



The Printer Working Group

January 1, 2016
White Paper

IPP Job Password Repertoire

Status: Draft

Abstract: This whitepaper defines new IPP attributes to allow a Printer supporting the "job-password" attribute to more specifically articulate the repertoire of allowable values it will accept.

This document is a White Paper. For a definition of a "White Paper", see: <http://ftp.pwg.org/pub/pwg/general/pwg-process30.pdf>

This document is available electronically at:

<http://ftp.pwg.org/pub/pwg/ipp/whitepaper/wp-job-password-repertoire-20160101.pdf>

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48 systems providers, network connectivity vendors, and print management application
49 developers. The group is chartered to make printers and the applications and operating
50 systems supporting them work together better. All references to the PWG in this
51 document implicitly mean “The Printer Working Group, a Program of the IEEE ISTO.” In
52 order to meet this objective, the PWG will document the results of their work as open
53 standards that define print related protocols, interfaces, procedures and conventions.
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55 interoperability provided by voluntary conformance to these standards.

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57 technically competent, has multiple, independent and interoperable implementations with
58 substantial operational experience, and enjoys significant public support.

59 For additional information regarding the Printer Working Group visit:

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68 About the Internet Printing Protocol Work Group

69 The Internet Printing Protocol (IPP) working group has developed a modern, full-featured
70 network printing protocol, which is now the industry standard. IPP allows a print client to
71 query a printer for its supported capabilities, features, and parameters to allow the
72 selection of an appropriate printer for each print job. IPP also provides Job information
73 prior to, during, and at the end of Job processing.

74 For additional information regarding IPP visit:

75 <http://www.pwg.org/ipp/>

76 Implementers of this specification are encouraged to join the IPP mailing list in order to
77 participate in any discussions of the specification. Suggested additions, changes, or
78 clarification to this specification, should be sent to the IPP mailing list for consideration.
79

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117 the automatic one).

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123 **1. Introduction**

124 The "Internet Printing Protocol (IPP): Job and Printer Extensions – Set 2 (JPS2)"
125 [PWG5100.11] already defines a collection of attributes to enable "Secure Print", by
126 defining the "job-password" and "job-password-encryption" Job Template attributes.
127 However, some Output Devices do not have a sophisticated control panel, but can still
128 accept passwords if the password provided by the User is limited to comply with a
129 particular pattern. The existing "job-password-supported" attribute contains a maximum
130 acceptable length for the "job-password" attribute. The "job-password-allowable-pattern"
131 attribute defined below provides a mechanism for a Printer to convey minimum and
132 maximum password length, as well as limitations on acceptable character ranges on a per-
133 character basis.

134 **2. Terminology**

135 **2.1 Conformance Terminology**

136 Capitalized terms, such as MUST, MUST NOT, RECOMMENDED, REQUIRED, SHOULD,
137 SHOULD NOT, MAY, and OPTIONAL, have special meaning relating to conformance as
138 defined in Key words for use in RFCs to Indicate Requirement Levels [RFC2119]. The
139 term CONDITIONALLY REQUIRED is additionally defined for a conformance requirement
140 that applies to a particular capability or feature.

141 **2.2 Terms Used in This Document**

142 *Secure Print*: An IPP feature described in [PWG5100.11] to restrain Job processing until a
143 Job password has been provided to the Printer.

144 *Encrypted Document*: A Document submitted as part of a job that Job or Print Document
145 confidentiality while the Document is in the process of being rendered.

146 **2.3 Protocol Role Terminology**

147 This document defines the following protocol roles in order to specify unambiguous
148 conformance requirements:

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

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

154 **2.4 Printing Terminology**

155 Normative definitions and semantics of printing terms are imported from the Printer MIB v2
156 [RFC3805], Printer Finishings MIB [RFC3806], Internet Printing Protocol/1.1: Model and
157 Semantics [RFC2911], and IPP: Job Progress Attributes [RFC3381].

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

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

163 **2.5 Acronyms and Organizations**

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

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

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

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

168

169 **3. Rationale for IPP Job Password Repertoire**

170 Existing specifications define the following:

- 171 1. Internet Printing Protocol (IPP): Job and Printer Extensions – Set 2 (JPS2)
172 [PWG5100.11] defines the "job-password" attribute for a Client to associate a
173 password with the job. The Printer holds the Job in 'pending-held' state until a user
174 provides that password. The "job-password-supported" attribute conveys the
175 maximum length of the password.
- 176 2. Internet Printing Protocol (IPP): Job and Printer Extensions – Set 2 (JPS2)
177 [PWG5100.11] defines the "job-password-encryption" attribute to specify the
178 hashing algorithm used to obfuscate the value sent in the corresponding "job-
179 password" attribute. The "job-password-encryption-supported" Printer Description
180 attribute conveys the hashing algorithms supported by the Printer.

181 To enhance the fidelity of the user experience when accepting job passwords, this white
182 paper:

- 183 1. Proposes the definition of additional Printer Description attributes to convey
184 restrictions on the length and range of acceptable characters supported by the "job-
185 password" Job Template attribute, so that these additional constraints may be
186 conveyed without breaking backward compatibility.
- 187 2. Recommends deprecation of some of the hashing algorithms, clarifies the
188 definitions of existing ambiguous keywords, and propose the definition of new
189 values.

190 **3.1 Use Cases**

191 The following use cases are germane to the new IPP attributes and their semantics.

192 **3.1.1 Secure Print with Limited Control Panel**

193 Duncan has an end-of-year evaluation document that he needs to print but is worried that
194 someone else might see. He wants the Printer to hold the Job until he gets to the Printer to
195 release it. Duncan chooses a Printer supporting Secure Print, which has a limited set of
196 control panel buttons (Up, Down, OK, Back) and a user can only enter numerical
197 passwords between 4-8 digits long. The Printer provides these restrictions to the Client;
198 the Client provides the user with feedback on the limitations, and only accepts a password
199 that complies with these restrictions.

200 **3.2 Exceptions**

201 No exceptions identified as of this writing.

202 **3.3 Out of Scope**

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

- 204 1. Authentication infrastructure that may be used by the Printer, such as LDAP or
205 RADIUS
- 206 2. The method of inputting a job password or user credential into the Printer

207 **3.4 Design Requirements**

208 The design requirements for this document are:

- 209 1. Define attributes for constraining the acceptable value formats for "job-
210 password" that are backward compatible with [PWG5100.11].
- 211 2. Register all attributes and operations with IANA and the PWG

212 The design recommendations for this document are:

- 213 1. Outlining best-practice user experience

214 **4. Printer Description Attributes**

215 **4.1 job-password-length-supported (rangeOfInteger(0:255))**

216 The 4.1 "job-password-length-supported" Printer Description attribute is a range that
217 specifies the minimum and maximum supported length of the unencrypted password,
218 measured in characters rather than octets. The character set encoding is specified by the
219 "job-password-repertoire-configured" attribute (Section 4.3). The Printer is configured to
220 accept an empty password if the range's minimum value is 0 (zero).

221 This attribute complements the existing "job-password-supported" attribute [PWG5100.11],
222 which specifies the maximum password length supported before encryption, measured in
223 octets.

224 **4.2 job-password-repertoire-supported (1setOf (type2 keyword))**

225 The "job-password-repertoire-supported" attribute enumerates the job password
226 repertoires (allowable characters, character sets and encodings) the Printer can be
227 configured to use.

228 The keywords are named according to a 'REGISTRY_ENCODING_RANGE' naming
229 structure convention. Table 1 lists the standard keywords. Vendor repertoire keywords,
230 prefixed with "vendor_" to indicate a vendor-specific registry, may also be used. Vendor
231 repertoire keywords SHOULD be registered with the PWG to achieve interoperability. As
232 an example, a vendor may choose to register the 'vendor_us-ascii_lowercase' keyword to

233 specify a repertoire limited to using only lowercase characters from the US ASCII
234 encoding.

235 The "utf-8" encoding name indicates the use of Network Unicode [RFC5198].

236 **Table 1: job-password-repertoire-supported keyword definitions**

<i>Keyword</i>	<i>Description</i>
<i>'iana_us-ascii_digits'</i>	Value must consist of only ASCII digits (0x30-0x39)
<i>'iana_us-ascii_letters'</i>	Value must consist of only US ASCII letters (0x41-0x5A, 0x61-0x7A)
<i>'iana_us-ascii_complex'</i>	Value must consist of US ASCII letters and numbers, with at least one uppercase letter, one lowercase letter, and one digit (0x30-0x39, 0x41-0x5A, 0x61-0x7A)
<i>'iana_us-ascii_any'</i>	Value must consist of US ASCII printable characters (0x20-0x7e)
<i>'iana_utf-8_digits'</i>	Value must consist of only UTF-8 numerical digits
<i>'iana_utf-8_letters'</i>	Value must consist of UTF-8 letters
<i>'iana_utf-8_any'</i>	Value must consist of UTF-8 printable characters

237 **4.3 job-password-repertoire-configured (type2 keyword)**

238 The "job-password-repertoire-configured" attribute indicates the password repertoire
239 currently configured for this Printer. The value of this attribute **MUST** be one of the set of
240 values listed in the "job-password-repertoire-supported" attribute defined in §4.2. A
241 supporting Client can use this attribute's value to limit User input so that the value in "job-
242 password" will comply with the configured password repertoire.

243 **5. Updates to Existing Attributes**

244 **5.1 job-password-encryption-supported**

245 "Internet Printing Protocol (IPP): Job and Printer Extensions – Set 2 (JPS2)"
246 [PWG5100.11] defines the "job-password-encryption-supported" attribute, and includes in
247 that definition a number of keywords. The 'sha' keyword indicated SHA-1.

248 This document proposes that the following values defined for "job-password-encryption-
249 supported" be deprecated: 'md2', 'md4', 'md5', 'sha'.

250 **6. Internationalization Considerations**

251 For interoperability and basic support for multiple languages, implementations use the
252 Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8) [RFC3629]
253 encoding of Unicode [UNICODE] [ISO10646] and the Unicode Format for Network
254 Interchange [RFC5198].

255 **7. Security Considerations**

256 The hash algorithms proposed to be deprecated in section 5.1 SHOULD NOT be used in
257 new Printers.

258 The IPP extensions defined in this document require the same security considerations as
259 defined in the IPP/1.1: Model and Semantics [RFC2911]. In addition, Infrastructure Printers
260 MUST:

- 261 1. Validate the HTTP Host request header in order to protect against DNS rebinding
262 attacks,
- 263 2. Provide confidentiality of data in transit using TLS encryption [RFC5246] of Client
264 and Proxy connections,
- 265 3. Authenticate Clients and Proxies using X.509 certificate validation, HTTP
266 authentication methods, and/or other mechanisms, and
- 267 4. Provide confidentiality of Document and Job data at rest.

268 Clients and Proxies MUST authenticate their connections to Infrastructure Printers, such
269 as by validating the Infrastructure Printer's X.509 certificate or using other in-band mutual
270 authentication protocols.

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 Informative References

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316 William Wagner - TIC
317 Daniel Manchala - Xerox
318 Zaphod Beeblebrox - President of the Galaxy

319 **10. Change History**

320 **10.1 January 1, 2016**

321 Updated as per IPP WG conference call discussion on 2015-12-07:

- 322 • Accepted the change to replace "job-password-minimum-length" with "job-
323 password-length-supported"
- 324 • Removed "iana_utf-8_complex" from Table 1
- 325 • Added security considerations boilerplate and accompanying references by
326 borrowing from 5100.18 (INFRA).

327 **10.2 November 28, 2015**

328 Updated as per IPP WG conference call discussion on 2015-10-19:

- 329 • Changed list of hash algorithms to list the ones deprecated. New ones will just be
330 registered as per the standard IANA process, and won't be mentioned here.
- 331 • Some confusion over the way to evolve the "job-password-minimum-length"
332 attribute, caused by a mistaken understanding of the "job-password-supported"
333 attribute defined in JPS2
- 334 • Fixed keyword structure for "job-password-repertoire-supported" to align on
335 convention, and also mentioned Network Unicode

336 **10.3 October 12, 2015**

337 Updated as per IPP WG conference call discussion on 2015-09-21:

- 338 • Changed title
- 339 • Changed the keyword names for job-password-repertoire to comply with PWG
340 5101.2
- 341 • Added the "job-password-repertoire-configured" attribute
- 342 • Updated the references
- 343 • Refactored Table 2

344 **10.4 September 9, 2015**

345 Updated after a hiatus using notes from the April 2015 PWG F2F and other inputs.
346 Renamed the attributes several times, added keyword definitions for many UTF-8 format
347 types, and added a new section for extending the definition of the "job-password-
348 encryption" keyword range, and to clarify the definitions and deprecate many of the old
349 values.

350 **10.5 April 14, 2015**

351 Updated as per IPP WG discussion, in preparation for 2015 April F2F (Sunnyvale)
352 discussion in IPP WG and IDS WG.

353 **10.6 February 4, 2015**

354 Initial revision, presented at Feb. 2015 F2F