



November 8, 2017
IPP Registration

The Printer Working Group

1 **IPP Get-User-Printer-Attributes**
2 **(GUPA)**

3 Status: Stable

4 Abstract: This registration defines the Get-User-Printer-Attributes IPP operation, which
5 allows an IPP Client to retrieve the Printer's attributes and capabilities that are available
6 specifically to the Client's most authenticated User.

7 This document is available electronically at:

8 <https://ftp.pwg.org/pub/pwg/ipp/whitepaper/wd-ippgupa-20171108.odt>
9 <https://ftp.pwg.org/pub/pwg/ipp/whitepaper/wd-ippgupa-20171108.pdf>

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11 Title: *IPP Get-User-Printer-Attributes (GUPA)*

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63 1 Introduction

64 This IPP Registration defines the Get-User-Printer-Attributes IPP operation, which allows
65 an IPP Client to retrieve the Printer's attributes and capabilities that are available
66 specifically to the Client's most authenticated User. It is semantically analogous to the
67 existing Get-Printer-Attributes IPP operation [RFC8011], with the key difference that the
68 Printer could respond with an authentication challenge.

69 2 Terminology

70 2.1 Conformance Terminology

71 Capitalized terms, such as MUST, MUST NOT, RECOMMENDED, REQUIRED, SHOULD,
72 SHOULD NOT, MAY, and OPTIONAL, have special meaning relating to conformance as
73 defined in Key words for use in RFCs to Indicate Requirement Levels [BCP14]. The term
74 CONDITIONALLY REQUIRED is additionally defined for a conformance requirement that
75 applies when a specified condition is true.

76 2.2 Printing Terminology

77 Normative definitions and semantics of printing terms are imported from IETF Printer MIB
78 v2 [RFC3805], IETF Finisher MIB [RFC3806], and IETF Internet Printing Protocol/1.1:
79 Model and Semantics [RFC8011].

80 *Document*: An object created and managed by a Printer that contains the description,
81 processing, and status information. A Document object may have attached data and is
82 bound to a single Job.

83 *Job*: An object created and managed by a Printer that contains description, processing,
84 and status information. The Job also contains zero or more Document objects.

85 *Logical Device*: a print server, software service, or gateway that processes jobs and either
86 forwards or stores the processed job or uses one or more Physical Devices to render
87 output.

88 *Output Device*: a single Logical or Physical Device

89 *Physical Device*: a hardware implementation of an endpoint device, e.g., a marking engine,
90 a fax modem, etc.

91 2.3 Protocol Role Terminology

92 This document defines the following protocol roles in order to specify unambiguous
93 conformance requirements:

94 *Client*: Initiator of outgoing IPP session requests and sender of outgoing IPP operation
95 requests (Hypertext Transfer Protocol -- HTTP/1.1 [RFC7230] User Agent).

96 *Printer*: Listener for incoming IPP session requests and receiver of incoming IPP operation
97 requests (Hypertext Transfer Protocol -- HTTP/1.1 [RFC7230] Server) that represents one
98 or more Physical Devices or a Logical Device.

99 **2.4 Other Terms Used in This Document**

100 *User*: A person or automata using a Client to communicate with a Printer.

101 **2.5 Acronyms and Organizations**

102 *IANA*: Internet Assigned Numbers Authority, <http://www.iana.org/>

103 *IETF*: Internet Engineering Task Force, <http://www.ietf.org/>

104 *ISO*: International Organization for Standardization, <http://www.iso.org/>

105 *PWG*: Printer Working Group, <http://www.pwg.org/>

106 **3 Requirements**

107 **3.1 Rationale**

108 While there are many proprietary print policy solutions that provide a way to specify
109 allowed or disallowed features according to individual users, systems, applications, and so
110 forth, there is no established standard method using IPP. IPP ecosystems would benefit
111 from having such a print policy method to better support systems such as IPP
112 Everywhere™ [PWG5100.14] in print infrastructures provided by public print providers,
113 enterprises or university settings.

114 Technical justification for pursuing the creation of a new IPP operation rather than reusing
115 or overloading existing operations such as Get-Printer-Attributes is discussed in section 4.

116 **3.2 Use Cases**

117 The need for solutions to these use cases emerged during the process of writing the IPP
118 Implementor's Guide v2 [PWG5100.19].

119 **3.2.1 Print Policy For Some Users Limits Print Capabilities**

120 Sue wants to print her report on her department's workgroup printer. She wants to print it in
121 color to make the color graphs look best. However, she has abused her printing privileges,
122 so her department head has instructed the network administrator to restrict her user
123 account's ability to print in color.

124 Sue opens the document on her laptop, chooses to print, and selects the department's
125 workgroup printer. The Printer authenticates the laptop using Sue's credentials, and then
126 provides the laptop with the print choices available for Sue's account, which does not
127 include color printing. Sue decides whether to print it in black-and-white anyway or to print
128 from one of the campus print centers, where she can pay to print in color.

129 Bob is an associate professor in the same department as Sue. His account has no
130 limitations for color printing. He opens a document on his tablet, taps to print, and selects
131 the department's workgroup printer. His tablet presents print options including the option of
132 printing in color. Bob chooses to print in color, and prints his document, which prints in
133 color as he expects.

134 Figure 3.1 illustrates this use case with a sequence diagram.

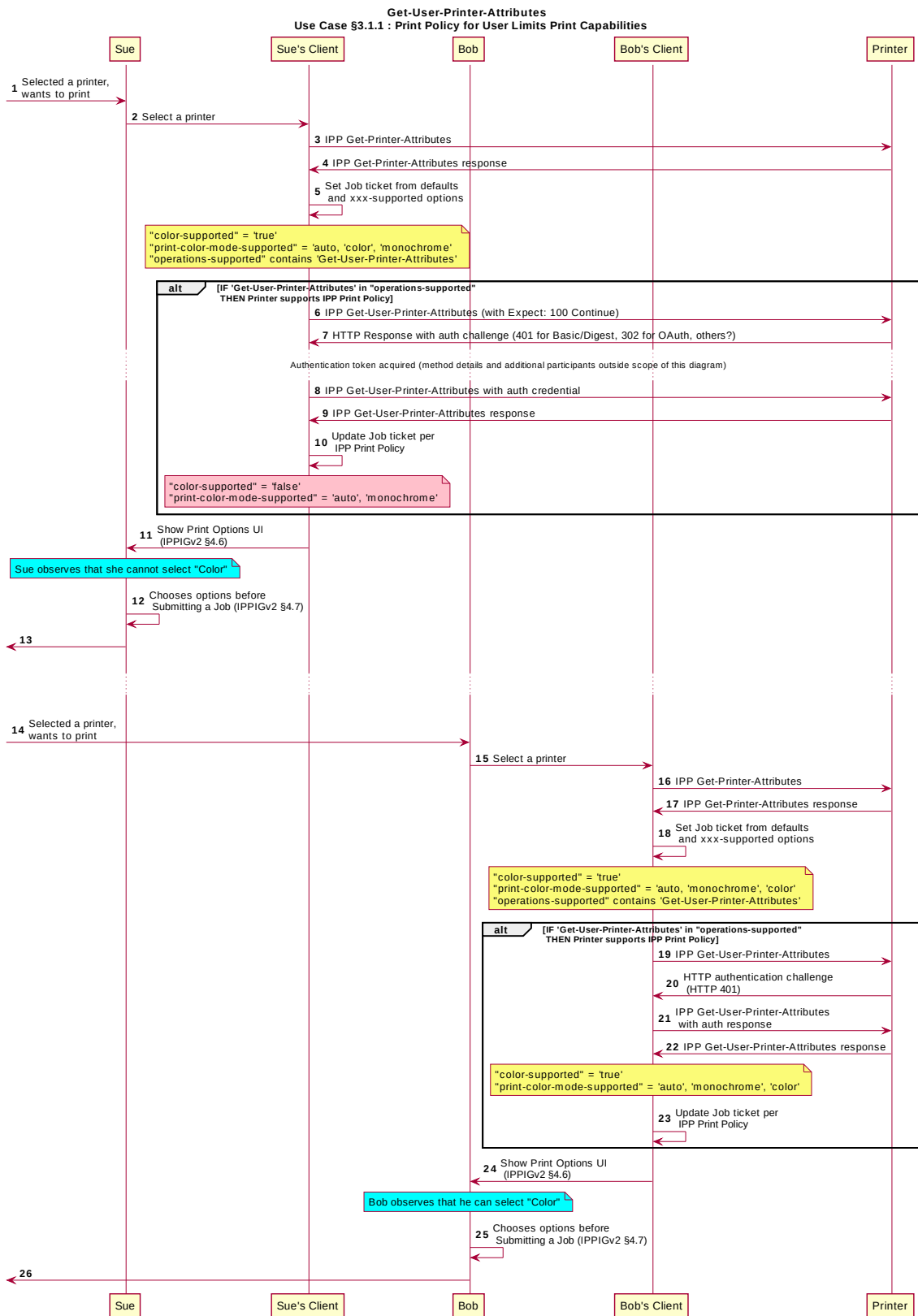


Figure 3.1 : Use Case 3.1.1 Sequence Diagram

135 3.2.2 User Not Listed in Print Policy Denied Ability to Print in Color

136 In this use case, a user who is not named in the print policy system is denied the ability to
137 print using existing conventional IPP print protocol use. The Client might implement
138 support for IPP Print Policy but authentication could fail, or the Client might have not
139 implemented support for IPP Print Policy.

140 Duncan is at the office and needs to print a 5 page report that contains color diagrams
141 before his next meeting. His office user account has been granted permission by his office
142 network administrator to print in color. Duncan opens the document on his tablet, taps to
143 print, and selects the desired Printer. The tablet fetches the Printer's default capabilities,
144 and then authenticates using Duncan's user account to retrieve the print options available
145 to him as per his account's print policy, including the option to print in color or
146 monochrome. He prints the document using the color option, retrieves the hardcopy from
147 the printer, and then goes on to his meeting.

148 Ed is visiting Duncan's office and needs to print a 3 page document. Ed is not listed as a
149 user in the print policy. Ed opens the document on his laptop, clicks to print, and selects
150 the Printer Duncan pointed out to him. The laptop does not support print policies or does
151 but has no valid credentials. The Printer provides Ed's laptop with the default print
152 capabilities. When the Job is submitted to the Printer, the Printer rejects the Job or
153 identifies the setting that were adjusted, since unknown users don't have the right to print
154 in color on this printer.

155 Figure 3.2 illustrates this use case with a sequence diagram.

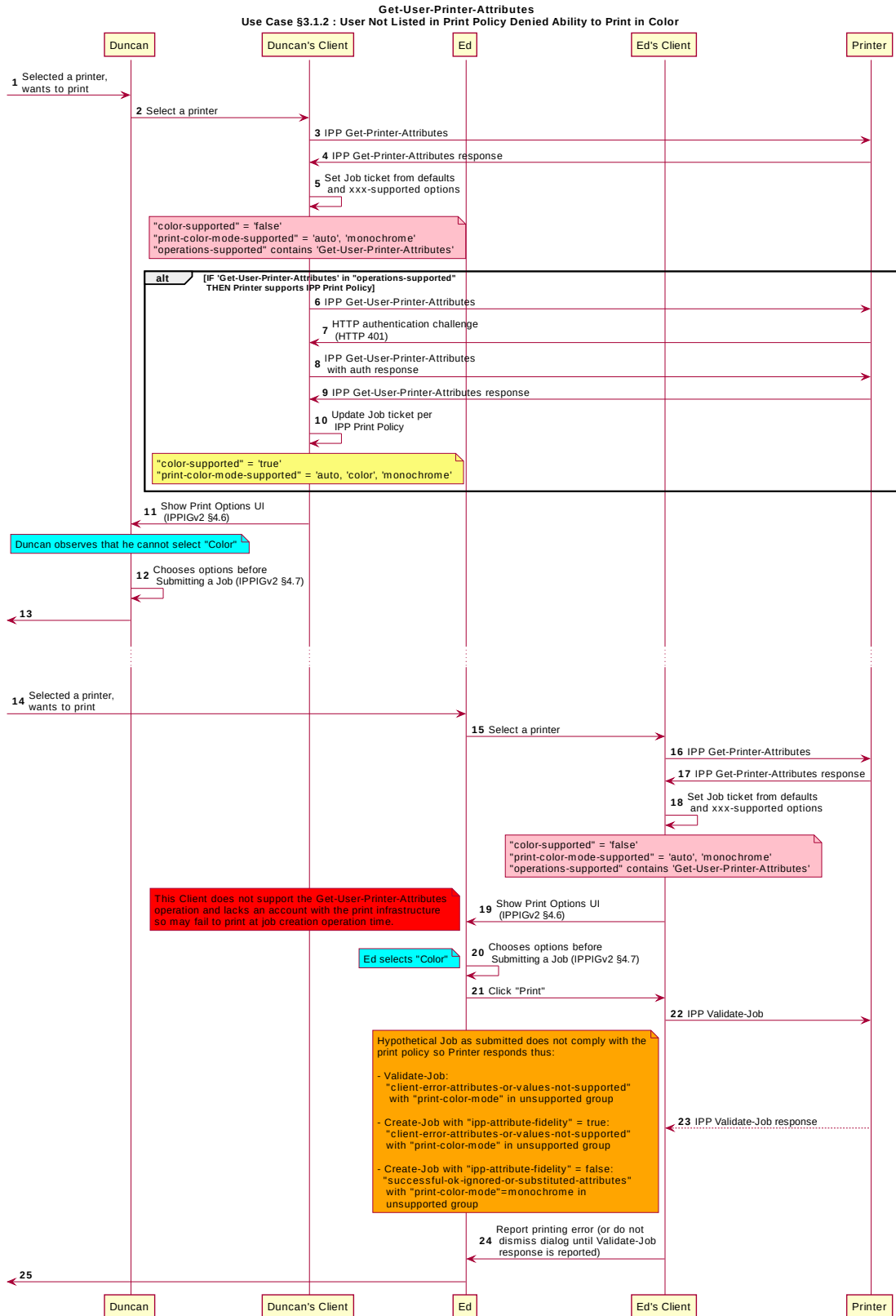


Figure 3.2 : Use Case 3.1.2 Sequence Diagram

156 **3.3 Exceptions**

157 There are no exceptions to the use cases in section 3.2.

158 **3.4 Out of Scope**

159 The following are considered out of scope for this document:

- 160 1. Definition of specific print policies.
- 161 2. Definition of how print policy management systems structure and/or organize the
- 162 sets of users and their policies.
- 163 3. Definition of non-IPP protocols that can provide similar functionality.

164 **3.5 Design Requirements**

165 The design requirements for this registration are:

- 166 1. Define an IPP operation to allow a Client to obtain supported Printer capabilities
- 167 for a given User.
- 168 2. Document interoperability requirements for Clients and Printers.
- 169 3. Define security requirements necessary to support the newly defined operations.
- 170 4. Define sections to register all attributes, values, and operations with IANA.

171 The design recommendations for this document are:

- 172 1. Recommend suitable authentication methods and guidelines for the use of those
- 173 methods and provide guidance for Client user interfaces.

174 **4 Get-User-Printer-Attributes Operation**

175 The Get-User-Printer-Attributes operation is semantically analogous to the Get-Printer-
176 Attributes operation [RFC8011] but the response is filtered based on the most
177 authenticated user. The authenticated user (see section 9.3 of [RFC8011]) performing this
178 operation **MUST** be either a User permitted to create Print Jobs or an Operator or
179 Administrator of the Printer. Otherwise, the Printer **MUST** reject the operation and return
180 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as
181 appropriate.

182 The Client **MUST** be prepared to handle an HTTP authentication challenge in response to
183 a Get-User-Printer-Attributes operation request. If the Client initiates the Get-User-Printer-
184 Attributes operation over a non-TLS connection, the Client **MUST** be prepared to receive
185 an HTTP 426 response to upgrade the connection to TLS [RFC2817]. See [RFC8010] and
186 [RFC8011] for authentication methods that require a secure channel.

187 A Printer **MUST** support all the same operation attributes for a Get-User-Printer-Attributes
188 operation that it supports with a Get-Printer-Attributes operation, including those a Client

189 can use to request a filtered response: “document-format” [RFC8011]; “first-index”
190 [PWG5100.13]; “limit” [PWG5100.13]; and any of the attributes named by “printer-get-
191 attributes-supported” [PWG5100.13].

192 **4.1 Get-User-Printer-Attributes Request**

193 The following groups of attributes are supplied as part of the Get-User-Printer-Attributes
194 request:

195 Group 1: Operation Attributes

196 "attributes-charset" (charset) and
197 "attributes-natural-language" (naturalLanguage) :

198 As described in [RFC8011] Section 4.1.4.1. The Client MUST supply and the
199 Printer MUST support both of these attributes.

200 "printer-uri" (uri) :

201 The Client MUST supply and the Printer MUST support this attribute, which is
202 the target for this operation as described in [RFC8011] Section 4.1.5.

203 "requesting-user-name" (name(MAX)) :

204 The Client MUST supply and the Printer MUST support this attribute, as
205 described in [RFC8011] Section 9.3.

206 "requesting-user-uri" (uri) :

207 The Client SHOULD supply and the Printer MUST support this attribute, as
208 described in [PWG5100.13] section 5.1.6.

209 "requesting-user-vcard" (1setOf text(MAX)) :

210 The Client SHOULD supply and the Printer MUST support this attribute, as
211 described in [PWG5100.SYSTEM] section 7.1.6.

212 "requested-attributes" (1setOf keyword):

213 The "requested-attributes" (1setOf keyword) attribute MAY be supplied by the
214 Client and MUST be supported by the Printer as described in [RFC8011]
215 Section 4.2.5.1.

216 "document-format" (mimeMediaType):

217 The "document-format" (mimeMediaType) attribute SHOULD be supplied by
218 the Client as described in [RFC8011] Section 4.2.5.1.

219 **4.2 Get-User-Printer-Attributes Response**

220 The Printer returns the following sets of attributes as part of the Get-User-Printer-Attributes
221 response:

222 Group 1: Operation Attributes

223 "attributes-charset" (charset) and
224 "attributes-natural-language" (naturalLanguage) :

225 As described in [RFC8011] Section 4.1.4.1. The Client MUST supply and the
226 Printer MUST support both of these attributes.

227 Status Message:

228 In addition to the REQUIRED status-code returned in every response, the
229 response MAY include a "status-message" (text(255)) and/or a "detailed-
230 status-message" (text(MAX)) operation attribute as described in [RFC8011]
231 Appendix B and Section 4.1.6.

232 Group 2: Unsupported Attributes

233 See [RFC8011] Section 4.1.7 for details on returning unsupported attributes.

234 Group 3: Printer Attributes

235 This is the set of requested attributes and their current values. See [RFC8011]
236 Section 4.2.5.2 for details.

237 **5 Conformance Requirements**

238 **5.1 Printer Conformance Requirements**

239 In order for a Printer to claim conformance to this document, a Printer MUST support:

240 1. The Get-User-Printer-Attributes operation as defined in section 4.

241 **5.2 Client Conformance Requirements**

242 In order for a Client to claim conformance to this document, a Client MUST support:

243 1. The Get-User-Printer-Attributes operation as defined in section 4.

244 **6 Internationalization Considerations**

245 For interoperability and basic support for multiple languages, conforming implementations
246 MUST support the Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8)
247 [RFC3629] encoding of Unicode [UNICODE] [ISO10646] and the Unicode Format for
248 Network Interchange [RFC5198].

249 Implementations of this specification SHOULD conform to the following standards on
250 processing of human-readable Unicode text strings, see:

- 251 • Unicode Bidirectional Algorithm [UAX9] – left-to-right, right-to-left, and vertical
- 252 • Unicode Line Breaking Algorithm [UAX14] – character classes and wrapping
- 253 • Unicode Normalization Forms [UAX15] – especially NFC for [RFC5198]
- 254 • Unicode Text Segmentation [UAX29] – grapheme clusters, words, sentences
- 255 • Unicode Identifier and Pattern Syntax [UAX31] – identifier use and normalization
- 256 • Unicode Collation Algorithm [UTS10] – sorting
- 257 • Unicode Locale Data Markup Language [UTS35] – locale databases

258 Implementations of this specification are advised to also review the following informational
259 documents on processing of human-readable Unicode text strings:

- 260 • Unicode Character Encoding Model [UTR17] – multi-layer character model
- 261 • Unicode in XML and other Markup Languages [UTR20] – XML usage
- 262 • Unicode Character Property Model [UTR23] – character properties
- 263 • Unicode Conformance Model [UTR33] – Unicode conformance basis

264 **7 Security Considerations**

265 The security considerations for the Get-User-Printer-Attributes operation build upon those
266 defined for IPP/1.1 [RFC8011] and IPP/2.0 [PWG5100.12] for the Validate-Job, Create-Job
267 and Print-Job operations. Additionally, a Printer MUST NOT send a Get-User-Printer-
268 Attributes response over a non-TLS connection for authentication methods that require a
269 secure channel, as defined in [RFC8010] and [RFC8011].

270 **7.1 Human-readable Strings**

271 Implementations of this specification SHOULD conform to the following standard on
272 processing of human-readable Unicode text strings, see:

273 • Unicode Security Mechanisms [UTS39] – detecting and avoiding security attacks

274 Implementations of this specification are advised to also review the following informational
275 document on processing of human-readable Unicode text strings:

276 • Unicode Security FAQ [UNISECFAQ] – common Unicode security issues

277 **8 References**

278 **8.1 Normative References**

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356 standard:

357 Mike Sweet – Apple Inc.
358 Ira McDonald – High North Inc.

359 **10 Change History**

360 **10.1 November 8, 2017**

- 361 • Added missing sub-sections “Conformance Terminology” and “Printing Terminology”
362 to section 2
- 363 • Resolved normative language issue in section 4 concerning filtering according to
364 the most authenticated user to make it declarative

365 **10.2 November 3, 2017**

366 Updated with changes reported during last call.

- 367 • Broken link to section 4 in section 3.1
- 368 • Changed wording to eliminate instances of passive voice

369 **10.3 October 16, 2017**

370 Updated as per feedback from IPP WG review in conference call on 2017-10-12 in
371 preparation for editorial review and last call.

- 372 • Renamed and adopted new acronym
- 373 • Refactored section 4 editorially
- 374 • Added mention of “first-index” and “limit” filtering attributes
- 375 • Added “Conformance Requirements” section
- 376 • Removed “Table Index” since there are no tables

377 **10.4 October 10, 2017**

378 Updated as per feedback from IPP WG reflector posting from Apple, including editorial
379 changes to comply with the new IPP Registration template.

380 **10.5 August 17, 2017**

381 Updated as per feedback from August 2017 IPP WG vF2F meeting minutes:

- 382 • Removed section 4

- 383 • Rewrote portions of now section 4 “Get-User-Printer-Attributes” definition and
384 restructured presentation of list of attributes in request and response sub-sections
385 for Get-User-Printer-Attributes definition
- 386 • Relabeled document to be “IPP Registration” instead of “White Paper”

387 **10.6 August 1, 2017**

388 Updated as per feedback from July 20, 2017 IPP WG meeting minutes and feedback:

- 389 • Added sub-sections for the Get-User-Printer-Attributes request and response,
390 leveraging text from RFC 8011 and 5100.SYSTEM
- 391 • Updated Internationalization section to use Unicode 10 and added a bunch of
392 references.
- 393 • Updated references to add System, and full standard of IPP/2.0 (5100.12)
- 394 • Other editorial fixes

395 **10.7 May 24, 2017**

396 Updated as per feedback from May 2017 F2F review.

- 397 • Removed previous use cases 3.1.2-3.1.5; renamed 3.1.6 to be new 3.1.2, with
398 updated sequence diagram that includes Validate-Job / Create-Job response.
- 399 • Removed section 6 – no new IPP attributes need to be defined as of this draft.

400 **10.8 April 18, 2017**

- 401 • Updated and clarified the description in section 4 “Technical Solutions/Approaches”
402 to explain with more detail why it is not practical to use the venerable Get-Printer-
403 Attributes operation for the task of conveying print policies.

404 **10.9 April 4, 2017**

- 405 • Updated with new and elaborated use cases and accompanying sequence
406 diagrams to better articulate the breadth of the problem space.

407 **10.10 February 1, 2017**

- 408 • Editorial changes.

409 **10.11** **January 30, 2017**

410 • Initial draft.