



June 19, 2018
IPP Registration

The Printer Working Group

1 **IPP Job Reprint Password**
2 **(REPRINTPWD)**

3 | *Status: StableInterim*

4 Abstract: This registration defines a new “job-reprint-password” operation attribute and
5 associated semantics to provide IPP with a mechanism to support password protection for
6 reprinting saved jobs.

7 This document is an IPP Registration. For a definition of an “IPP Registration Document”,
8 see:

9 <https://ftp.pwg.org/pub/pwg/general/process/ipp-registry-policy.txt>

10 This document is available electronically at:

11 | <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippreprintpwd-2018061920180424.odt>

12 | <https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippreprintpwd-2018061920180424.pdf>

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64 define print related protocols, interfaces, procedures and conventions. Printer
65 manufacturers and vendors of printer related software will benefit from the interoperability
66 provided by voluntary conformance to these standards.

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

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120 1. Introduction

121 Users and network administrators are increasingly concerned about network and data
122 security, and this extends to printing. Most all Users are familiar with sending a Job to a
123 Printer and the Printer processing that Job fairly immediately. ~~Some Printers support~~
124 ~~controlling the processing, and some do so~~ using a “job password” that prevents the Job
125 from being processed until the User provides that password on the Printer’s control panel
126 to approve its release to processing. The IPP “job-password” operation attribute
127 [PWG5100.11] and related attributes ~~support this workflow in IPP~~ ~~provide support for this~~
128 ~~workflow. Some Printers also support saving jobs for later printing or re-printing. In certain~~
129 ~~cases there may be Users that wish to take advantage of both capabilities. Unfortunately~~
130 ~~however, since “job-password” is an operation attribute, and that Job’s processing is the~~
131 ~~act of saving the Job, the “job-password” attribute does not persist beyond its being saved.~~
132 ~~Therefore, in order for IPP to support scenarios involving a password protected saved job,~~
133 ~~IPP must be extended with new attributes that convey a Job password that persists~~
134 ~~beyond Job processing completion.~~

135 ~~Some Printers also support saving Jobs for later printing or re-printing. This facility might~~
136 ~~be provided as a user-selectable feature at job creation time, for instance using IPP Job~~
137 ~~Save [PWG5100.11]. Or the Printer might be configured to save all Jobs for some period of~~
138 ~~time so they are available for reprinting, without requiring the User to overtly choose this at~~
139 ~~job creation time.~~

140 ~~But as defined currently, the IPP defined to support these two features cannot be used~~
141 ~~together to support the “saved job with password” scenario without changing the defined~~
142 ~~semantics of the existing IPP attributes. The Printer could provide unique processing~~
143 ~~methodologies to cause the job password to persist, but doing so would violate backward~~
144 ~~compatibility with the expected semantic defined for the “job-password” operation attribute.~~
145 ~~This could lead to a discrepancy between the User’s expectations and what the Printer~~
146 ~~produces.~~

147 ~~This registration defines a new “job-reprint-password” operation attribute to support the~~
148 ~~“saved job with password” scenario.~~

149 2. Terminology

150 2.1. Protocol Roles Terminology

151 This document defines the following protocol roles in order to specify unambiguous
152 conformance requirements:

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

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

158 **2.2. Other Terms Used in This Document**

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

160 *Saved Job*: A Saved Job is a Retained Job that the Printer retains indefinitely (until
161 removed by a Delete-Job or Purge-Jobs operation) so that a copy of it can be reprinted
162 any time using the Reprocess-Job or Resubmit-Job operations, rather than aging the job
163 out after an implementation-defined period. [PWG5100.11]

164 **2.3. Acronyms and Organizations**

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

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

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

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

169 **3. RationaleRequirements for IPP Job Reprint Password**

170 In the definition of IPP Job Save [PWG5100.11], a reprint means that a Job has been
171 processed and reached the completed state, and the Job has been saved (implicitly or
172 explicitly). To simply save a Job, the Printer “processes” the Job by saving it.

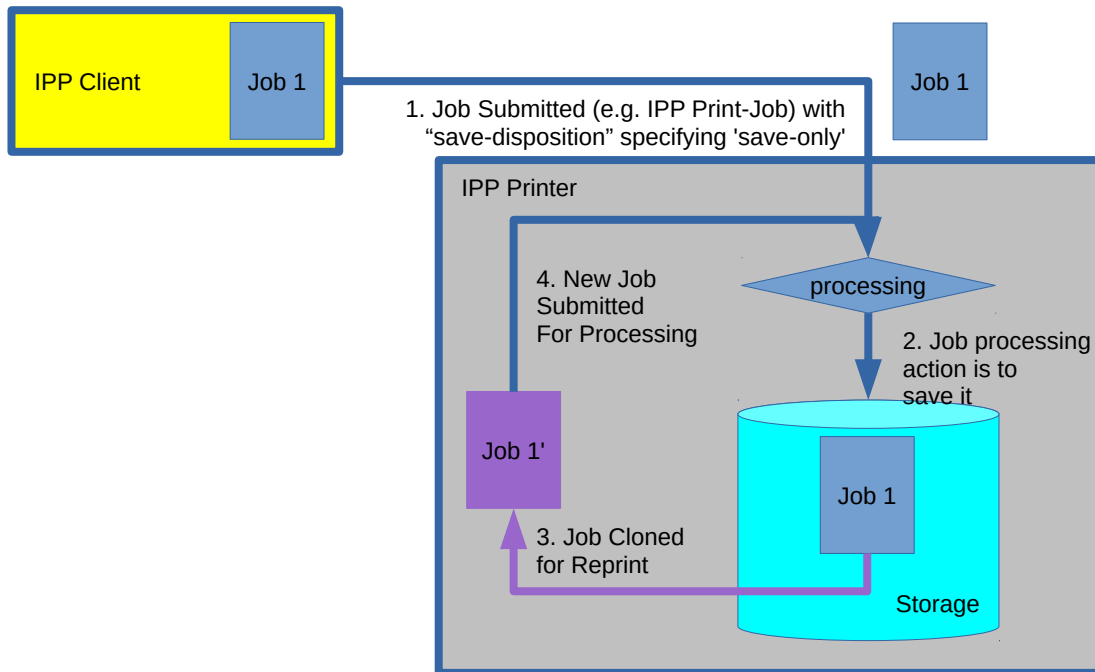


Figure 1: IPP Job Save and Reprint

173 The “job-password” operation attribute was defined to prevent the Printer from processing
 174 the submitted Job until the matching password was provided to the Printer. Since it is an
 175 operation attribute, the “job-password” attribute is not supposed to persist beyond the
 176 execution of that operation.

177 If “job-password” is used with IPP Job Save, preventing Job processing will prevent the
 178 Job Save process from completing because the Job's processing when Job Save is
 179 enabled is to save the Job.

180 Since the individual semantics of these IPP attributes cannot be used in combination with
 181 one another to provide support for the “saved job with password” scenarios described in
 182 section 3.1, this registration document defines new IPP attributes to enable IPP to provide
 183 that support.

184 3.1. Use Cases

185 3.1.1. Protecting a Saved Document with a Persistent Password

186 Wilma has authored a departmental policy document that she intends to save on her
 187 departmental MFD, to allow some of her peers to print copies as needed. But as the
 188 document contains sensitive information, Wilma wishes to only allow those who know the
 189 job's password to re-print copies. She is familiar with providing a password when
 190 configuring a print job, and she is also familiar with configuring the job to be saved in the
 191 printer. In the print dialog used to configure the print job on her computer, Wilma provides a
 192 password, and also chooses to have the job saved. Wilma clicks “Print” and the computer
 193 submits the job to the printer. The printer saves the job content and protects it with the
 194 password provided.

195 3.1.2. Re-printing a Saved Job Via Printer Control Panel

196 Barney hears from Wilma that she has saved that document to the departmental MFD.
197 Wilma tells Barney the job's name, and Barney then goes to the MFD and looks up the job.
198 He taps on the control panel to have a copy printed, and is prompted to enter the job's
199 password. He enters that on the control panel, and the MFD prints a copy. Barney collects
200 it from the output bin and returns to his desk.

201 ~~3.1.3. Re-printing a Saved Job Using An IPP Client~~

202 ~~4. Barney sends an IM to Betty that Wilma has saved a job on the departmental MFD.~~
203 ~~Betty opens her computer's print system and browses the saved jobs on the MFD. She~~
204 ~~selects the job and clicks "Print" to have a copy made for her. A dialog is presented~~
205 ~~asking for the job's password. Betty types in the job's password, and the MFD prints a~~
206 ~~copy. She collects it from the MFD and returns to her office.~~

207 4.1.1. Exceptions

208 4.1.2. Unauthorized Re-printing Disallowed From Printer Control Panel

209 Harvey, an employee from another department, walks up to Wilma's departmental MFD.
210 He navigates the MFD's control panel user interface and sees Wilma's departmental policy
211 document listed on the control panel. He tries to get the MFD to produce a re-print. The
212 MFD challenges Harvey for the reprint password; Harvey doesn't know it. The MFD won't
213 re-print the document without receiving the reprint password, so Harvey walks away empty
214 handed.

215 4.2. Out of Scope

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

- 217 1. How the Document or Documents in a Job are stored by the Printer
- 218 2. Methods for encrypting the document itself.
- 219 3. Mechanisms for supporting per-user credentials / access control list for releasing
220 the stored job.
- 221 4. [Remote access for reprint.](#)

222 4.3. Design Requirements

223 The design requirements for this document are:

- 224 1. Use existing attributes or collections if possible.
- 225 2. Support at the least the fidelity supported currently by "job password" and "job-
226 password-encryption"

227 3. Register all attributes and operations with IANA

228 The design recommendations for this document are:

- 229 1. Reusing UI controls with similar enough purposes so that the user doesn't need to
230 be confused by e.g. needing to interact with different controls for different kinds of
231 passwords.

232 5. New Operation Attributes For Existing Operations

233 5.1. job-reprint-password (octetString(255) | no-value)

234 The REQUIRED "job-reprint-password" ~~operation~~**Operation** attribute specifies the
235 password the Printer requires before permitting the saved Job to be reprinted. The Printer
236 permanently attaches the password to a saved Job [PWG5100.11]. The Printer MUST
237 associate this operation attribute with the Job when the Job Creation operation includes
238 this attribute in the operation request, for as long as the Job is retained and available for
239 reprinting. A Printer that supports and accepts the "job-reprint-password" attribute MUST
240 save any Job that is created using a Job Creation operation that includes the "job-reprint-
241 password" operation attribute. This operation attribute is used as a request attribute for the
242 Job Creation operations listed in section 6.1, and as a response attribute for the Fetch-Job
243 operation [PWG5100.18]A Client MAY provide a zero-length value or the 'no-value' out-of-
244 band value to specify that no authentication is required to reprint the Job. The Printer
245 MUST NOT allow access to the Job's stored "job-reprint-password" attribute via IPP Get-
246 Jobs or Get-Job-Attributes operations, but SHOULD provide access via Fetch-Job
247 [PWG5100.18]. More detailed information about IPP operations that can include this
248 operation attribute in either a request or response are listed in Section 6.1 of this
249 document~~challenge the User for this password to authorize reprinting that Saved Job if the~~
250 ~~value is a non-zero-length octetString.~~

251 ~~The Printer MUST associate this operation attribute with the Job, and it MUST persist for~~
252 ~~as long as the Job is retained and available for reprinting. The Printer MUST NOT allow~~
253 ~~access to the Job's stored "job-reprint-password" attribute via IPP or any other protocol.~~
254 ~~IPP operations that can and cannot include this operation attribute are listed in Section 6.1~~
255 ~~of this document. This attribute MUST NOT be included in any IPP operation responses.~~

256 A Client MUST NOT include the "job-reprint-password" ~~operation~~**Operation** attribute in an
257 ~~operation~~**Operation** sent over an insecure IPP connection. This ~~operation~~**Operation**
258 attribute MUST be present in the ~~operation~~**Operation** request if the "job-reprint-password-
259 encryption" operation attribute is present in the operation request.

260 5.2. job-reprint-password-encryption (type2 keyword | name(MAX))

261 The “job-reprint-password-encryption” ~~operation~~**Operation** attribute specifies the hashing
262 algorithm used to obfuscate the password to produce the value specified by the “job-
263 reprint-password” operation attribute. This attribute is semantically ~~equivalent~~**similar** to the
264 “job-password-encryption” operation attribute [PWG5100.11]. This ~~operation attribute is~~
265 ~~used as a request attribute for the Job Creation operations listed in section 6.1, and as a~~
266 ~~response attribute for the Fetch-Job operation [PWG5100.18]. The Printer attribute MUST~~
267 ~~NOT allow access to the Job's stored “job-reprint-password” attribute via IPP Get-Jobs or~~
268 ~~Get-Job-Attributes operations, but SHOULD provide access via Fetch-Job [PWG5100.18].~~
269 ~~More detailed information about IPP operations that can include this operation attribute in~~
270 ~~either a request or response are listed in Section 6.1 of this document. be included in any~~
271 ~~IPP operation responses.~~

272 ~~The value of this attribute must be one of the values listed in the Printer's “job-reprint-~~
273 ~~password-encryption-supported” Printer Description attribute.~~ If the Client specifies a zero-
274 length value or 'no-value' for “job-reprint-password” then the value of this attribute MUST
275 be 'none'.

276 ~~This Operation attribute MUST be present in the Operation request if the “job-reprint-~~
277 ~~password” operation attribute is present. The value of this attribute must be one of the~~
278 ~~values listed in the Printer's “job-reprint-password-encryption-supported” Printer~~
279 ~~Description attribute.~~

280 Printer Description Attributes

281 5.3. job-reprint-password-supported (rangeOfInteger(0:255))

282 The “job-reprint-password-supported” attribute specifies the minimum and maximum
283 length the Printer supports for the cleartext unencrypted password. A conforming Printer
284 MUST be able to accept 255 octets without truncation. However, a Printer MAY be
285 implemented as a gateway to another print system that cannot accept the full 255-octet
286 range, in which case the client MUST NOT allow an unencrypted password greater than
287 the length specified by this attribute.

288 If the “job-reprint-password” ~~operation~~**Operation** attribute is supported, then this attribute
289 MUST be supported.

290 5.4. job-reprint-password-encryption-supported (1setOf ~~type2~~**type3** 291 keyword | name(MAX))

292 The “job-reprint-password-encryption-supported” Printer Description attribute specifies the
293 encryption methods the Printer supports for obfuscating the value of the “job-reprint-
294 password” ~~operation~~**Operation** attribute. The set of allowable keywords for this attribute are
295 the same as those registered for the “job-password-encryption” attribute [PWG5100.11].
296 Deprecated keywords SHOULD NOT be listed.

297 If the Printer supports the "job-reprint-password" and "job-reprint-password-encryption"
298 ~~operation~~~~Operation~~ attributes, then this attribute MUST be supported.

299 **5.5. job-reprint-password-repertoire-configured (type2** 300 **keywordsupported (1setOf (type2 keyword))**

301 ~~The "job-reprint-password-repertoire-configured" attribute indicates the password~~
302 ~~repertoire currently configured for this Printer. The value of this attribute MUST be one of~~
303 ~~the set of values listed in the "job-reprint-password-repertoire-supported" attribute defined~~
304 ~~in 5.6. A supporting Client can use this attribute's value to limit User input so that the value~~
305 ~~in "job-reprint-password" will comply with the configured password repertoire.~~

306 **5.6. job-reprint-password-repertoire-supported (1setOf type2 keyword)**

307 The "job-reprint-password-repertoire-supported" Printer Description attribute specifies the
308 password ~~repertoires (sets~~~~repertoire (set~~ of allowable characters) supported by this Printer
309 for the "job-reprint-password-repertoire-configured" ~~Printer Description attribute.~~ "
310 ~~Operation attribute. A Client SHOULD use this attribute's value to limit the range of~~
311 ~~allowable User input so that the value in "job-reprint-password" will be supported by the~~
312 ~~Printer. If the value of the "job-reprint-password" Operation attribute is encrypted, the~~
313 ~~Printer will be unable to reject the password at time of receipt, and the User may never be~~
314 ~~able to successfully authenticate to reprint the Job.~~

315 **6. Additional Semantics For Existing Operations**

316 **6.1. Print-Job, Print-URI, Create-Job and job-reprint-** 317 **passwordaccesses**

318 The "job-reprint-password" and "job-reprint-password-encryption" ~~operation~~~~Operation~~
319 attributes MAY be included in a ~~Print-Job, Print-URI, or~~and Create-Job operation
320 ~~request~~requests [RFC8011] to specify the persistent access credentials for a Job created
321 by one of these operations. ~~The Although the "job-reprint-password" and "job-reprint-~~
322 ~~password-encryption" attributes get copied to the Job Object, the Printer MUST NOT~~
323 include a Job's "job-reprint-password" and "job-reprint-password-encryption" attributes ~~in~~
324 ~~any~~as Job Description attributes in a Job operation such as ~~Get-Jobs or~~ Get-Job-Attributes
325 [RFC8011].

326 **6.2. Fetch-Job and job-reprint-password**

327 ~~The "job-reprint-password" and "job-reprint-password-encryption" operation attributes MAY~~
328 ~~be included in a Fetch-Job [PWG5100.18] operation response. The "job-reprint-password"~~
329 ~~and "job-reprint-password-encryption" operation attributes MUST NOT be included in a~~
330 ~~Fetch-Job [PWG5100.18] operation request.~~

331 | **7. Internationalization Considerations**

332 For interoperability and basic support for multiple languages, conforming implementations
333 MUST support the Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8)
334 [STD63] encoding of Unicode [UNICODE] [ISO10646] and the Unicode Format for
335 Network Interchange [RFC5198].

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

- 338 • Unicode Bidirectional Algorithm [UAX9] – left-to-right, right-to-left, and vertical
- 339 • Unicode Line Breaking Algorithm [UAX14] – character classes and wrapping
- 340 • Unicode Normalization Forms [UAX15] – especially NFC for [RFC5198]
- 341 • Unicode Text Segmentation [UAX29] – grapheme clusters, words, sentences
- 342 • Unicode Identifier and Pattern Syntax [UAX31] – identifier use and normalization
- 343 • Unicode Collation Algorithm [UTS10] – sorting
- 344 • Unicode Locale Data Markup Language [UTS35] – locale databases

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

- 347 • Unicode Character Encoding Model [UTR17] – multi-layer character model
- 348 • Unicode in XML and other Markup Languages [UTR20] – XML usage
- 349 • Unicode Character Property Model [UTR23] – character properties
- 350 • Unicode Conformance Model [UTR33] – Unicode conformance basis

351 | **8. Security Considerations**

352 The IPP extensions defined in this document require the same security considerations as
353 defined in the IPP/1.1: Model and Semantics [RFC8011], IPP: Job and Printer Extensions
354 – Set 2 (JPS2) [[PWG5100.11](#)], and IPP Job Password Repertoire [[IPPREPETOIRE](#)].

355 In addition to those requirements, the Printer MUST protect the values of “job-reprint-
356 [passwordaccesses](#)” at rest. Also, the Printer MUST reject any IPP operation sent over a
357 non-encrypted connection that includes the “job-reprint-[passwordaccesses](#)” attribute.

358 | **8.1. Human-readable Strings**

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

- 361 • Unicode Security Mechanisms [UTS39] – detecting and avoiding security attacks
 362 Implementations of this specification are advised to also review the following informational
 363 document on processing of human-readable Unicode text strings:
 364 • Unicode Security FAQ [UNISECFAQ] – common Unicode security issues

365 9. IANA Considerations

366 9.1. Attribute Registrations

367 The attributes defined in this document will be published by IANA according to the
 368 procedures in IPP Model and Semantics [RFC8011] section 6.2 in the following file:

369 <http://www.iana.org/assignments/ipp-registrations>

370 The registry entries will contain the following information:

371	Operation attributes:	Reference
372	-----	-----
373	job-reprint-password (octetString(255) no-value)	
374		[REPRINTPWD]
375	job-reprint-password-encryption	
376	(type2 keyword name(MAX))–	[REPRINTPWD]
377	Printer Description attributes:	Reference
378	-----	-----
379	job-reprint-password-supported	
380	(rangeOfInteger(0:255))	[REPRINTPWD]
381	job-reprint-password-encryption-supported	
382	(1setOf type2 (type3 keyword name(MAX)) __ →	
383	[REPRINTPWD]	
384	<u>job-reprint-password-repertoire-configured</u>	
385	<u>(1setOf type2 keyword)</u>	[REPRINTPWD]
386	job-reprint-password-repertoire-supported	
387	(1setOf type2 keyword) __ →	[REPRINTPWD]

388 10. References

389 10.1. Normative References

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 391 [https://ftp.pwg.org/pub/pwg/ipp/whitepaper/wp-job-password-](https://ftp.pwg.org/pub/pwg/ipp/whitepaper/wp-job-password-repertoire-20160101.pdf)
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485 12. Change History

486 12.1. June 20, 2018

487 Added a figure to section 3 and also moved the new text from section 4 to section 3
488 because that is where it seems to fit best.

489 12.2. June 19, 2018

490 Updated as per feedback from the PWG May 2018 F2F

- 491 • Rewrote section 1
- 492 • Fixed title of section 3
- 493 • Removed section 3.1.3
- 494 • Added preamble text to section 4
- 495 • Updated Section 4 with a number of changes
- 496 • Added “job-reprint-password-repertoire-configured” to Section 5

- 497 | • [Added Fetch-Job to Section 6](#)
- 498 | • [Added references to 5100.18 and IPPREPERTOIRE](#)

499 | **12.3. April 24, 2018**

500 Re-authored using the new PWG Working Draft template for Apache OpenOffice, moving
501 away from LibreOffice due to interoperability issues. Also, adopted changes recommended
502 in the April 12, 2018 IPP WG meeting:

- 503 | • Returned to the “job-password” / “job-password-encryption” attribute set design
504 | pattern from the “xxx-accesses” attribute set design pattern.

505 | **12.4. April 4, 2018**

506 Updated as per feedback from IPP WG meeting on March 29, 2018

- 507 | • Converted document to an IPP Registration document and made document
508 | changes and file name changes to comply with that policy.
- 509 | • Renamed “job-save-accesses” to “job-reprint-accesses”
- 510 | • Removed “access-x509-certificate” but can add it back in later if its use becomes
511 | more clearly defined

512 | **1.1 March 13, 2018**

513 Updated as per feedback from IPP WG reflector:

- 514 | • Fixed the abstract to make it less redundantly redundant.
- 515 | • Fixed RFC references for HTTP Basic and Digest authentication
- 516 | • Removed “job-save-accesses-configured” (but I still don't understand why some use
517 | the “xxx” / “xxx-supported” model while others use “xxx” / “xxx-configured” / “xxx-
518 | supported”...)
- 519 | • Added new “Additional Semantics for Existing Operations” section
- 520 | • Updated Security Considerations

521 | **1.2 March 11, 2018**

522 Updated as per feedback from February 2018 PWG F2F review:

- 523 | • Refactored the attributes used to leverage the attributes used in IPP Shared
524 | Infrastructure Extensions and IPP Scan Service. This model is more appropriate
525 | since job-save and its members become Job Description attributes, which are

526 required to be accessible via a Get-Job-Attributes operation. Access to the
527 credentials, even if hashed, would be unacceptable.

- 528 • Propose this be moved to IPP Registration candidate status

529 **1.3 February 5, 2018**

530 Updated as per feedback from Dec. 14, 2017 IPP WG teleconference review:

- 531 • Updated Use Cases, Out of Scope and Design Requirements sections
532 • Refactored to make the solution become member attributes of job-save, with
533 associated Printer Description attributes.

534 **1.4 December 5, 2017**

535 Initial revision.