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IPP Job Save Password
(SAVEPASSWORD)

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Status: Interim

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Abstract: This white paper defines a new "job-save-accesses" operation attribute and associated semantics that provides IPP with a mechanism to associate access credentials that the Printer will require at any printing time, including re-printing that Job if it was saved.

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

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Abstract: This document is a whitepaper that proposes the creation of a new "save-password" Job Template attribute that provides the Job with a persistent password that will need to be provided when initially printing or re-printing that Job.

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

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This document is available electronically at:

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http://ftp.pwg.org/pub/pwg/ipp/whitepaper/tb-savepassword-20180313.odt
http://ftp.pwg.org/pub/pwg/ipp/whitepaper/tb-savepassword-20180205.odt
http://ftp.pwg.org/pub/pwg/ipp/whitepaper/tb-savepassword-20180313.pdf
http://ftp.pwg.org/pub/pwg/ipp/whitepaper/tb-savepassword-20180205.pdf

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21   Title: IPP Job Save Password *(SAVEPASSWORD)*

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The Printer Working Group

Table of Contents

The Printer Working Group

71   **List of Figures**

72   **List of Tables**

The Printer Working Group

1   Introduction

Users and network administrators are increasingly concerned about network and data security, and this extends to printing. Most all Users are familiar with sending a Job to a Printer and the Printer processing that Job fairly immediately, and some do so using a "job password" that prevents the Job from being processed until the User provides that password on the Printer's control panel to approve its release to processing. The IPP "job-password" operation attribute [PWG5100.11] and related attributes provide support for this workflow. Some Printers also support saving jobs for later printing or re-printing. In certain cases there may be Users that wish to take advantage of both capabilities. Unfortunately however, since "job-password" is an operation attribute, and that Job's processing is the act of saving the Job, the "job-password" attribute does not persist beyond its being saved. Therefore, to support scenarios involving a password protected saved job, new attributes need to be defined that convey a Job password that persists beyond Job processing completion.

2   Terminology

2.1   Protocol Roles Terminology

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

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

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

2.2   Other Terms Used in This Document

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

2.3   Acronyms and Organizations

IANA: Internet Assigned Numbers Authority, http://www.iana.org/

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100   *IETF*: Internet Engineering Task Force, http://www.ietf.org/

101   *ISO*: International Organization for Standardization, http://www.iso.org/

102   *PWG*: Printer Working Group, http://www.pwg.org/

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103   3   Requirements for IPP Job Save Password

104   3.1   Use Cases

105   3.1.1   Protecting a Saved Document with a Persistent Password

106 Wilma has written a document that she intends to save on her departmental MFD, to allow
107 some of her peers to print copies as needed. But as the document contains sensitive
108 information, Wilma wishes to only allow those who know the job's password to re-print
109 copies. She is familiar with providing a password when configuring a print job, and she is
110 also familiar with configuring the job to be saved in the printer. In the print dialog used to
111 configure the print job on her computer, Wilma provides a password, and also chooses to
112 have the job saved. Wilma clicks "Print" and the computer submits the job to the printer.
113 The printer saves the job content and protects it with the password provided.

114   3.1.2   Re-printing a Saved Job Via Printer Control Panel

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

120   3.1.3   Re-printing a Saved Job Using An IPP Client

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

126   3.2   Exceptions

127 Harvey, an employee from another department, walks up to Wilma's departmental MFD.
128 The .

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129 ### 3.3 Out of Scope

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

131   1. How the Document or Documents in a Job are stored by the Printer
132   2. Methods for encrypting the document itself.
133   3. Mechanisms for supporting per-user credentials / access control list for
134   releasing the stored job.

135 ### 3.4 Design Requirements

136 The design requirements for this document are:

137   1. Use existing attributes or collections if possible.
138   2. Support at the least the fidelity supported currently by "job password" and "job-
139   password-encryption"
140   3. Register all attributes and operations with IANA

141 The design recommendations for this document are:

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

145 # 4 Operation Attributes

146 ## 4.1 job-save-accesses (collection | no-value)

147 The OPTIONAL "job-save-accesses" operation attribute allows the Client to provide
148 authentication information for a referenced saved Job.

149 The collection value contains zero of more member attributes which provide the
150 authentication information required for the Job to be reprinted. A Client MAY also provide
151 the no- value out-of-band value to specify that no authentication information is necessary.

152 Printers specify which member attributes are supported using the "job-save-accesses-
153 supported" Printer attribute (section XXX).

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4.1.1 access-oauth-token (1setOf octetString(MAX))

The OPTIONAL "access-oauth-token" member attribute provides a Base64-encoded OAuth Access Token as defined in The OAuth 2.0 Authorization Framework [RFC6749]. When the size of the access token exceeds 1023 octets (the maximum size of an octetString value), the Client separates the token into multiple octetString values and sends the result as an ordered set to the Printer. The Printer reassembles each octetString to produce the complete access token value to be used to access the Document URI.

Printers that support this attribute MUST list 'access-oauth-token' in the "job-save-accesses-supported" Printer Description attribute.

4.1.2 access-oauth-uri (uri)

The OPTIONAL "access-oauth-uri" member attribute is the authorization server that issued the "access-oauth-token" member attribute. See Authorization Server [RFC6749] section 1.1.

4.1.3 access-password (text(MAX))

The OPTIONAL "access-password" member attribute provides a password string, typically for HTTP Basic Authentication [RFC7617] or HTTP Digest authentication [RFC7616]. Clients MUST provide the password using the UTF-8 encoding [STD63] in Unicode Normalization Form C as required for Network Unicode [RFC5198]. Printers MUST convert the password, as needed, to whatever encoding is required to access the Document URI.

Printers that support this attribute MUST list 'access-password' in the "job-save-accesses-supported" Printer Description attribute.

4.1.4 access-pin (text(MAX))

The OPTIONAL "access-pin" member attribute provides a Personal Identification Number string. Clients MUST restrict the characters to the US ASCII digits '0' (code 48) through '9' (code 57) and Printers MUST reject values containing characters other than the digits '0' through '9'.

Printers that support this attribute MUST list 'access-pin' in the "job-save-accesses-supported" Printer Description attribute.

The Printer Working Group

4.1.5 access-user-name (text(MAX))

The OPTIONAL "access-user-name" member attribute provides a user name string, typically for HTTP Basic or Digest authentication [RFC2617]. Clients MUST provide the user name using the UTF-8 encoding [STD63] in Unicode Normalization Form C as required for Network Unicode [RFC5198]. Printers MUST convert the user name, as needed, to whatever encoding is required by the Document URI.

Printers that support this attribute MUST list 'access-user-name' in the "job-save-accesses-supported" Printer Description attribute.

4.1.6 access-x509-certificate (1setOf octetString(MAX))

The OPTIONAL "access-x509-certificate" member attribute provides a PEM-encoded X.509 certificate identifying the User or Client that is making the request. When the size of the certificate exceeds 1023 octets (the maximum size of an octetString value), the Client separates the certificate into multiple octetString values and sends the result as an ordered set to the Printer. The Printer reassembles each octetString to produce the complete X.509 certificate to be used to access the Document URI.

Printers that support this attribute MUST list 'access-x509-certificate' in the "job-save-accesses-supported" Printer Description attribute and MUST provide an implementation-defined method for loading the corresponding private key that is used for authenticating the holder of the X.509 certificate.

5   Printer Description Attributes

5.1 job-save-accesses-supported (1setOf (type2 keyword))

The "job-save-accesses-supported" Printer Description attribute specifies which member attributes the Printer supports in the "job-save-accesses" operation attribute. This attribute MUST be supported if the "job-save-accesses" operation attribute is supported.

6   Additional Semantics for Existing Operations

6.1   Print-Job, Print-URI, Create-Job: job-save-accesses

This specification adds the new "job-save-accesses" operation attribute to the Print-Job, Print-URI, and Create-Job operation requests [RFC8011] to specify the persistent access credentials for a Job created by one of these operations. The "job-save-accesses" attribute gets copied to the Job Object, but the Printer MUST NOT include a Job's "job-save-accesses" attribute as a Job Description attribute in a Job operation such as Get-Job-Attributes [RFC8011].

6.2   ~~save-password-supported (rangeOfInteger(0:255))~~

7   ~~The "save-password" Printer Description attribute specifies whether the Printer supports the persistent Job password specified by the "save-password" Job Template attribute, and if so, what range of lengths the Printer's password policy requires for the unencrypted value of "save-password". If the Client allows the User to provide it with an unencrypted password value shorter than the lower bounds of "save-password-supported", the behavior is undefined but the Job may never print.~~

7.1   ~~save-password-encryption-supported (1setOf (type2 keyword))~~

8   ~~The "save-password-encryption-supported" Printer Description attribute specifies the encryption formats supported by the Printer for encrypting "save-password". Any of the keywords registered for the "job-password-encryption" attribute may be listed in the "save-password-encryption-supported" attribute, except for the keyword 'none' and all the keywords that are deprecated by the PWG in the IANA IPP Registry [IANA-IPP] as of this writing: 'sha', 'md2', 'md4', 'md5'. The 'sha3-256' encryption hashing algorithm MUST be supported if this attribute is supported, to ensure interoperability between implementations. This attribute MUST be supported if the "save-password" member attribute of "job-save-disposition" is supported.~~

8.1   ~~save-password-repertoire-configured (1setOf (type2 keyword))~~

9   ~~The "save-password-repertoire-configured" Printer Description attribute specifies the set of repertoires the Printer is configured to accept for a Job's "save-password-repertoire" attribute. The values specified by "save-password-repertoire-configured" MUST~~

236   be present in the set of keyword values specified by "save-password-repertoire-
237   supported".

9.1   save-password-repertoire-supported (1setOf (type2 keyword))

10   The "save-password-repertoire-supported" Printer Description attribute specifies
the range of repertoires the Printer supports that may be configured for listing in the
Printer's "save-password-repertoire-configured" attribute. All keywords specified in the
"save-password-repertoire-supported" must be registered in the IANA IPP Registry [IANA-
IPP] for the "job-password-repertoire" attribute [IPPREPERTOIRE]. The 'iana_utf-8_any'
keyword MUST be supported if this attribute is supported. This attribute MUST be
supported if the "save-password-repertoire" member attribute of "job-save-disposition" is
supported.

11   Additional Values and Semantics for Existing Attributes

11.1   job-save-disposition Member Attributes

12   This specification defines several new "job-save-disposition" member attributes to
support the specification of a Job Save Password.

12.1.1   save-password (octetString(1024))

13   The "save-password" member attribute specifies a password for the Job, which is
semantically analogous to the "job-password" Operation attribute [PWG5100.11]. The
Printer MUST NOT process the Job unless a User provides a password value that
matches the value stored in "save-password" to authorize the Printer to allow its release.
This member attribute MUST be present if the "save-password-encryption" member
attribute is present.

14   The maximum length of this attribute is greater than the length of "save-password-
supported" because this attribute needs to accommodate encrypted passwords which
have longer fixed lengths.

14.1.1   save-password-encryption (type2 keyword)

15   The "save-password-encryption" Job Template attribute specifies the hashing
algorithm the Client employed to obfuscate the password value specified in the "save-
password" Job Template attribute. This member attribute MUST be present if the "save-

265 ~~password" member attribute is present. The value held by "save-password-encryption"~~
266 ~~MUST be one of the values in the "save-password-encryption-supported" Printer~~
267 ~~Description attribute.~~

268 ~~**15.1.1**   **save-password-repertoire (type2 keyword)**~~

269 16 ~~The "save-password-repertoire" Job Template attribute specifies the repertoire~~
270 ~~selected for the "save-password" attribute. This member attribute MUST be present if the~~
271 ~~"save-password" member attribute is present. The value held by "save-password-~~
272 ~~repertoire" MUST be one of the values in the "save-password-repertoire-supported" Printer~~
273 ~~Description attribute.~~

274 **16.1 Internationalization Considerations**

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

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

281 • Unicode Bidirectional Algorithm [UAX9] – left-to-right, right-to-left, and vertical

282 • Unicode Line Breaking Algorithm [UAX14] – character classes and wrapping

283 • Unicode Normalization Forms [UAX15] – especially NFC for [RFC5198]

284 • Unicode Text Segmentation [UAX29] – grapheme clusters, words, sentences

285 • Unicode Identifier and Pattern Syntax [UAX31] – identifier use and normalization

286 • Unicode Collation Algorithm [UTS10] – sorting

287 • Unicode Locale Data Markup Language [UTS35] – locale databases

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

290 • Unicode Character Encoding Model [UTR17] – multi-layer character model

291   • Unicode in XML and other Markup Languages [UTR20] – XML usage

292   • Unicode Character Property Model [UTR23] – character properties

293   • Unicode Conformance Model [UTR33] – Unicode conformance basis

17   Security Considerations

295 The IPP extensions defined in this document require the same security considerations as
296 defined in the IPP/1.1: Model and Semantics [RFC8011], IPP: Job and Printer Extensions
297 – Set 2 (JPS2), and IPP Job Password Repertoire.

298 In addition to those requirements, the Printer MUST protect the values of "job-save-
299 accesses" at rest. Also, the Printer MUST reject any IPP operation sent over a non-
300 encrypted connection that includes the "job-save-accesses" attribute.

301 ~~The IPP extensions defined in this document require the same security considerations as~~
302 ~~defined in the IPP/1.1: Model and Semantics [RFC8011], IPP: Job and Printer Extensions~~
303 ~~– Set 2 (JPS2), and IPP Job Password Repertoire, plus additional security considerations~~
304 ~~below.~~

305 Human-readable Strings

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

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

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

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

18   IANA Considerations

18.1 Attribute Registrations

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

316   http://www.iana.org/assignments/ipp-registrations

317   The registry entries will contain the following information:

```
318    Operation attributes:                            Reference
319    ----------------------------------          ----------------
320    job-save-accesses (collection | no-value)       [SAVEPASSWORD]
321     access-oauth-token (1setOf octetString(MAX))   [SAVEPASSWORD]
322     access-oauth-uri (uri)                         [SAVEPASSWORD]
323     access-password (text(MAX))                    [SAVEPASSWORD]
324     access-pin (text(MAX))                         [SAVEPASSWORD]
325     access-user-name(text(MAX))                    [SAVEPASSWORD]
326     access-x509-certificate (1setOf octetString(MAX))
327                                                     [SAVEPASSWORD]

328    Printer Description attributes:                  Reference
329    ----------------------------------          ----------------
330    job-save-accesses-configured (1setOf (type2 keyword))
331                                                     [SAVEPASSWORD]
332    job-save-accesses-supported (1setOf (type2 keyword))
333                                                     [SAVEPASSWORD]
```

19   References

19.1 Normative References

336   [IPPREPERTOIRE] S. Kennedy, "IPP Job Password Repertoire", January 2016,
337   https://ftp.pwg.org/pub/pwg/ipp/whitepaper/wp-job-password-
338   repertoire-20160101.pdf

339   [ISO10646]   "Information technology -- Universal Coded Character Set (UCS)",
340   ISO/IEC 10646:2011

341   [PWG5100.5]   D. Carney, T. Hastings, P. Zehler. "Internet Printing Protocol (IPP):
342   Document Object", PWG 5100.5-2003, October 2003,
343   http://ftp.pwg.org/pub/pwg/candidates/cs-ippdocobject10-20031031-
344   5100.5.pdf

The Printer Working Group

345 [PWG5100.11]   T. Hastings, D. Fullman, "IPP: Job and Printer Extensions – Set 2
346   (JPS2)", PWG 5100.11-2010, October 2010,
347   https://ftp.pwg.org/pub/pwg/candidates/cs-ippjobprinterext10-
348   20101030-5100.11.pdf

349 [PWG5100.12]   R. Bergman, H. Lewis, I. McDonald, M. Sweet, "IPP Version 2.0, 2.1,
350   and 2.2", PWG 5100.12-2015, October 2015,
351   http://ftp.pwg.org/pub/pwg/standards/std-ipp20-20151030-5100.12.pdf

352 [PWG5100.13]   M. Sweet, I. McDonald, P. Zehler, "IPP: Job and Printer Extensions -
353   Set 3 (JPS3)", PWG 5100.13-2012, July 2012,
354   http://ftp.pwg.org/pub/pwg/candidates/cs-ippjobprinterext3v10-
355   20120727-5100.13.pdf

356 [PWG5100.19]   S. Kennedy, "IPP Implementor's Guide v2.0", PWG 5100.19-2015,
357   August 2015, http://ftp.pwg.org/pub/pwg/candidates/cs-ippig20-
358   20150821-5100.19.pdf

359 [RFC2817]   R. Khare, S. Lawrence, "Upgrading to TLS Within HTTP/1.1", RFC
360   2817, May 2000, https://www.ietf.org/rfc/rfc2817.txt

361 [RFC3510]   R. Herriot, I. McDonald, "Internet Printing Protocol/1.1: IPP URL
362   Scheme", RFC 3510, April 2003, https://tools.ietf.org/html/rfc3510

363 [RFC3629]   F. Yergeau, "UTF-8, a transformation format of ISO 10646", RFC
364   3629, November 2003, https://www.ietf.org/rfc/rfc3629.txt

365 [RFC5198]   J. Klensin, M. Padlipsky, "Unicode Format for Network Interchange",
366   RFC 5198, March 2008, https://www.ietf.org/rfc/rfc5198.txt

367 [RFC7616]   R. Shekh-Yusef, Ed., D. Ahrens, S. Bremer, "HTTP Digest Access
368   Authentication", RFC 7616, September 2015,
369   https://www.ietf.org/rfc/rfc7616.txt

370 [RFC7617]   J. Reschke, "The 'Basic' HTTP Authentication Scheme", RFC 7617,
371   September 2015, https://www.ietf.org/rfc/rfc7617.txt

372 [RFC7230]   R. Fielding, J. Reschke, "Hypertext Transfer Protocol (HTTP/1.1):
373   Message Syntax and Routing", RFC 7230, June 2014,
374   http://www.ietf.org/rfc/rfc7230.txt

375 [RFC7472]   I. McDonald, M. Sweet, "Internet Printing Protocol (IPP) over HTTPS
376   Transport Binding and the 'ipps' URI Scheme", RFC 7472, March
377   2015, https://tools.ietf.org/html/rfc7472

378 [RFC8010]   M. Sweet, I. McDonald, "Internet Printing Protocol/1.1: Encoding and
379   Transport", RFC 8010, January 2017,
380   https://www.ietf.org/rfc/rfc8010.txt

381 [RFC8011]   M. Sweet, I. McDonald, "Internet Printing Protocol/1.1: Model and
382   Semantics", RFC 8011, January 2017,
383   https://www.ietf.org/rfc/rfc8011.txt

384 [UAX9]   Unicode Consortium, "Unicode Bidirectional Algorithm", UAX#9, May
385   2016, http://www.unicode.org/reports/tr9

386 [UAX14]   Unicode Consortium, "Unicode Line Breaking Algorithm", UAX#14,
387   June 2016, http://www.unicode.org/reports/tr14

388 [UAX15]   Unicode Consortium, "Normalization Forms", UAX#15, February
389   2016, http://www.unicode.org/reports/tr15

390 [UAX29]   Unicode Consortium, "Unicode Text Segmentation", UAX#29, June
391   2016, http://www.unicode.org/reports/tr29

392 [UAX31]   Unicode Consortium, "Unicode Identifier and Pattern Syntax",
393   UAX#31, May 2016, http://www.unicode.org/reports/tr31

394 [UNICODE]   The Unicode Consortium, "Unicode® 10.0.0", June 2017,
395   http://unicode.org/versions/Unicode10.0.0/

396 [UTS10]   Unicode Consortium, "Unicode Collation Algorithm", UTS#10, May
397   2016, http://www.unicode.org/reports/tr10

398 [UTS35]   Unicode Consortium, "Unicode Locale Data Markup Language",
399   UTS#35, October 2016, http://www.unicode.org/reports/tr35

400 [UTS39]   Unicode Consortium, "Unicode Security Mechanisms", UTS#39, June
401   2016, http://www.unicode.org/reports/tr39

19.2 Informative References

[IANA-IPP]   IANA Internet Printing Protocol (IPP) Registrations,
                  http://www.iana.org/assignments/ipp-registrations

[UNISECFAQ]   Unicode Consortium "Unicode Security FAQ", November2016,
                  http://www.unicode.org/faq/security.html

[UTR17]   Unicode Consortium "Unicode Character Encoding Model", UTR#17,
                  November 2008, http://www.unicode.org/reports/tr17

[UTR20]   Unicode Consortium "Unicode in XML and other Markup Languages",
                  UTR#20, January 2013, http://www.unicode.org/reports/tr20

[UTR23]   Unicode Consortium "Unicode Character Property Model", UTR#23,
                  May 2015, http://www.unicode.org/reports/tr23

[UTR33]   Unicode Consortium "Unicode Conformance Model", UTR#33,
                  November 2008, http://www.unicode.org/reports/tr33

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        Zapp Brannigan - Democratic Order of Planets
        Wowbanger The Infinitely Prolonged – Independent Consultant
        Ira McDonald – High North Inc.
        Mike Sweet – Apple Inc.

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21   Change History

21.1 March 13, 2018

Updated as per feedback from IPP WG reflector:

- Fixed the abstract to make it less redundantly redundant.

- Fixed RFC references for HTTP Basic and Digest authentication

- Removed "job-save-accesses-configured" (but I still don't understand why some use the "xxx" / "xxx-supported" model while others use "xxx" / "xxx-configured" / "xxx-supported"...)

- Added new "Additional Semantics for Existing Operations" section

- Updated Security Considerations

21.2 March 11~~February 5~~, 2018

Updated as per feedback from February 2018 PWG F2F ~~Dec. 14, 2017 IPP WG teleconference~~ review:

- Refactored the attributes used to leverage the attributes used in IPP Shared Infrastructure Extensions and IPP Scan Service. This model is more appropriate since job-save and its members become Job Description attributes, which are required to be accessible via a Get-Job-Attributes operation. Access to the credentials, even if hashed, would be unacceptable.

- Propose this be moved to IPP Registration candidate status

21.3 February 5, 2018

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

- Updated Use Cases, Out of Scope and Design Requirements sections

The Printer Working Group

451   •   Refactored to make the solution become member attributes of job-save, with
452   associated Printer Description attributes.

     •

453   •   December 5, 2017

454   Initial revision.