Wi-Fi Frequency	swf	array of string	Refer to description for valid values.	N/A	R	Yes	Supported Wi-Fi frequencies by Enrollee. Can be multiple. ("2.4G", "5G")
Target Network Name	tnn	string	N/A	N/A	RW	Yes	Target network name (SSID of Wi-Fi AP i.e. enroller)
Credential	cd	string	N/A	N/A	RW	No	Credential information of Wi-Fi AP (Password used to connect to enroller).

Wi-Fi Auth Type	wat	string	enum	N/A	RW	Yes	Wi-Fi auth type ("None", "WEP", "WPA_PSK", "WPA2_PSK")
Wi-Fi Encryption Type	wet	string	enum	N/A	RW	Yes	Wi-Fi encryption type ("None", "WEP_64", "WEP_128", "TKIP", "AES", "TKIP_AES")
Supported Wi-Fi Auth Type	swat	array of string	enum	N/A	R	Yes	Supported Wi-Fi Auth types. Can be multiple. ("None", "WEP", "WPA_PSK", "WPA2_PSK")
Supported Wi-Fi Encryption Type	swet	array of string	enum	N/A	R	Yes	Supported Wi-Fi Encryption types. Can be multiple. ("None", "WEP-64", "WEP_128", "TKIP", "AES", "TKIP_AES")

296

297 6.4 DevConf Resource Type

298 6.4.1 Introduction

299 The DevConf Resource Type stores Device configuration information required in Wi-Fi Easy Setup.

300 6.4.2 Resource Type

301 The DevConf Resource Type is as defined in Table 5

302

Table 5 – DevConf Resource Type

Example URI	Resource Type Title	Resource Type ID ("rt" value)	Interfaces	Description	Related Functional Interaction
/example/DevConfResURI	DevConf	oic.r.devconf	oic.if.baseline, "oic.if.r"	Stores device configuration information required in Easy Setup process The Resource properties exposed are listed in Table 6.	N/A

303

304 Table 6 defines the details for the "oic.r.devconf" Resource Type.

305

Table 6 – "oic.r.devconf" Resource Type definition

Property title	Property name	Value type	Value rule	Unit	Access mode	Mandatory	Description
Device Name	dn	one of: string or array of object	N/A	N/A	R	Yes	Indicates a pre-configured device name in language indicated by "dl" in "/oic/con". or An array of objects where each object has a language field (containing an IETF RFC 5646 language tag) and a value field

							containing the pre-configured device name in the indicated language. The pre-configured device name is presented by enrollee to mediator during easy-setup process.
--	--	--	--	--	--	--	--

306

307 **7 Network and connectivity**

308 Both the Mediator and Enrollee communicate via a common connectivity (e.g. Wi-Fi).

309 If using Wi-Fi for Easy Setup then the Enrollee shall have capability to act as a Soft AP. A Soft AP
310 shall support the access point requirements defined by IEEE 802.11:2016.

311 **8 Functional interactions**

312 **8.1 Onboarding, Provisioning and Configuration**

313 The Mediator may be present as a standalone function or in conjunction with other functions or
314 services such as AMS as part of an OBT (Onboarding Tool); please refer to the ISO/IEC 30118-
315 2:2018.

316 **8.2 Resource discovery**

317 The Mediator connects to the Enrollee via a mutually supported connection.

318 When in Easy Setup phase, if using Wi-Fi as the connectivity between the Enrollee and the Mediator
319 then the Enrollee shall make itself discoverable as a Soft AP. The Soft AP has additional availability
320 constraints which are documented in ISO/IEC 30118-2:2018.

321 **8.3 Retrieving and Updating Easy Setup Resources**

322 The Enrollee shall expose Easy Setup Resources such that a Mediator is able to discover them
323 using standard OCF Resource discovery methods (i.e. via a RETRIEVE on /oic/res); see the
324 ISO/IEC 30118-1:2018, clause 11.3.

325 Easy Setup Resources shall expose only secure Endpoints (e.g. CoAPS); see the ISO/IEC 30118-
326 1:2018, clause 10.

327 The Mediator may RETRIEVE a Resource within the Easy Setup Collection or the Collection itself
328 to check the Enrollee's status at any stage of Easy Setup. This applies only when the Enrollee &
329 the Mediator are on a common network.

330 The Mediator may UPDATE Resource Property(-ies) on the Enrollee. Upon receipt of the request
331 from the Mediator the Enrollee shall update its current Resource Property Values, and shall perform
332 any required action. For example, if the "cn" Property of "EasySetup" Resource is updated by the
333 Mediator, to indicate connection to Wi-Fi, the Enrollee shall start the connection to Enroller.

334 For details of Easy Setup Resources refer to clause 6.

335 **8.4 Error Handling**

336 The "lec" Property of the EasySetup Resource (i.e. "oic.r.easyssetup") is used to indicate the error
337 that occurred in the Easy Setup process while trying to connect to the Enroller (using the
338 information provided by the Mediator in WiFiConf Resource):

- 339 – The Enrollee shall set "lec" Property to 1, if it fails to connect because it can't find the SSID.
- 340 – The Enrollee shall set "lec" Property to 2, if it fails to connect due to wrong credential (password)
341 information.
- 342 – The Enrollee should set "lec" Property to 6, if the Auth type is not supported by the Enrollee.
- 343 – The Enrollee should set "lec" Property to 7, if the Encryption type is not supported by the
344 Enrollee.
- 345 – The Enrollee should set "lec" Property to 8, if it fails to connect due to wrong Auth type
346 information (even though it's supported by the Enrollee).

347 – The Enrollee should set "lec" Property to 9, if it fails to connect due to wrong Encryption type
348 information (even though it's supported by the Enrollee).

349 When using Wi-Fi as the connectivity between the Enrollee and Mediator, if the Enrollee fails to
350 connect to the Enroller, it shall again make itself discoverable as a Soft AP (in case it destroyed
351 its Soft AP earlier).

352 **8.5 Example Easy Setup Flow**

353 Figure 3 shows an example Easy Setup flow for informative purposes:

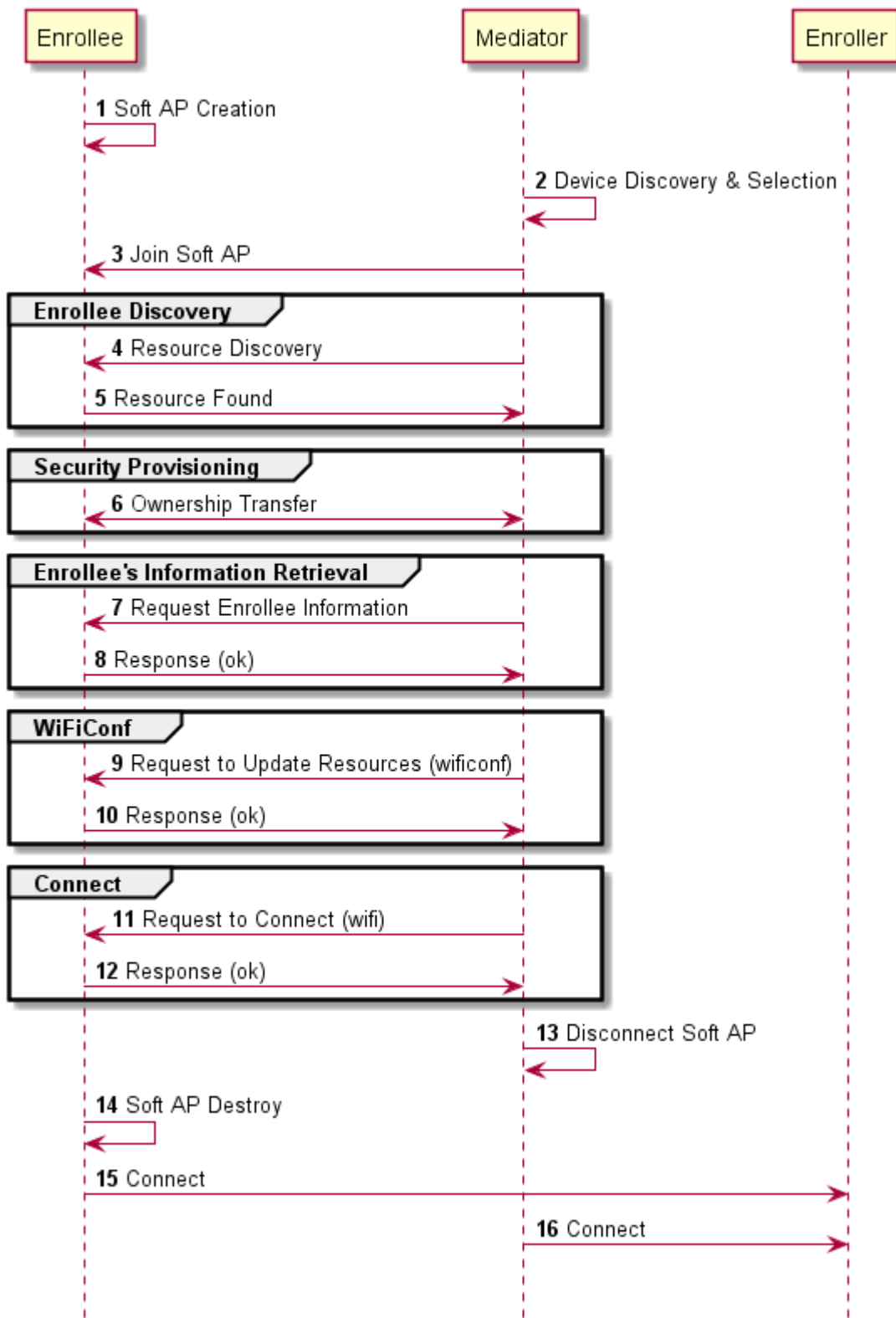


Figure 3 – Easy Setup Flow (Informative)

354
355
356

357 The example flow in Figure 1Figure 3 undergoes security provisioning (step 6) during Easy Setup.
 358 Alternatively, security provisioning can be done before Enrollee Discovery (steps 4 and 5) if
 359 preferred. Please refer to the ISO/IEC 30118-2:2018 for more information on the different scenarios.

360 **8.6 Easy Setup SSID Tags**

361 If using Wi-Fi as the connectivity between the Enrollee and the Mediator then the Enrollee's Soft
 362 AP SSID should contain exactly one of the following Easy Setup SSID tags:

- 363 – "OCF_"
 - 364 – Prefix tag that has to be at the beginning of the SSID.
 - 365 – Example: OCF_MySSID
- 366 – "_OCF"
 - 367 – Suffix tag that has to be at the end of the SSID.
 - 368 – Example: MySSID_OCF

369 These tags are case sensitive.

370 **8.7 Easy Setup Information Element**

371 **8.7.1 Overview**

372 If using Wi-Fi as the connectivity between the Enrollee and the Mediator then the Enrollee's Soft
 373 AP beacon should contain the Easy Setup Information Element. The information element provides
 374 additional information about the device such as a friendly name or device manufacturer for the
 375 mediator application. The mediator application can then use this information to provide a better
 376 user experience.

377 **8.7.2 OCF Device Information Element (IE)**

378 The Easy Setup Information Element has the structure shown in Figure 4

1 byte	1 byte	3 bytes	1 byte	<252 bytes
Type = 221	Length	CID = 6A 40 65	OCF IE Type = 0	Data

379 **Figure 4 – Easy Setup Information Element Definition**

- 380 – Type is a unique id allocated by the IEEE registrar to identify different information elements
 381 from each other. The Easy Setup Information Element shall have a Type value of 221 which is
 382 standard vendor specific information element.
- 383 – Length shall indicate the total size of CID, OCF IE Type, and Data in bytes.
- 384 – Company ID (CID) is a unique 24-bit identifier for a specific company or organization. The Easy
 385 Setup Information Element shall have a CID value of 6A 40 65.
- 386 – OCF IE Type is the identifier of the specific IE within OCF. The OCF IE Type shall be set to 0
 387 for Easy Setup.
- 388 – Data is a set of type-length-value (TLV) structures that represent the device information in Table
 389 1. The length of this field shall be less than 252 bytes.

390

391 Each TLV has the structure shown in Figure 5.

1 byte	1 byte	<250 bytes
Type	Length	Value

Figure 5 – Type-Length-Value Structure

- 392
- 393 – Type shall indicate the type of the field from Table 7.
 - 394 – Length shall indicate the length of the Value in bytes.
 - 395 – Value shall represent the corresponding information for specific TLV type from Table 7.
- 396 Data is a set of TLVs as defined in Table 7.

Table 7 – Easy Setup Information Element TLVs

Type	Length (bytes)	Value	Description of TLV	# of Occurrences in IE or IEC	Required
1	<65	Friendly name of the device	Device Friendly Name	1	Y
2	<27	Device Type	Device type/Class	>=1	Y
3	<65	Name of Device Manufacturer	Manufacturer Name	1	Y
4	<43	Language tag for strings	See IETF RFC 5646	1	Y
5	16	Protocol Independent ID in network byte order	See ISO/IEC 30118-1:2018	1	Y
101	<65	Device Type/Class	Device Type as string	>=0	N

398

399 The TLVs may be set in any order inside an IE or IEC. All strings shall be UTF-8 encoded and shall
 400 not include a null terminator. All TLVs in Table 7 with a required value of "Y" shall be included in
 401 the IE or IEC (if multiple IEs are required). The value of each TLV shall meet the length
 402 requirements specified in Table 1.

403 **8.7.2.1 Device Friendly Name (Type 1)**

404 User readable string representing the friendly name of the device that is beaconing and ready to
 405 undergo Easy Setup. This should match "n" from "oic.wk.d" as defined in the ISO/IEC 30118-
 406 1:2018.

407 This string is in the same language specified in the type 4 TLV.

408 **8.7.2.2 Device Type (Type 2)**

409 Device type shall be the shortened form of Device Type as specified in the ISO/IEC 30118-5:2018. For
 410 example:

- 411 – Device Type as specified in the ISO/IEC 30118-5:2018: "oic.d.airconditioner"
- 412 – Device Type as specified in a type 2 TLV: "airconditioner"

413 In cases where the device supports multiple functions, several type 2 TLVs may be included to
 414 represent each function of the device.
 415

416 If the device does not support any of the functions as specified in the ISO/IEC 30118-5:2018, at
417 least one type 101 TLV shall be included. Type 101 TLV contains a user readable string in the
418 same language specified in the type 4 TLV. (Ex: "Lock").

419 If the device supports more than one function, a mix of type 2 and type 101 TLVs may be used
420 depending on which functions are defined in the ISO/IEC 30118-5:2018.

421 **8.7.2.3 Device Manufacturer Name (Type 3)**

422 User readable string representing the manufacturer name of the device that is beaconing and ready
423 to undergo Easy Setup. This should match "mnmn" Property from "oic.wk.p" as defined in the
424 ISO/IEC 30118-1:2018.

425 This string is in the same language specified in the type 4 TLV.

426 **8.7.2.4 Language Tag (Type 4)**

427 The language of all strings shall be specified in a type 4 TLV. The value of the type 4 TLV shall
428 contain a language tag as described in IETF RFC 5646 (Ex: "en-us"). If the actual length of the
429 language tag exceeds 42 bytes the manufacturer shall exclude subtags on the language tag until
430 it is less than 43 bytes.

431 Please see 8.7.2.8 for information on supporting multiple languages.

432 If an IE contains a TLV that is a string (i.e. type 1, type 3 or type 101), then a type 4 TLV
433 corresponding to the language of the string(s) shall also be present in the IE.

434 **8.7.2.5 Protocol Independent ID (Type 5)**

435 This shall match "piid" from "oic.wk.d" as defined in the ISO/IEC 30118-1:2018.

436 The piid in the TLV shall be in network byte order.

437 **8.7.2.6 Multiple Information Elements**

438 Additional Easy Setup IEs may be present in the Soft AP beacon in the following situations:

- 439 – The total size of the TLVs is larger than the size of Data as defined in an Easy Setup Information
440 Element.
- 441 – Support for multiple languages is necessary.

442 Two or more Easy Setup Information Elements are referred to as an Information Element Collection
443 (IEC).

444 **8.7.2.7 IEC for Large TLV Size Support**

445 If a TLV or set of TLVs will not fit into the current IE, a manufacturer may add additional Easy Setup
446 IEs to contain the TLV/s thereby creating or extending an IEC. The additional IE shall contain the
447 following fields as described in 8.7.2:

- 448 – Type
- 449 – Length
- 450 – CID
- 451 – OCF IE Type

452 If an IE contains a TLV that is a string (i.e. type 1, type 3 or type 101), then a type 4 TLV
453 corresponding to the language of the string(s) shall also be present in the IE.

454 **8.7.2.8 IEC for Multiple Language Support**

455 A manufacturer may include additional Easy Setup IEs to support multiple languages in the Soft
456 AP beacon. In the case that a manufacturer needs to provide device information in more than one
457 language, they shall include an additional copy of the IE/IEC for each additional language. Each
458 additional IE/IEC shall include all of the mandatory TLVs defined in 8.7.2.

459 **9 Security**

460 A Device shall meet the Wi-Fi Easy Setup security requirements specified in ISO/IEC 30118-2:2018.

Annex A(normative)

OpenAPI 2.0 specification definitions

A.1 List of Resource Type definitions

Table A.1 contains the list of defined resources in this document.

Table A.1 – Alphabetized list of resources

Friendly Name (informative)	Resource Type (rt)	Clause
Device Configuration	"oic.r.devconf"	A.2
Easy Setup	"oic.r.easyssetup"	A.3
Wi-Fi Configuration	"oic.r.wificonf"	A.4

A.2 Device Configuration

A.2.1 Introduction

The Device configuration Resource stores Device settings such as the Device name. Vendor-specific information can be added to the Resource. The Device name is a human-friendly name read by a Mediator during easy setup.

A.2.2 Example URI

/example/DevConfResURI

A.2.3 Resource type

The Resource Type is defined as: "oic.r.devconf".

A.2.4 OpenAPI 2.0 definition

```
{
  "swagger": "2.0",
  "info": {
    "title": "Device Configuration",
    "version": "20190306",
    "license": {
      "name": "OCF Data Model License",
      "url":
"https://github.com/openconnectivityfoundation/core/blob/e28a9e0a92e17042ba3e83661e4c0fbce8bdc4ba/LI
CENSE.md",
      "x-copyright": "Copyright 2018-2019 Open Connectivity Foundation, Inc. All rights reserved."
    },
    "termsOfService": "https://openconnectivityfoundation.github.io/core/DISCLAIMER.md"
  },
  "schemes": ["http"],
  "consumes": ["application/json"],
  "produces": ["application/json"],
  "paths": {
    "/example/DevConfResURI" : {
      "get": {
        "description": "The Device configuration Resource stores Device settings such as the Device
name. Vendor-specific information can be added to the Resource.\nThe Device name is a human-friendly
name read by a Mediator during easy setup.\n",
        "parameters": [
          {"$ref": "#/parameters/interface"}
```

```

504     ],
505     "responses": {
506         "200": {
507             "description" : "",
508             "x-example": {
509                 "rt": ["oic.r.devconf"],
510                 "dn" : "My Refrigerator"
511             },
512             "schema": { "$ref": "#/definitions/DevConf" }
513         }
514     }
515 }
516 }
517 },
518 "parameters": {
519     "interface" : {
520         "in" : "query",
521         "name" : "if",
522         "type" : "string",
523         "enum" : ["oic.if.r", "oic.if.baseline"]
524     }
525 },
526 "definitions": {
527     "DevConf" : {
528         "properties": {
529             "rt" : {
530                 "description": "Resource Type of the Resource",
531                 "items": {
532                     "enum": ["oic.r.devconf"],
533                     "maxLength": 64,
534                     "type": "string"
535                 },
536                 "minItems": 1,
537                 "readOnly": true,
538                 "uniqueItems": true,
539                 "type": "array"
540             },
541             "n" : {
542                 "$ref":
543 "https://openconnectivityfoundation.github.io/core/schemas/oic.common.properties.core-
544 schema.json#/definitions/n"
545             },
546             "id" : {
547                 "$ref":
548 "https://openconnectivityfoundation.github.io/core/schemas/oic.common.properties.core-
549 schema.json#/definitions/id"
550             },
551             "if" : {
552                 "description": "The OCF Interfaces supported by this Resource",
553                 "items": {
554                     "enum": [
555                         "oic.if.r",
556                         "oic.if.baseline"
557                     ],
558                     "type": "string",
559                     "maxLength": 64
560                 },
561                 "minItems": 2,
562                 "readOnly": true,
563                 "uniqueItems": true,
564                 "type": "array"
565             },
566             "dn": {
567                 "oneOf": [
568                     {
569                         "type": "string",
570                         "description": "Indicates a pre-configured Device name in language indicated by 'dl'
571 in /oic/con; presented by an Enrollee Device to a Mediator Device during the easy-setup process",
572                         "pattern": "^.*$",
573                         "readOnly": true

```



```

574     },
575     {
576         "type": "array",
577         "items": {
578             "type": "object",
579             "properties": {
580                 "language": {
581                     "$ref": "http://openconnectivityfoundation.github.io/core/schemas/oic.types-
schema.json#/definitions/language-tag",
582                     "readOnly": true,
583                     "description": "An RFC 5646 language tag."
584                 },
585             },
586             "value": {
587                 "type": "string",
588                 "description": "Pre-configured Device name in the indicated language.",
589                 "pattern": "^.*$",
590                 "readOnly": true
591             }
592         }
593     },
594     "minItems" : 1,
595     "readOnly": true,
596     "description": "Localized device name."
597 }
598 ]
599 },
600 },
601 "type" : "object",
602 "required": ["dn"]
603 }
604 }
605 }
606

```

607 A.2.5 Property definition

608 Table A.2 defines the Properties that are part of the "oic.r.devconf" Resource Type.

609 **Table A.2 – The Property definitions of the Resource with type "rt" = "oic.r.devconf".**

Property name	Value type	Mandatory	Access mode	Description
id	multiple types: see schema	No	Read Write	
n	multiple types: see schema	No	Read Write	
dn	multiple types: see schema	Yes	Read Write	
rt	array: see schema	No	Read Only	Resource Type of the Resource.
if	array: see schema	No	Read Only	The OCF Interfaces supported by this Resource.

610 A.2.6 CRUDN behaviour

611 Table A.3 defines the CRUDN operations that are supported on the "oic.r.devconf" Resource Type.

612 **Table A.3 – The CRUDN operations of the Resource with type "rt" = "oic.r.devconf".**

Create	Read	Update	Delete	Notify
	get			observe

613 A.3 Easy Setup Collection

614 A.3.1 Introduction

615 The Easy Setup Resource stores useful information including the current status of unboxing a
616 Device and the last error code which are produced in the process of easy setup.
617 Note that the Easy Setup Resource is a Collection Resource, which contains Links to WiFiConf,
618 and DevConf Resources and may additionally contain Links to other Resources.
619

620 A.3.2 Example URI

621 /EasySetupResURI

622 A.3.3 Resource type

623 The Resource Type is defined as: "oic.r.easyssetup, oic.wk.col".

624 A.3.4 OpenAPI 2.0 definition

```
625 {  
626   "swagger": "2.0",  
627   "info": {  
628     "title": "Easy Setup Collection",  
629     "version": "20190327",  
630     "license": {  
631       "name": "OCF Data Model License",  
632       "url":  
633 "https://github.com/openconnectivityfoundation/core/blob/e28a9e0a92e17042ba3e83661e4c0fbce8bdc4ba/LI  
634 CENSE.md",  
635       "x-copyright": "Copyright 2016-2019 Open Connectivity Foundation, Inc. All rights reserved."  
636     },  
637     "termsOfService": "https://openconnectivityfoundation.github.io/core/DISCLAIMER.md"  
638   },  
639   "schemes": ["http"],  
640   "consumes": ["application/json"],  
641   "produces": ["application/json"],  
642   "paths": {  
643     "/EasySetupResURI?if=oic.if.ll" : {  
644       "get": {  
645         "description": "The Easy Setup Resource stores useful information including the current  
646 status of unboxing a Device and the last error code which are produced in the process of easy  
647 setup.\nNote that the Easy Setup Resource is a Collection Resource, which contains Links to  
648 WiFiConf, and DevConf Resources and may additionally contain Links to other Resources.\n",  
649         "parameters": [  
650           {"$ref": "#/parameters/interface-all"}  
651         ],  
652         "responses": {  
653           "200": {  
654             "description": "",  
655             "x-example":  
656               [  
657                 {  
658                   "href": "/EasySetupResURI",  
659                   "rt": ["oic.r.easyssetup", "oic.wk.col"],  
660                   "if": ["oic.if.b"],  
661                   "p":{"bm":3},  
662                   "eps": [  
663                     {"ep": "coaps://[fe80::b1d6]:1111", "pri": 2}  
664                   ],  
665                   "rel":["self", "item"]  
666                 },  
667                 {  
668                   "href": "/WiFiConfResURI",  
669                   "rt": ["oic.r.wificonf"],  
670                   "if": ["oic.if.baseline"],  
671                   "p":{"bm":3},  
672                   "eps": [  

```

```

673         {"ep": "coaps://[fe80::bld6]:1111", "pri": 2}
674     ]
675 },
676 {
677     "href": "/DevConfResURI",
678     "rt": ["oic.r.devconf"],
679     "if": ["oic.if.baseline"],
680     "p":{"bm":3},
681     "eps": [
682         {"ep": "coaps://[fe80::bld6]:1111", "pri": 2}
683     ]
684 }
685 ],
686 "schema": { "$ref": "#/definitions/slinks" }
687 }
688 }
689 },
690 },
691 "/EasySetupResURI?if=oic.if.b" : {
692     "get": {
693         "description": "The Easy Setup Resource stores useful information including the current
694 status of unboxing a Device and the last error code which are produced in the process of easy
695 setup.\nNote that the Easy Setup Resource is a Collection Resource, which contains Links to
696 Wi-FiConf, and DevConf Resources and may additionally contain Links to other Resources.\n",
697         "parameters": [
698             {"$ref": "#/parameters/interface-all"}
699         ],
700         "responses": {
701             "200": {
702                 "description" : "",
703                 "x-example":
704                 [
705                     {
706                         "href": "/EasySetupResURI",
707                         "rep":{
708                             "ps" : 0,
709                             "lec": 0,
710                             "cn": [1]
711                         }
712                     },
713                     {
714                         "href": "/Wi-FiConfResURI",
715                         "rep":{
716                             "swmt" : ["A", "B", "G"],
717                             "swf": ["2.4G", "5G"],
718                             "tnn": "Home_AP_SSID",
719                             "cd": "Home_AP_PWD",
720                             "wat": "WPA2_PSK",
721                             "wet": "AES",
722                             "swat": ["WPA_PSK", "WPA2_PSK"],
723                             "swet": ["TKIP", "AES", "TKIP_AES"]
724                         }
725                     },
726                     {
727                         "href": "/DevConfResURI",
728                         "rep":{
729                             "dn" : "My Refrigerator"
730                         }
731                     }
732                 ],
733                 "schema": { "$ref": "#/definitions/sbatch" }
734             }
735         }
736     },
737     "post": {
738         "description": "Able to deliver Wi-Fi, Device configuration and other
739 configuration\ninformation in a batch by utilizing 'batch' OCF Interface.\nIf you want to deliver
740 Wi-Fi and Device configuration information in a batch,\nyou can write all Properties you want to
741 send with a 'batch' OCF Interface.\nThe below example is the case to send Easy Setup and Wi-Fi
742 configuration\n(i.e. connection type, target network, auth type information) in a batch.\n",

```

```

743     "parameters": [
744         { "$ref": "#/parameters/interface-update" },
745     ],
746     "name": "body",
747     "in": "body",
748     "required": true,
749     "schema": { "$ref": "#/definitions/sbatch-update" },
750     "x-example":
751     [
752         {
753             "href": "/EasySetupResURI",
754             "rep": {
755                 "cn": [1]
756             }
757         },
758         {
759             "href": "/WiFiConfResURI",
760             "rep": {
761                 "tnn": "Home_AP_SSID",
762                 "cd": "Home_AP_PWD",
763                 "wat": "WPA2_PSK",
764                 "wet": "AES"
765             }
766         }
767     ]
768 },
769 ],
770 "responses": {
771     "200": {
772         "description": "",
773         "x-example":
774         [
775             {
776                 "href": "/EasySetupResURI",
777                 "rep": {
778                     "ps": 0,
779                     "lec": 0,
780                     "cn": [1]
781                 }
782             },
783             {
784                 "href": "/WiFiConfResURI",
785                 "rep": {
786                     "swmt": ["A", "B", "G"],
787                     "swf": ["2.4G", "5G"],
788                     "tnn": "Home_AP_SSID",
789                     "cd": "Home_AP_PWD",
790                     "wat": "WPA2_PSK",
791                     "wet": "AES",
792                     "swat": ["WPA_PSK", "WPA2_PSK"],
793                     "swet": ["TKIP", "AES", "TKIP_AES"]
794                 }
795             },
796             {
797                 "href": "/DevConfResURI",
798                 "rep": {
799                     "dn": "My Refrigerator"
800                 }
801             }
802         ],
803         "schema": { "$ref": "#/definitions/sbatch" }
804     }
805 }
806 },
807 ],
808 "/EasySetupResURI?if=oic.if.baseline" : {
809     "get": {
810         "description": "The Easy Setup Resource stores useful information including the current
811 status of unboxing a Device and the last error code which are produced in the process of easy
812 setup.\nNote that the Easy Setup Resource is a Collection Resource, which contains Links to

```

```

813 WiFiConf, and DevConf Resources and may additionally contain Links to other Resources.\n",
814 "parameters": [
815   {"$ref": "#/parameters/interface-all"}
816 ],
817 "responses": {
818   "200": {
819     "description": "",
820     "x-example":
821       {
822         "rt": ["oic.r.easyssetup", "oic.wk.col"],
823         "if": ["oic.if.ll", "oic.if.baseline", "oic.if.b"],
824         "ps": 0,
825         "lec": 0,
826         "cn": [1],
827         "links": [
828           {
829             "href": "/EasySetupResURI",
830             "rt": ["oic.r.easyssetup", "oic.wk.col"],
831             "if": ["oic.if.b"],
832             "p":{"bm":3},
833             "eps": [
834               {"ep": "coaps://[fe80:bld6]:1111", "pri": 2}
835             ],
836             "rel":["self", "item"]
837           },
838           {
839             "href": "/WiFiConfResURI",
840             "rt": ["oic.r.wificonf"],
841             "if": ["oic.if.baseline"],
842             "p":{"bm":3},
843             "eps": [
844               {"ep": "coaps://[fe80:bld6]:1111", "pri": 2}
845             ]
846           },
847           {
848             "href": "/DevConfResURI",
849             "rt": ["oic.r.devconf"],
850             "if": ["oic.if.baseline"],
851             "p":{"bm":3},
852             "eps": [
853               {"ep": "coaps://[fe80:bld6]:1111", "pri": 2}
854             ]
855           }
856         ]
857       },
858     "schema": { "$ref": "#/definitions/EasySetup" }
859   }
860 },
861 "post": {
862   "description": "Able to update connection type to attempt to connect to the Enroller to
863 start during while posting to /EasySetupResURI\nThe below example is the case to send Easy Setup
864 configuration\n(i.e. connection type) in a post.\n",
865   "parameters": [
866     {"$ref": "#/parameters/interface-update"},
867     {
868       "name": "body",
869       "in": "body",
870       "required": true,
871       "schema": { "$ref": "#/definitions/EasySetupUpdate" },
872       "x-example":
873         {
874           "cn": [1]
875         }
876     }
877   ],
878   "responses": {
879     "200": {
880       "description": "",
881       "x-example":

```

```

883     {
884         "rt" : ["oic.r.easyssetup", "oic.wk.col"],
885         "if" : ["oic.if.ll", "oic.if.baseline", "oic.if.b"],
886         "ps" : 0,
887         "lec" : 0,
888         "cn" : [1],
889         "links" : [
890             {
891                 "href" : "/EasySetupResURI",
892                 "rt" : ["oic.r.easyssetup", "oic.wk.col"],
893                 "if" : ["oic.if.b", "oic.if.ll", "oic.if.baseline"],
894                 "p":{"bm":3},
895                 "eps" : [
896                     {"ep" : "coaps://[fe80::b1d6]:1111", "pri" : 2}
897                 ],
898                 "rel":["self", "item"]
899             },
900             {
901                 "href" : "/WiFiConfResURI",
902                 "rt" : ["oic.r.wificonf"],
903                 "if" : ["oic.if.rw", "oic.if.baseline"],
904                 "p":{"bm":3},
905                 "eps" : [
906                     {"ep" : "coaps://[fe80::b1d6]:1111", "pri" : 2}
907                 ]
908             },
909             {
910                 "href" : "/DevConfResURI",
911                 "rt" : ["oic.r.devconf"],
912                 "if" : ["oic.if.r", "oic.if.baseline"],
913                 "p":{"bm":3},
914                 "eps" : [
915                     {"ep" : "coaps://[fe80::b1d6]:1111", "pri" : 2}
916                 ]
917             }
918         ]
919     },
920     "schema": { "$ref": "#/definitions/EasySetup" }
921 }
922 }
923 }
924 },
925 },
926 "parameters": {
927     "interface-all" : {
928         "in" : "query",
929         "name" : "if",
930         "type" : "string",
931         "enum" : ["oic.if.ll", "oic.if.b", "oic.if.baseline"]
932     },
933     "interface-update" : {
934         "in" : "query",
935         "name" : "if",
936         "type" : "string",
937         "enum" : ["oic.if.b", "oic.if.baseline"]
938     }
939 },
940 "definitions": {
941     "oic.oic-link": {
942         "type": "object",
943         "properties": {
944             "anchor": {
945                 "$ref":
946 "https://openconnectivityfoundation.github.io/core/schemas/oic.links.properties.core-
947 schema.json#/definitions/anchor"
948             },
949             "di": {
950                 "$ref":
951 "https://openconnectivityfoundation.github.io/core/schemas/oic.links.properties.core-
952 schema.json#/definitions/di"

```

```

953     },
954     "eps": {
955       "$ref":
956       "https://openconnectivityfoundation.github.io/core/schemas/oic.links.properties.core-
957       schema.json#/definitions/eps"
958     },
959     "href": {
960       "$ref":
961       "https://openconnectivityfoundation.github.io/core/schemas/oic.links.properties.core-
962       schema.json#/definitions/href"
963     },
964     "ins": {
965       "$ref":
966       "https://openconnectivityfoundation.github.io/core/schemas/oic.links.properties.core-
967       schema.json#/definitions/ins"
968     },
969     "p": {
970       "$ref":
971       "https://openconnectivityfoundation.github.io/core/schemas/oic.links.properties.core-
972       schema.json#/definitions/p"
973     },
974     "rel": {
975       "$ref":
976       "https://openconnectivityfoundation.github.io/core/schemas/oic.links.properties.core-
977       schema.json#/definitions/rel_array"
978     },
979     "title": {
980       "$ref":
981       "https://openconnectivityfoundation.github.io/core/schemas/oic.links.properties.core-
982       schema.json#/definitions/title"
983     },
984     "type": {
985       "$ref":
986       "https://openconnectivityfoundation.github.io/core/schemas/oic.links.properties.core-
987       schema.json#/definitions/type"
988     },
989     "if": {
990       "description": "The OCF Interfaces supported by the target Resource",
991       "items": {
992         "enum": [
993           "oic.if.baseline",
994           "oic.if.ll",
995           "oic.if.b",
996           "oic.if.r",
997           "oic.if.rw"
998         ],
999         "type": "string",
1000         "maxLength": 64
1001       },
1002       "minItems": 1,
1003       "uniqueItems": true,
1004       "type": "array"
1005     },
1006     "rt": {
1007       "description": "Resource Type of the target Resource",
1008       "items": {
1009         "maxLength": 64,
1010         "type": "string"
1011       },
1012       "minItems": 1,
1013       "uniqueItems": true,
1014       "type": "array"
1015     }
1016   },
1017   "required": [
1018     "href",
1019     "rt",
1020     "if"
1021   ]
1022 },

```

```

1023     "slinks" : {
1024         "type": "array",
1025         "items": {
1026             "$ref": "#/definitions/oic.oic-link"
1027         }
1028     },
1029     "sbatch" : {
1030         "minItems" : 1,
1031         "items" : {
1032             "additionalProperties": true,
1033             "properties": {
1034                 "href": {
1035                     "$ref":
1036 "https://openconnectivityfoundation.github.io/core/schemas/oic.links.properties.core-
1037 schema.json#/definitions/href"
1038                 },
1039                 "rep": {
1040                     "description": "The response payload from a single Resource",
1041                     "type": "object",
1042                     "anyOf": [
1043                         {
1044                             "$ref": "#/definitions/EasySetup"
1045                         },
1046                         {
1047                             "$ref": "https://openconnectivityfoundation.github.io/core-
1048 extensions/swagger2.0/oic.r.wificonf.swagger.json#/definitions/WiFiConf"
1049                         },
1050                         {
1051                             "$ref": "https://openconnectivityfoundation.github.io/core-
1052 extensions/swagger2.0/oic.r.devconf.swagger.json#/definitions/DevConf"
1053                         }
1054                     ]
1055                 }
1056             },
1057             "required": [
1058                 "href",
1059                 "rep"
1060             ],
1061             "type": "object"
1062         },
1063         "type" : "array"
1064     },
1065     "sbatch-update" : {
1066         "minItems" : 1,
1067         "items" : {
1068             "additionalProperties": true,
1069             "description": "Array of Resource representations to apply to the batch Collection, using
1070 href to indicate which resource(s) in the batch to update. If the href Property is empty,
1071 effectively making the URI reference to the Collection itself, the representation is to be applied
1072 to all Resources in the batch",
1073             "properties": {
1074                 "href": {
1075                     "$ref":
1076 "https://openconnectivityfoundation.github.io/core/schemas/oic.links.properties.core-
1077 schema.json#/definitions/href"
1078                 },
1079                 "rep": {
1080                     "description": "The response payload from a single Resource",
1081                     "type": "object",
1082                     "anyOf": [
1083                         {
1084                             "$ref": "#/definitions/EasySetupUpdate"
1085                         },
1086                         {
1087                             "$ref": "https://openconnectivityfoundation.github.io/core-
1088 extensions/swagger2.0/oic.r.wificonf.swagger.json#/definitions/WiFiConfUpdate"
1089                         }
1090                     ]
1091                 }
1092             },
1093             "type": "object"
1094         }
1095     }

```



```

1093     "required": [
1094         "href",
1095         "rep"
1096     ],
1097     "type": "object"
1098 },
1099     "type": "array"
1100 },
1101     "EasySetup" : {
1102         "properties": {
1103             "n" : {
1104                 "$ref":
1105 "https://openconnectivityfoundation.github.io/core/schemas/oic.common.properties.core-
1106 schema.json#/definitions/n"
1107             },
1108             "rts" : {
1109                 "description": "Resource Type of the Resources within the Collection",
1110                 "items": {
1111                     "maxLength": 64,
1112                     "type": "string"
1113                 },
1114                 "minItems": 1,
1115                 "uniqueItems": true,
1116                 "readOnly": true,
1117                 "type": "array"
1118             },
1119             "id" : {
1120                 "$ref":
1121 "https://openconnectivityfoundation.github.io/core/schemas/oic.common.properties.core-
1122 schema.json#/definitions/id"
1123             },
1124             "rts-m" : {
1125                 "description": "Resource Type of the mandatory Resources within the Collection",
1126                 "items": {
1127                     "maxLength": 64,
1128                     "type": "string"
1129                 },
1130                 "minItems": 1,
1131                 "uniqueItems": true,
1132                 "readOnly": true,
1133                 "type": "array"
1134             },
1135             "if" : {
1136                 "description": "The OCF Interfaces supported by this Resource",
1137                 "items": {
1138                     "enum": [
1139                         "oic.if.ll",
1140                         "oic.if.baseline",
1141                         "oic.if.b"
1142                     ],
1143                     "type": "string",
1144                     "maxLength": 64
1145                 },
1146                 "minItems": 2,
1147                 "uniqueItems": true,
1148                 "readOnly": true,
1149                 "type": "array"
1150             },
1151             "rt" : {
1152                 "items": {
1153                     "enum": [
1154                         "oic.r.easyssetup",
1155                         "oic.wk.col"
1156                     ],
1157                     "type": "string",
1158                     "maxLength": 64
1159                 },
1160                 "minItems": 2,
1161                 "type": "array",
1162                 "uniqueItems": true

```

```

1163     },
1164     "ps" : {
1165         "description": "Indicates the easy setup status of the Device. (0: Need to Setup, 1:
1166 Connecting to Enroller, 2: Connected to Enroller, 3: Failed to Connect to Enroller, 4~254: Reserved,
1167 255: EOF)",
1168         "enum": [
1169             0,
1170             1,
1171             2,
1172             3
1173         ],
1174         "readOnly": true,
1175         "type": "integer"
1176     },
1177     "lec" : {
1178         "description": "Indicates a failure reason (0: NO error, 1: A given SSID is not found, 2:
1179 Wi-Fi's password is wrong, 3: IP address is not allocated, 4: No internet connection, 5: Timeout, 6:
1180 Wi-Fi Auth Type is not supported by the Enrollee, 7: Wi-Fi Encryption Type is not supported by the
1181 Enrollee, 8: Wi-Fi Auth Type is wrong (failure while connecting to the Enroller), 9: Wi-Fi
1182 Encryption Type is wrong (failure while connecting to the Enroller), 10~254: Reserved, 255: Unknown
1183 error)",
1184         "enum": [
1185             0,
1186             1,
1187             2,
1188             3,
1189             4,
1190             5,
1191             6,
1192             7,
1193             8,
1194             9,
1195             255
1196         ],
1197         "readOnly": true,
1198         "type": "integer"
1199     },
1200     "cn" : {
1201         "description": "Indicates an array of connection types that trigger an attempt to connect
1202 to the Enroller to start.",
1203         "items": {
1204             "description": "Connection type to attempt. (1 : Wi-Fi, 2 : other entities / transports
1205 to be added in future (e.g. Connect to cloud / BLE))",
1206             "type": "integer"
1207         },
1208         "type": "array"
1209     },
1210     "links" : {
1211         "type": "array",
1212         "description": "A set of OCF Links.",
1213         "items": {
1214             "$ref": "#/definitions/oic.oic-link"
1215         }
1216     }
1217 },
1218 "type" : "object",
1219 "required": ["ps", "lec", "cn"]
1220 },
1221 "EasySetupUpdate" : {
1222     "additionalProperties": true,
1223     "description": "Update to writeable values in EasySetupResURI",
1224     "properties": {
1225         "cn" : {
1226             "description": "Indicates an array of connection types that trigger an attempt to connect
1227 to the Enroller to start.",
1228             "items": {
1229                 "description": "Connection type to attempt. (1 : Wi-Fi, 2 : other entities / transports
1230 to be added in future (e.g. Connect to cloud / BLE))",
1231                 "type": "integer"
1232             },

```

```

1233         "type": "array"
1234     },
1235 },
1236 "required": [
1237     "cn"
1238 ],
1239 "type": "object"
1240 }
1241 }
1242 }
1243

```

1244 **A.3.5 Property definition**

1245 Table A.4 defines the Properties that are part of the "oic.r.easyssetup, oic.wk.col" Resource Type.

1246 **Table A.4 – The Property definitions of the Resource with type "rt" = "oic.r.easyssetup,**
1247 **oic.wk.col".**

Property name	Value type	Mandatory	Access mode	Description
rep	object: see schema	Yes	Read Write	The response payload from a single Resource.
href	multiple types: see schema	Yes	Read Write	
rep	object: see schema	Yes	Read Write	The response payload from a single Resource.
href	multiple types: see schema	Yes	Read Write	
links	array: see schema	No	Read Write	A set of OCF Links.
rts-m	array: see schema	No	Read Only	Resource Type of the mandatory Resources within the Collection.
n	multiple types: see schema	No	Read Write	
if	array: see schema	No	Read Only	The OCF Interfaces supported by this Resource.
ps	integer	Yes	Read Only	Indicates the easy setup status of the Device. (0: Need to Setup, 1: Connecting to Enroller, 2: Connected to Enroller, 3: Failed to Connect to Enroller, 4~254: Reserved, 255: EOF).
lec	integer	Yes	Read Only	Indicates a failure reason (0: NO error, 1: A given SSID is not found, 2: Wi-Fi's password is wrong, 3: IP address is not allocated, 4: No internet connection, 5: Timeout, 6: Wi-Fi Auth Type is not supported by the

				Enrollee, 7: Wi-Fi Encryption Type is not supported by the Enrollee, 8: Wi-Fi Auth Type is wrong (failure while connecting to the Enroller), 9: Wi-Fi Encryption Type is wrong (failure while connecting to the Enroller), 10~254: Reserved, 255: Unknown error).
rt	array: see schema	No	Read Write	
rts	array: see schema	No	Read Only	Resource Type of the Resources within the Collection.
cn	array: see schema	Yes	Read Write	Indicates an array of connection types that trigger an attempt to connect to the Enroller to start.
id	multiple types: see schema	No	Read Write	
rt	array: see schema	Yes	Read Write	Resource Type of the target Resource.
href	multiple types: see schema	Yes	Read Write	
if	array: see schema	Yes	Read Write	The OCF Interfaces supported by the target Resource.
type	multiple types: see schema	No	Read Write	
p	multiple types: see schema	No	Read Write	
ins	multiple types: see schema	No	Read Write	
title	multiple types: see schema	No	Read Write	
anchor	multiple types: see schema	No	Read Write	
rel	multiple types: see schema	No	Read Write	
eps	multiple types: see schema	No	Read Write	
di	multiple types: see schema	No	Read Write	
cn	array: see schema	Yes	Read Write	Indicates an array of connection types that trigger an attempt to connect to the Enroller to start.

1248 **A.3.6 CRUDN behaviour**

1249 Table A.5 defines the CRUDN operations that are supported on the "oic.r.easysetup, oic.wk.col"
1250 Resource Type.

1251 **Table A.5 – The CRUDN operations of the Resource with type "rt" = "oic.r.easysetup,**
1252 **oic.wk.col".**

Create	Read	Update	Delete	Notify
	get	post		observe

1253 **A.4 Wi-Fi Configuration**

1254 **A.4.1 Introduction**

1255 WiFiConf Resource stores essential information to help an unboxing Device
1256 to connect to an existing Wi-Fi AP.
1257

1258 **A.4.2 Example URI**

1259 /WiFiConfResURI

1260 **A.4.3 Resource type**

1261 The Resource Type is defined as: "oic.r.wificonf".

1262 **A.4.4 OpenAPI 2.0 definition**

```
1263 {  
1264   "swagger": "2.0",  
1265   "info": {  
1266     "title": "Wi-Fi Configuration",  
1267     "version": "20190327",  
1268     "license": {  
1269       "name": "OCF Data Model License",  
1270       "url":  
1271       "https://github.com/openconnectivityfoundation/core/blob/e28a9e0a92e17042ba3e83661e4c0fbce8bdc4ba/LI  
1272       CENSE.md",  
1273       "x-copyright": "Copyright 2018-2019 Open Connectivity Foundation, Inc. All rights reserved."  
1274     },  
1275     "termsOfService": "https://openconnectivityfoundation.github.io/core/DISCLAIMER.md"  
1276   },  
1277   "schemes": ["http"],  
1278   "consumes": ["application/json"],  
1279   "produces": ["application/json"],  
1280   "paths": {  
1281     "/WiFiConfResURI?if=oic.if.rw" : {  
1282       "get": {  
1283         "description": "The WiFiConf Resource stores essential information to help an unboxing  
1284         Device connect to an existing Wi-Fi AP.\n",  
1285         "parameters": [  
1286           {"$ref": "#/parameters/interface-all"}  
1287         ],  
1288         "responses": {  
1289           "200": {  
1290             "description" : "",  
1291             "x-example":  
1292             {  
1293               "tnn": "Home_AP_SSID",  
1294               "swmt" : ["A", "B", "G"],  
1295               "swf": ["2.4G", "5G"],  
1296               "cd": "Home_AP_PWD",  
1297               "wat": "WPA2_PSK",  
1298               "wet": "AES",  
1299               "swat": ["WPA_PSK", "WPA2_PSK"],
```

```

1300         "swet": ["TKIP", "AES", "TKIP_AES"]
1301     },
1302     "schema": { "$ref": "#/definitions/WiFiConf" }
1303 }
1304 },
1305 },
1306 "post": {
1307     "description": "Deliver Wi-Fi AP's information for an unboxing Device to connect to it.\n",
1308     "parameters": [
1309         { "$ref": "#/parameters/interface-all" },
1310         {
1311             "name": "body",
1312             "in": "body",
1313             "required": true,
1314             "schema": { "$ref": "#/definitions/WiFiConfUpdate" },
1315             "x-example":
1316                 {
1317                     "tnn": "Home_AP_SSID",
1318                     "cd": "Home_AP_PWD",
1319                     "wat": "WPA2_PSK",
1320                     "wet": "AES"
1321                 }
1322         }
1323     ],
1324     "responses": {
1325         "200": {
1326             "description": "",
1327             "x-example":
1328                 {
1329                     "tnn": "Home_AP_SSID",
1330                     "swmt": ["A", "B", "G"],
1331                     "swf": ["2.4G", "5G"],
1332                     "cd": "Home_AP_PWD",
1333                     "wat": "WPA2_PSK",
1334                     "wet": "AES",
1335                     "swat": ["WPA_PSK", "WPA2_PSK"],
1336                     "swet": ["TKIP", "AES", "TKIP_AES"]
1337                 },
1338             "schema": { "$ref": "#/definitions/WiFiConf" }
1339         }
1340     }
1341 },
1342 },
1343 "/WiFiConfResURI?if=oic.if.baseline" : {
1344     "get": {
1345         "description": "WiFiConf Resource stores essential information to help an unboxing
1346 Device\nto connect to an existing Wi-Fi AP.\n",
1347         "parameters": [
1348             { "$ref": "#/parameters/interface-all" }
1349         ],
1350         "responses": {
1351             "200": {
1352                 "description": "",
1353                 "x-example":
1354                     {
1355                         "rt": ["oic.r.wificonf"],
1356                         "if": ["oic.if.rw", "oic.if.baseline"],
1357                         "swmt": ["A", "B", "G"],
1358                         "swf": ["2.4G", "5G"],
1359                         "tnn": "Home_AP_SSID",
1360                         "cd": "Home_AP_PWD",
1361                         "wat": "WPA2_PSK",
1362                         "wet": "TKIP",
1363                         "swat": ["WPA_PSK", "WPA2_PSK"],
1364                         "swet": ["TKIP", "AES", "TKIP_AES"]
1365                     },
1366                 "schema": { "$ref": "#/definitions/WiFiConf" }
1367             }
1368         }
1369     },

```

```

1370     "post": {
1371       "description": "Deliver Wi-Fi AP's information for an unboxing device to connect to it.\n",
1372       "parameters": [
1373         { "$ref": "#/parameters/interface-all"},
1374         {
1375           "name": "body",
1376           "in": "body",
1377           "required": true,
1378           "schema": { "$ref": "#/definitions/WiFiConfUpdate" },
1379           "x-example":
1380             {
1381               "tnn": "Home_AP_SSID",
1382               "cd": "Home_AP_PWD",
1383               "wat": "WPA2_PSK",
1384               "wet": "AES"
1385             }
1386         }
1387       ],
1388       "responses": {
1389         "200": {
1390           "description": "",
1391           "x-example":
1392             {
1393               "rt": ["oic.r.wificonf"],
1394               "if": ["oic.if.rw", "oic.if.baseline"],
1395               "tnn": "Home_AP_SSID",
1396               "swmt": ["A", "B", "G"],
1397               "swf": ["2.4G", "5G"],
1398               "cd": "Home_AP_PWD",
1399               "wat": "WPA2_PSK",
1400               "wet": "AES",
1401               "swat": ["WPA_PSK", "WPA2_PSK"],
1402               "swet": ["TKIP", "AES", "TKIP_AES"]
1403             },
1404           "schema": { "$ref": "#/definitions/WiFiConf" }
1405         }
1406       }
1407     }
1408   },
1409 },
1410 "parameters": {
1411   "interface-all": {
1412     "in": "query",
1413     "name": "if",
1414     "type": "string",
1415     "enum": ["oic.if.rw", "oic.if.baseline"]
1416   }
1417 },
1418 "definitions": {
1419   "WiFiConf": {
1420     "properties": {
1421       "rt": {
1422         "description": "Resource Type of the Resource",
1423         "items": {
1424           "enum": ["oic.r.wificonf"],
1425           "type": "string",
1426           "maxLength": 64
1427         },
1428         "minItems": 1,
1429         "uniqueItems": true,
1430         "readOnly": true,
1431         "type": "array"
1432       },
1433       "tnn": {
1434         "description": "Indicates Target Network Name (SSID of Wi-Fi AP)",
1435         "pattern": "^.*$",
1436         "type": "string"
1437       },
1438       "swmt": {
1439         "description": "Indicates supported Wi-Fi mode types. It can be multiple",

```

```

1440         "items": {
1441             "description": "Supported Wi-Fi Mode Type.",
1442             "enum": [
1443                 "A",
1444                 "B",
1445                 "G",
1446                 "N",
1447                 "AC"
1448             ],
1449             "type": "string"
1450         },
1451         "readOnly": true,
1452         "type": "array"
1453     },
1454     "wat" : {
1455         "description": "Indicates Wi-Fi Auth Type",
1456         "enum": [
1457             "None",
1458             "WEP",
1459             "WPA_PSK",
1460             "WPA2_PSK"
1461         ],
1462         "type": "string"
1463     },
1464     "n" : {
1465         "$ref":
1466         "https://openconnectivityfoundation.github.io/core/schemas/oic.common.properties.core-
1467         schema.json#/definitions/n"
1468     },
1469     "swat" : {
1470         "description": "Indicates supported Wi-Fi Auth types. It can be multiple",
1471         "items": {
1472             "description": "Indicates Wi-Fi Auth Type",
1473             "enum": [
1474                 "None",
1475                 "WEP",
1476                 "WPA_PSK",
1477                 "WPA2_PSK"
1478             ],
1479             "type": "string"
1480         },
1481         "readOnly": true,
1482         "type": "array"
1483     },
1484     "swf" : {
1485         "description": "Indicates Supported Wi-Fi frequencies by the Enrollee. Can be multiple.
1486 Valid values are ('2.4G', '5G')",
1487         "items": {
1488             "pattern": "^(2\\.4|5)G$",
1489             "type": "string"
1490         },
1491         "readOnly": true,
1492         "type": "array"
1493     },
1494     "swet" : {
1495         "description": "Indicates supported Wi-Fi Encryption types. It can be multiple",
1496         "items": {
1497             "description": "Indicates Wi-Fi Encryption Type",
1498             "enum": [
1499                 "None",
1500                 "WEP_64",
1501                 "WEP_128",
1502                 "TKIP",
1503                 "AES",
1504                 "TKIP_AES"
1505             ],
1506             "type": "string"
1507         },
1508         "readOnly": true,
1509         "type": "array"

```



```

1510     },
1511     "wet" : {
1512         "description": "Indicates Wi-Fi Encryption Type",
1513         "enum": [
1514             "None",
1515             "WEP_64",
1516             "WEP_128",
1517             "TKIP",
1518             "AES",
1519             "TKIP_AES"
1520         ],
1521         "type": "string"
1522     },
1523     "cd" : {
1524         "description": "Indicates credential information of Wi-Fi AP",
1525         "pattern": "^.*$",
1526         "type": "string"
1527     },
1528     "id" : {
1529         "$ref":
1530         "https://openconnectivityfoundation.github.io/core/schemas/oic.common.properties.core-
1531         schema.json#/definitions/id"
1532     },
1533     "if" : {
1534         "description": "The OCF Interfaces supported by this Resource",
1535         "items": {
1536             "enum": [
1537                 "oic.if.rw",
1538                 "oic.if.baseline"
1539             ],
1540             "type": "string",
1541             "maxLength": 64
1542         },
1543         "minItems": 2,
1544         "uniqueItems": true,
1545         "readOnly": true,
1546         "type": "array"
1547     }
1548 },
1549 "type" : "object",
1550 "required":["swmt", "swf", "swat", "swet", "tnn", "wat", "wet"]
1551 },
1552 "WiFiConfUpdate" : {
1553     "properties": {
1554         "wat" : {
1555             "description": "Indicates Wi-Fi Auth Type",
1556             "enum": [
1557                 "None",
1558                 "WEP",
1559                 "WPA_PSK",
1560                 "WPA2_PSK"
1561             ]
1562         },
1563         "cd" : {
1564             "description": "Indicates credential information of Wi-Fi AP",
1565             "pattern": "^.*$",
1566             "type": "string"
1567         },
1568         "wet" : {
1569             "description": "Indicates Wi-Fi Encryption Type",
1570             "enum": [
1571                 "None",
1572                 "WEP_64",
1573                 "WEP_128",
1574                 "TKIP",
1575                 "AES",
1576                 "TKIP_AES"
1577             ]
1578         },
1579         "tnn" : {

```

```

1580         "description": "Indicates Target Network Name (SSID of Wi-Fi AP)",
1581         "pattern": "^.*$",
1582         "type": "string"
1583     }
1584 },
1585     "type" : "object",
1586     "required":["tnn", "wat", "wet"]
1587 }
1588 }
1589 }
1590

```

1591 **A.4.5 Property definition**

1592 Table A.6 defines the Properties that are part of the "oic.r.wificonf" Resource Type.

1593 **Table A.6 – The Property definitions of the Resource with type "rt" = "oic.r.wificonf".**

Property name	Value type	Mandatory	Access mode	Description
if	array: see schema	No	Read Only	The OCF Interfaces supported by this Resource.
cd	string	No	Read Write	Indicates credential information of Wi-Fi AP.
wat	string	Yes	Read Write	Indicates Wi-Fi Auth Type.
swat	array: see schema	Yes	Read Only	Indicates supported Wi-Fi Auth types. It can be multiple.
tnn	string	Yes	Read Write	Indicates Target Network Name (SSID of Wi-Fi AP).
wet	string	Yes	Read Write	Indicates Wi-Fi Encryption Type.
id	multiple types: see schema	No	Read Write	
rt	array: see schema	No	Read Only	Resource Type of the Resource.
swmt	array: see schema	Yes	Read Only	Indicates supported Wi-Fi mode types. It can be multiple.
swf	array: see schema	Yes	Read Only	Indicates Supported Wi-Fi frequencies by the Enrollee. Can be multiple. Valid values are ("2.4G", "5G").
n	multiple types: see schema	No	Read Write	
swet	array: see schema	Yes	Read Only	Indicates supported Wi-Fi Encryption types. It can be multiple.
wat	multiple types: see schema	Yes	Read Write	Indicates Wi-Fi Auth Type.

cd	string	No	Read Write	Indicates credential information of Wi-Fi AP.
tnn	string	Yes	Read Write	Indicates Target Network Name (SSID of Wi-Fi AP).
wet	multiple types: see schema	Yes	Read Write	Indicates Wi-Fi Encryption Type.

1594 **A.4.6 CRUDN behaviour**

1595 Table A.7 defines the CRUDN operations that are supported on the "oic.r.wificonf" Resource Type.

1596 **Table A.7 – The CRUDN operations of the Resource with type "rt" = "oic.r.wificonf".**

Create	Read	Update	Delete	Notify
	get	post		observe

1597