



The Printer Working Group

March 15, 2019  
Working Draft

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22

**IPP Job Extensions v2.0  
(JOBEXT)**

Status: Prototype

Abstract: This specification extends the Job management, monitoring, and processing capabilities of IPP.

This is a PWG Working Draft. For a definition of a "PWG Working Draft", see:

<https://ftp.pwg.org/pub/pwg/general/pwg-process30.pdf>

This specification is available electronically at:

<https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippjobext20-20190315.docx>  
<https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippjobext20-20190315.pdf>

23 Copyright © 2003-2019 The Printer Working Group. All rights reserved.

24 This document may be copied and furnished to others, and derivative works that comment  
25 on, or otherwise explain it or assist in its implementation may be prepared, copied, published  
26 and distributed, in whole or in part, without restriction of any kind, provided that the above  
27 copyright notice, this paragraph and the title of the Document as referenced below are  
28 included on all such copies and derivative works. However, this document itself may not be  
29 modified in any way, such as by removing the copyright notice or references to the IEEE-  
30 ISTO and the Printer Working Group, a program of the IEEE-ISTO.

31 Title: *IPP Job Extensions v1.1 (JOBEXT)*

32 The IEEE-ISTO and the Printer Working Group DISCLAIM ANY AND ALL WARRANTIES,  
33 WHETHER EXPRESS OR IMPLIED INCLUDING (WITHOUT LIMITATION) ANY IMPLIED  
34 WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

35 The Printer Working Group, a program of the IEEE-ISTO, reserves the right to make  
36 changes to the document without further notice. The document may be updated, replaced  
37 or made obsolete by other documents at any time.

38 The IEEE-ISTO takes no position regarding the validity or scope of any intellectual property  
39 or other rights that might be claimed to pertain to the implementation or use of the technology  
40 described in this document or the extent to which any license under such rights might or  
41 might not be available; neither does it represent that it has made any effort to identify any  
42 such rights.

43 The IEEE-ISTO invites any interested party to bring to its attention any copyrights, patents,  
44 or patent applications, or other proprietary rights which may cover technology that may be  
45 required to implement the contents of this document. The IEEE-ISTO and its programs shall  
46 not be responsible for identifying patents for which a license may be required by a document  
47 and/or IEEE-ISTO Industry Group Standard or for conducting inquiries into the legal validity  
48 or scope of those patents that are brought to its attention. Inquiries may be submitted to the  
49 IEEE-ISTO by e-mail at: [ieee-isto@ieee.org](mailto:ieee-isto@ieee.org).

50 The Printer Working Group acknowledges that the IEEE-ISTO (acting itself or through its  
51 designees) is, and shall at all times be the sole entity that may authorize the use of  
52 certification marks, trademarks, or other special designations to indicate compliance with  
53 these materials.

54 Use of this document is wholly voluntary. The existence of this document does not imply that  
55 there are no other ways to produce, test, measure, purchase, market, or provide other goods  
56 and services related to its scope.

57

## 58 **About the IEEE-ISTO**

59 The IEEE-ISTO is a not-for-profit corporation offering industry groups an innovative and  
60 flexible operational forum and support services. The IEEE-ISTO provides a forum not only  
61 to develop standards, but also to facilitate activities that support the implementation and  
62 acceptance of standards in the marketplace. The organization is affiliated with the IEEE  
63 (<http://www.ieee.org/>) and the IEEE Standards Association (<http://standards.ieee.org/>).

64 For additional information regarding the IEEE-ISTO and its industry programs visit:

65 <http://www.ieee-isto.org>

## 66 **About the IEEE-ISTO PWG**

67 The Printer Working Group (or PWG) is a Program of the IEEE Industry Standards and  
68 Technology Organization (ISTO) with member organizations including printer  
69 manufacturers, print server developers, operating system providers, network operating  
70 system providers, network connectivity vendors, and print management application  
71 developers. The PWG is chartered to make printers and the applications and operating  
72 systems supporting them work together better. All references to the PWG in this document  
73 implicitly mean “The Printer Working Group, a Program of the IEEE ISTO.”

74 To meet this objective, the PWG documents the results of their work as open standards that  
75 define print related protocols, interfaces, procedures, and conventions. A PWG standard is  
76 a stable, well understood, and technically competent specification that is widely used with  
77 multiple independent and interoperable implementations. Printer manufacturers and  
78 vendors of printer related software benefit from the interoperability provided by voluntary  
79 conformance to these standards.

80 For additional information regarding the Printer Working Group visit:

81 <http://www.pwg.org>

82 Contact information:

83 The Printer Working Group  
84 c/o The IEEE Industry Standards and Technology Organization  
85 445 Hoes Lane  
86 Piscataway, NJ 08854  
87 USA  
88

## Table of Contents

89		
90	1. Introduction .....	9
91	1.1 Document Natural Language and Character Set .....	9
92	1.2 Attribute Fidelity .....	9
93	1.3 Rendering Optimizations .....	9
94	1.4 Printing on a Specific Output Device .....	9
95	1.5 Results of Job/Document Processing .....	9
96	1.6 Job Scheduling and Lifecycle .....	10
97	1.7 Job Operations .....	10
98	1.8 Obsolete Attributes and Values .....	10
99	2. Terminology .....	11
100	2.1 Conformance Terminology .....	11
101	2.2 Printing Terminology .....	11
102	2.3 Protocol Role Terminology .....	11
103	2.4 Other Terminology .....	12
104	2.5 Acronyms and Organizations .....	12
105	3. Requirements .....	12
106	3.1 Rationale .....	12
107	3.2 Use Cases .....	13
108	3.2.1 Print a Plain Text File .....	13
109	3.2.2 Print a Document Using a Matching Size .....	13
110	3.2.3 Force a Document to Print on a Specific Media Size .....	13
111	3.2.4 Print a Presentation with Best Quality .....	13
112	3.2.5 Print Using a Specific Output Device .....	13
113	3.2.6 Monitor Whether Jobs are Printed Correctly .....	13
114	3.2.7 Hold a Job Until a Specific Date and Time .....	14
115	3.2.8 Delay Output Until a Specific Time Period .....	14
116	3.2.9 Submit a Variable Number of Documents in a Job .....	14
117	3.2.10 Cancel a Job After a Specific Time Period .....	14
118	3.2.11 Cancel Multiple Jobs .....	14
119	3.2.12 Resubmit a Job .....	14
120	3.2.13 Retain Jobs for a Specific Time Period .....	14
121	3.2.14 Keep Job History Information for a Specific Time Period .....	14
122	3.3 Exceptions .....	15
123	3.3.1 Too Many Jobs on a Printer .....	15
124	3.3.2 Too Many Documents in a Job .....	15
125	3.4 Out of Scope .....	15
126	3.5 Design Requirements .....	15
127	4. New Operations .....	16
128	4.1 Cancel-Jobs .....	16
129	4.1.1 Cancel-Jobs Request .....	16
130	4.1.2 Cancel-Jobs Response .....	17
131	4.2 Cancel-My-Jobs .....	17
132	4.2.1 Cancel-My-Jobs Request .....	17
133	4.2.2 Cancel-My-Jobs Response .....	18
134	4.3 Close-Job .....	18

135	4.3.1 Close-Job Request .....	19
136	4.3.2 Close-Job Response.....	19
137	4.4 Resubmit-Job .....	20
138	4.4.1 Resubmit-Job Request .....	21
139	4.4.2 Resubmit-Job Response.....	21
140	5. Attributes .....	23
141	5.1 Operation Attributes.....	23
142	5.1.1 job-hold-until-time (dateTime).....	23
143	5.1.2 job-ids (1setOf integer(1:MAX)).....	23
144	5.1.3 job-mandatory-attributes (1setOf keyword).....	23
145	5.2 Document and Job Status Attributes .....	23
146	5.2.1 errors-count (integer(0:MAX)).....	23
147	5.2.2 print-content-optimize-actual (1setOf type2 keyword) .....	24
148	5.2.3 warnings-count (integer(0:MAX)).....	24
149	5.3 Document and Job Template Attributes .....	24
150	5.3.1 output-device (name(127)).....	24
151	5.3.2 print-content-optimize (type2 keyword).....	24
152	5.4 Job Template Attributes.....	24
153	5.4.1 job-cancel-after (integer(0:MAX)).....	24
154	5.4.2 job-delay-output-until (type2 keyword   name(MAX)).....	24
155	5.4.3 job-delay-output-until-time (dateTime) .....	25
156	5.4.4 job-hold-until-time (dateTime) .....	26
157	5.4.5 job-retain-until (type2 keyword   name(MAX)) .....	26
158	5.4.6 job-retain-until-interval (integer(0:MAX)).....	26
159	5.4.7 job-retain-until-time (dateTime).....	26
160	5.5 Printer Description Attributes.....	27
161	5.5.1 document-charset-default (charset) .....	27
162	5.5.2 document-charset-supported (1setOf charset) .....	27
163	5.5.3 document-natural-language-default (naturalLanguage).....	27
164	5.5.4 document-natural-language-supported (1setOf naturalLanguage).....	27
165	5.5.5 job-cancel-after-default (integer(0:MAX)   no-value) .....	27
166	5.5.6 job-cancel-after-supported (rangeOfInteger(0:MAX)) .....	27
167	5.5.7 job-creation-attributes-supported (1setOf keyword).....	27
168	5.5.8 job-delay-output-until-default (type2 keyword   name(MAX)).....	28
169	5.5.9 job-delay-output-until-supported (1setOf (type2 keyword   name(MAX))) .....	28
170	5.5.10 job-delay-output-until-time-supported (rangeOfInteger(0:MAX)) .....	28
171	5.5.11 job-history-attributes-configured (1setOf keyword).....	28
172	5.5.12 job-history-attributes-supported (1setOf keyword).....	28
173	5.5.13 job-history-interval-configured (integer(0:MAX)).....	28
174	5.5.14 job-history-interval-supported (rangeOfInteger(0:MAX)).....	28
175	5.5.15 job-ids-supported (boolean) .....	29
176	5.5.16 job-mandatory-attributes-supported (boolean).....	29
177	5.5.17 job-retain-until-default (type2 keyword   name(MAX)) .....	29
178	5.5.18 job-retain-until-interval-default (integer(0:MAX)   no-value) .....	29
179	5.5.19 job-retain-until-interval-supported (rangeOfInteger(0:MAX)) .....	29
180	5.5.20 job-retain-until-supported (1setOf (type2 keyword   name(MAX))) .....	29

181	5.5.21 job-retain-until-time-supported (rangeOfInteger(0:MAX)) .....	29
182	5.5.22 job-spooling-supported (type2 keyword).....	29
183	5.5.23 media-col-database (1setOf collection) .....	30
184	5.5.24 output-device-supported (1setOf name(127)).....	31
185	5.5.25 print-content-optimize-default (type2 keyword).....	31
186	5.5.26 print-content-optimize-supported (1setOf type2 keyword) .....	31
187	5.5.27 which-jobs-supported (1setOf type2 keyword).....	31
188	5.6 Printer Status Attributes.....	31
189	5.6.1 printer-detailed-status-messages (1setOf text(MAX)).....	31
190	6. Additional Semantics for Existing Operations .....	32
191	6.1 Create-Job, Print-Job, Print-URI, Validate-Job: job-mandatory-attributes.....	32
192	6.2 Create-Job, Print-Job, Print-URI: server-error-too-many-jobs Status Code .....	32
193	6.3 Get-Jobs Operation: "job-ids (1setOf integer(1:MAX))" .....	32
194	6.4 Hold-Job Operation: "job-hold-until-time (dateTime)" .....	32
195	6.5 Print-Job, Print-URI, Send-Document, Send-URI: server-error-too-many-documents	
196	Status Code .....	33
197	6.6 Set-Job-Attributes Operation: "job-hold-until-time (dateTime)" .....	33
198	7. Additional Values for Existing Attributes .....	33
199	7.1 job-state-reasons (1setOf type2 keyword).....	33
200	7.2 media (type2 keyword   name(MAX)) .....	34
201	7.3 media-col (collection).....	34
202	7.3.1 media-grain (type2 keyword   name(MAX)) .....	34
203	7.3.2 media-thickness (integer(1:MAX)) .....	34
204	7.3.3 media-tooth (type2 keyword   name(MAX)) .....	34
205	7.4 pdl-override-supported (type2 keyword).....	35
206	7.5 which-jobs (type2 keyword) .....	35
207	8. New Status Codes .....	36
208	8.1 server-error-too-many-jobs (0x050B) .....	36
209	8.2 server-error-too-many-documents (0x050C) .....	36
210	9. Obsolete Attributes.....	37
211	9.1 Obsolete Operation Attributes .....	37
212	9.2 Obsolete Job Status Attributes .....	37
213	9.3 Obsolete Job Template Attributes .....	38
214	9.4 Obsolete Printer Description Attributes .....	38
215	10. Obsolete Values .....	39
216	10.1 Obsolete "job-state-reasons" Values .....	39
217	11. Conformance Requirements .....	39
218	11.1 Printer Conformance Requirements .....	39
219	11.2 Client Conformance Requirements .....	39
220	12. Internationalization Considerations .....	39
221	13. Security Considerations .....	40
222	14. IANA Considerations .....	41
223	14.1 Attribute Registrations .....	41
224	14.2 Attribute Keyword Value Registrations .....	43
225	14.3 Type2 enum Registrations.....	45
226	14.4 Operation Registrations.....	45

227	14.5 Status Code Registrations.....	46
228	15. Overview of Changes.....	47
229	15.1 IPP Job Extensions v2.0.....	47
230	16. References.....	48
231	16.1 Normative References.....	48
232	16.2 Informative References.....	50
233	17. Author's Address.....	51
234	18. Change History.....	52
235	18.1 March 15, 2019.....	52
236	18.2 March 8, 2019.....	52
237	18.3 October 23, 2018.....	52
238	18.4 September 26, 2018.....	53
239	18.5 September 25, 2018.....	53

240

241

### List of Tables

242	Table 1 - Obsolete Operation Attributes.....	37
243	Table 2 - Obsolete Job Status Attributes.....	37
244	Table 3 - Obsolete Job Template AttributesTable 2.....	38
245	Table 4 - Obsolete Printer Description Attributes.....	38

246

247

248



## 249 **1. Introduction**

250 This specification extends the Job management, monitoring, and processing capabilities of  
251 IPP. This specification obsoletes portions of the previous version of this specification  
252 [PWG5100.7-2003] - a list of changes can be found in section 15. This specification also  
253 incorporates the relevant portions of the obsolete IPP Job and Printer Extensions - Set 2  
254 [PWG5100.11-2010] specification.

### 255 **1.1 Document Natural Language and Character Set**

256 Certain Document formats are ambiguous about the natural language and character set  
257 used in a file. The Internet Printing Protocol/1.1 [STD92] defines the "document-natural-  
258 language" operation attribute to specify the natural language in Document Creation  
259 operations, but does not provide a way to specify the character set. In addition, there is no  
260 way for a Client to discover which languages and character sets are supported by a Printer  
261 for a given Document format. This specification defines attributes for specifying and  
262 discovering supported languages and character sets.

### 263 **1.2 Attribute Fidelity**

264 The Internet Printing Protocol/1.1 [STD92] defines the "ipp-attribute-fidelity" operation  
265 attribute to enforce the fidelity of all attributes in the Job Creation request. This specification  
266 defines an operation attribute to enforce the fidelity of a subset of attributes in the Job  
267 Creation request.

### 268 **1.3 Rendering Optimizations**

269 Most Printers are able to optimize output for different kinds of Document data, for example  
270 using a higher resolution for black text and lines, however the Internet Printing Protocol/1.1  
271 [STD92] only defines the "print-quality" and "printer-resolution" Job Template attributes that  
272 specify the overall quality and resolution of the output. This specification defines an attribute  
273 with corresponding values for specifying the type of optimizations to perform.

### 274 **1.4 Printing on a Specific Output Device**

275 The Internet Printing Protocol/1.1 [STD92] defines the "output-device-assigned" Job Status  
276 attribute but does not define corresponding Job Template or Printer Description attributes  
277 for specifying which Output Device to use for a Job.

### 278 **1.5 Results of Job/Document Processing**

279 The Internet Printing Protocol/1.1 [STD92] defines some Job Status attributes and values  
280 but none of them provide information about processing issues that do not prevent a Job or

281 Document from being printed. This specification defines attributes and values for discovering  
282 those processing issues.

## 283 **1.6 Job Scheduling and Lifecycle**

284 The Internet Printing Protocol/1.1 [STD92] defines the "job-hold-until (keyword |  
285 name(MAX))" Job Template attribute to hold a Job for processing until a named time period.  
286 This specification defines an additional Job Template attribute that holds the Job for  
287 processing until the specified date and time.

288 This specification also includes the "job-delay-output-until (keyword | name(MAX))" and "job-  
289 delay-output-until-time (dateTime)" Job Template attributes [PWG5100.11-2010] that delay  
290 output of a Job until the specified time.

291 In addition, this specification defines Job Template attributes to schedule when a pending  
292 Job is canceled automatically, Job Template attributes to specify when a Job should  
293 transition from the retained phase to the history phase, and Printer Description attributes to  
294 specify how long a Job stays in the history phase.

## 295 **1.7 Job Operations**

296 The Internet Printing Protocol/1.1 [STD92] defines many operations that operate on a single  
297 Job object. This specification defines new operations that:

- 298 • Cancel all Jobs on a given Printer;
- 299 • Cancel all Jobs owned by a User on a given Printer;
- 300 • Close a Job in the 'pending' state that is still open for additional Document  
301 submissions; and
- 302 • Resubmit an existing Job for processing as a new Job, potentially with different Job  
303 Template attributes and values.

304 This specification also extends the Get-Jobs operation to support additional values for the  
305 "which-jobs" operation attribute.

## 306 **1.8 Obsolete Attributes and Values**

307 The original version of this specification [PWG5100.7-2003] defines several attributes and  
308 values that have proven problematic from an interoperability and privacy standpoint. This  
309 specification obsoletes these attributes and values.

## 310 **2. Terminology**

### 311 **2.1 Conformance Terminology**

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

317 The term DEPRECATED is used for previously defined and approved protocol elements that  
318 SHOULD NOT be used or implemented. The term OBSOLETE is used for previously defined  
319 and approved protocol elements that MUST NOT be used or implemented.

### 320 **2.2 Printing Terminology**

321 Normative definitions and semantics of printing terms are imported from the Internet Printing  
322 Protocol/1.1 [STD92].

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

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

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

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

331 *Physical Device*: a hardware implementation of a endpoint device, e.g., a marking engine, a  
332 fax modem, etc.

### 333 **2.3 Protocol Role Terminology**

334 This document also defines the following protocol roles to specify unambiguous  
335 conformance requirements:

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

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

## 341 **2.4 Other Terminology**

342 *Completed Job*: a Job in the 'aborted', 'canceled', or 'completed' state.

343 *Document Creation Operation*: operations that accept Document Content. Specifically:  
344 Print-Job, Print-URI, Send-Document and Send-URI. Note: Print-Job and Print-URI are  
345 both Job Creation and Document Creation operations.

346 *Job Creation Operation*: operations that create Job objects, specifically: Print-Job, Print-URI,  
347 and Create-Job [STD92].

348 *Not Completed Job*: a Job in the 'pending', 'pending-held', 'processing', or 'processing-  
349 stopped' state.

350 *Retained Job*: a Completed Job whose attributes and Document data are still available to  
351 the Printer.

## 352 **2.5 Acronyms and Organizations**

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

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

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

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

## 357 **3. Requirements**

### 358 **3.1 Rationale**

359 The Internet Printing Protocol/1.1 [STD92] defines many attributes and values for specifying  
360 how Jobs and Documents are processed by a Printer. Given the need for managing Jobs,  
361 specifying Job processing options, and retrieving processing status information, this  
362 specification should:

- 363 1. Define attributes and values that specify the Document character set and  
364 rendering optimizations;
- 365 2. Define an attribute for doing selective fidelity enforcement;
- 366 3. Define a media size for automatically printing Documents on the correct size;
- 367 4. Define attributes and values that allow a Client to discover the results of  
368 Document processing;
- 369 5. Define attributes for delaying the output from a Job until a specified time period;
- 370 6. Define attributes for holding a Job until a specified date and time;
- 371 7. Define attributes for retaining a Job for a specified time period;
- 372 8. Define attributes for configuring the Job history attributes and time period;

- 373 9. Define attributes for automatically canceling a Job after a specified time period;  
374 10. Define operations for managing one or more Jobs; and  
375 11. Define values that allow a Client to monitor specific groups of Jobs.

376 Rationale for the changes from the previous versions of this specification can be found in  
377 section 15.

## 378 **3.2 Use Cases**

### 379 **3.2.1 Print a Plain Text File**

380 Jane has a plain text file report using a character set other than UTF-8 that she would like  
381 to print. She submits the file for printing using her Client software, which allows her to specify  
382 the exact character set used for the report.

### 383 **3.2.2 Print a Document Using a Matching Size**

384 John is viewing a document in a web browser and decides to print it. He submits the file for  
385 printing from the browser which specifies the output should be formatted for US Letter or  
386 ISO A4 media, as available on the printer.

### 387 **3.2.3 Force a Document to Print on a Specific Media Size**

388 Elizabeth has a contract that must be printed on US Legal media. She uses her Client  
389 software to submit the print job, specifying that US Legal size must be used with no  
390 substitutions.

### 391 **3.2.4 Print a Presentation with Best Quality**

392 Bob wants to print a presentation. He submits the presentation for printing using his Client  
393 software, specifying that the output should be optimized for text and graphics.

### 394 **3.2.5 Print Using a Specific Output Device**

395 Sally needs to print a poster on a specific output device. She uses her Client software to  
396 select the large format printer associated with the local print service and submit the poster  
397 for printing.

### 398 **3.2.6 Monitor Whether Jobs are Printed Correctly**

399 Mary is the administrator for the office printers and wants to know whether users are having  
400 difficulty printing their documents. She uses Client software to query the history of jobs on  
401 each printer, including any errors or warnings that were encountered during processing.

**402 3.2.7 Hold a Job Until a Specific Date and Time**

403 John wants to withhold printing of a weekly newsletter until Monday morning. He uses his  
404 Client software to submit the print job with the correct date and time.

**405 3.2.8 Delay Output Until a Specific Time Period**

406 Bob has a large print job he would like printed overnight. He uses his Client software to  
407 submit the job for printing, specifying that output should not begin until 6pm.

**408 3.2.9 Submit a Variable Number of Documents in a Job**

409 Elizabeth has a print job that contains a variable number of documents for printing. She uses  
410 her Client software to create a new job and then add each document to the job. When she  
411 is sure she has all of the documents for the job, she uses her Client software to close the  
412 job so that the printer can begin processing the documents for printing.

**413 3.2.10 Cancel a Job After a Specific Time Period**

414 Sally operates a high-volume printer for her company. She configures the printer to  
415 automatically cancel any jobs that take longer than four hours to print so as to maintain the  
416 availability of the printer to other users.

**417 3.2.11 Cancel Multiple Jobs**

418 Bob needs to cancel a group of jobs that were incorrectly submitted to a printer. He uses his  
419 Client software to send a request to cancel a list of those jobs. The printer then cancels the  
420 jobs all at once.

**421 3.2.12 Resubmit a Job**

422 Mary needs to reprint a job with different settings. She uses her Client software to pick a  
423 retained job on the printer, chooses the settings to use for the reprint, and submits the reprint  
424 request. The printer then makes a copy of the original job, substituting any new settings for  
425 the copied job.

**426 3.2.13 Retain Jobs for a Specific Time Period**

427 John's company needs to retain all print jobs for at least one year for legal reasons. He  
428 configures the printer with a default retention policy of one year, allowing users to specify  
429 longer periods of time as needed.

**430 3.2.14 Keep Job History Information for a Specific Time Period**

431 Bob's company needs to keep an accounting history of all print jobs for at least one year.  
432 He configures the printer to keep the job history for at least one year, including the job  
433 identifier, owner, name, and number of pages.

### 434 **3.3 Exceptions**

#### 435 **3.3.1 Too Many Jobs on a Printer**

436 Jane has several documents to print for a meeting. While submitting the documents for  
437 printing from her Client software, the printer responds that there are too many queued jobs.

#### 438 **3.3.2 Too Many Documents in a Job**

439 Bob is submitting multiple documents in a single job. While submitting the documents from  
440 his Client software, the printer responds that there are too many documents in the job.

### 441 **3.4 Out of Scope**

442 The following are considered out of scope for this specification:

- 443 1. Definition of new file formats; and
- 444 2. Definition of new protocol bindings.

### 445 **3.5 Design Requirements**

446 The design requirements for this specification are:

- 447 1. Define attributes for supported languages and character sets in Document data;
- 448 2. Define attributes and values to describe the kind of processing optimizations that  
449 should be performed on Document data;
- 450 3. Define an attribute to specify fidelity requirements;
- 451 4. Define attributes to select an Output Device for printing;
- 452 5. Define attributes and values to report processing errors and warnings;
- 453 6. Define attributes to hold Jobs until a specific date and time;
- 454 7. Define attributes to cancel Jobs after a specific time period;
- 455 8. Define attributes and values to retain Jobs for a specific time period;
- 456 9. Define an operation to close an open Job;
- 457 10. Define attributes and operations to cancel groups of Jobs;
- 458 11. Define an operation to resubmit a Job with new Job Template attributes; and
- 459 12. Define sections to register all attributes, values, and operations with IANA.

460

## 461 **4. New Operations**

### 462 **4.1 Cancel-Jobs**

463 This REQUIRED operation allows the Operator or Administrator for the Printer to cancel a  
464 list of Not Completed Jobs or *all* Not Completed Jobs on the Printer. This operation works  
465 like the Cancel-Job operation [STD92] except that it works on a number of Jobs at once. If  
466 the Printer cannot cancel all of the requested Jobs successfully, it MUST NOT cancel any  
467 and MUST return an error code along with the list of offending "job-id" values.

468 Access Rights: The authenticated user [STD92] performing this operation must be an  
469 Operator or Administrator of the Printer. Otherwise, the Printer MUST reject the operation  
470 and return 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-  
471 authorized' as appropriate.

#### 472 **4.1.1 Cancel-Jobs Request**

473 The following groups of attributes are part of a Cancel-Jobs request.

474 Group 1: Operation Attributes

475 "attributes-charset" (charset) and  
476 "attributes-natural-language" (naturalLanguage):

477 The Client MUST supply and the Printer MUST support both of these  
478 attributes.

479 "printer-uri" (uri):

480 The Client MUST supply and the Printer MUST support the "printer-uri"  
481 operation attribute which is the target Printer for the operation.

482 "job-ids" (1setOf integer(1:MAX)):

483 The Client MAY supply and the Printer MUST support this operation attribute  
484 which specifies the target Job(s) for the operation.

485 "requesting-user-name" (name(MAX)) and  
486 "requesting-user-uri" (uri):

487 The Client SHOULD supply and the Printer MUST support these attributes.

488 "message" (text(127)):

489 The Client MAY supply and the Printer MAY support this attribute, which  
490 provides a message to the Operator. How or where to display this message  
491 to the Operator (if at all) is an implementation decision.



## 492 **4.1.2 Cancel-Jobs Response**

493 The following groups of attributes are part of Cancel-Jobs response.

494 Group 1: Operation Attributes

495 "attributes-charset" (charset) and  
496 "attributes-natural-language" (naturalLanguage):

497 The Printer **MUST** return both of these attributes.

498 "status-message" (text(255)) and/or  
499 "detailed-status-message" (text(MAX)):

500 The Printer **MAY** return one or both of these attributes.

501 Group 2: Unsupported Attributes

502 See [STD92] for details on returning Unsupported Attributes.

## 503 **4.2 Cancel-My-Jobs**

504 This **REQUIRED** operation allows a User to cancel a list of Not Completed Jobs or *all* their  
505 own Not Completed Jobs on the Printer. This operation works like the Cancel-Job operation  
506 [STD92] except that it works on a number of Jobs at once. If the Printer cannot cancel all of  
507 the requested Jobs successfully, it **MUST NOT** cancel any and **MUST** return an error code  
508 along with the list of offending "job-id" values.

509 Access Rights: The authenticated user [STD92] performing this operation must be the Job  
510 owner. Otherwise, the Printer **MUST** reject the operation and return 'client-error-forbidden',  
511 'client-error-not-authenticated', or 'client-error-not-authorized' as appropriate.

### 512 **4.2.1 Cancel-My-Jobs Request**

513 The following groups of attributes are part of a Cancel-My-Jobs request.

514 Group 1: Operation Attributes

515 "attributes-charset" (charset) and  
516 "attributes-natural-language" (naturalLanguage):

517 The Client **MUST** supply and the Printer **MUST** support both of these  
518 attributes.

519 "printer-uri" (uri):

520 The Client **MUST** supply and the Printer **MUST** support the "printer-uri"  
521 operation attribute which is the target Printer for the operation.

522 "job-ids" (1setOf integer(1:MAX)):

523 The Client MAY supply and the Printer MUST support this operation attribute  
524 which specifies the target Job(s) for the operation.

525 "requesting-user-name" (name(MAX)) and  
526 "requesting-user-uri" (uri):

527 The Client SHOULD supply and the Printer MUST support these attributes.

528 "message" (text(127)):

529 The Client MAY supply and the Printer MAY support this attribute, which  
530 provides a message to the Operator. How or where to display this message  
531 to the Operator (if at all) is an implementation decision.

#### 532 **4.2.2 Cancel-My-Jobs Response**

533 The following groups of attributes are part of a Cancel-My-Jobs response.

534 Group 1: Operation Attributes

535 "attributes-charset" (charset) and  
536 "attributes-natural-language" (naturalLanguage):

537 The Printer MUST return both of these attributes.

538 "status-message" (text(255)) and/or  
539 "detailed-status-message" (text(MAX)):

540 The Printer MAY return one or both of these attributes.

541 Group 2: Unsupported Attributes

542 See [STD92] for details on returning Unsupported Attributes.

#### 543 **4.3 Close-Job**

544 This REQUIRED operation allows a Client to close a Job that was created using the Create-  
545 Job [STD92] operation. It is semantically similar to a Send-Document [STD92] operation  
546 with the "last-document" operation attribute supplied with a 'true' value with no Document  
547 data, except that the Printer MUST NOT add an additional Document object when accepting  
548 a Close-Job operation.

549 A Client SHOULD check whether the Printer supports the Close-Job operation by querying  
550 the values of the "operations-supported" [STD92] Printer Description attribute.

551 Access Rights: The authenticated user [STD92] performing this operation must be either the  
552 Job owner or an Operator or Administrator of the Printer. Otherwise, the Printer MUST reject  
553 the operation and return 'client-error-forbidden', 'client-error-not-authenticated', or 'client-  
554 error-not-authorized' as appropriate.

#### 555 **4.3.1 Close-Job Request**

556 The following attributes are part of a Close-Job request.

557 Group 1: Operation Attributes

558 "attributes-charset" (charset) and  
559 "attributes-natural-language" (naturalLanguage):

560 The Client MUST supply and the Printer MUST support both of these  
561 attributes.

562 "printer-uri" (uri) and "job-id" (integer(1:MAX)):

563 The Client MUST supply and the Printer MUST support the "printer-uri" and  
564 "job-id" operation attributes which are the target Job for the operation.

565 "requesting-user-name" (name(MAX)) and  
566 "requesting-user-uri" (uri):

567 The Client SHOULD supply and the Printer MUST support these attributes.

#### 568 **4.3.2 Close-Job Response**

569 The following attributes are part of a Close-Job response.

570 Group 1: Operation Attributes

571 "attributes-charset" (charset) and  
572 "attributes-natural-language" (naturalLanguage):

573 The Printer MUST return both of these attributes.

574 "status-message" (text(255)) and/or  
575 "detailed-status-message" (text(MAX)):

576 The Printer MAY return one or both of these attributes.

577 Group 2: Unsupported Attributes

578 See [STD92] for details on returning Unsupported Attributes.

579 Group 3: Job Attributes

580 "job-state" (type1 enum):

581 The Printer MUST return the Job's REQUIRED "job-state" attribute. The  
582 value of this attribute along with the value of the "job-state-reasons" attribute  
583 is a "snapshot" of the new Job's state when the Printer returns the response.

584 "job-state-reasons" (1setOf type2 keyword):

585 The Printer MUST return the Job's REQUIRED "job-state-reasons" attribute.

586 "job-state-message" (text(MAX)):

587 The Printer SHOULD return the Job's RECOMMENDED "job-state-message"  
588 attribute. If the Printer supports this attribute, then it MUST be returned in the  
589 response. If this attribute is not returned in the response, the Client can  
590 assume that the "job-state-message" attribute is not supported and will not  
591 be returned in a subsequent Job query.

592 "number-of-intervening-jobs" (integer(0:MAX)):

593 The Printer SHOULD return the Job's RECOMMENDED "number-of-  
594 intervening-jobs" attribute. If the Printer supports this attribute, then it MUST  
595 be returned in the response. If this attribute is not returned in the response,  
596 the Client can assume that the "number-of-intervening-jobs" attribute is not  
597 supported and will not be returned in a subsequent Job query.

#### 598 **4.4 Resubmit-Job**

599 This RECOMMENDED operation allows a Client to create a copy of a Retained Job and  
600 change or add attributes for the new Job. Once accepted, a Printer MUST create a new Job  
601 object and assign a unique "job-id" and "job-uri" value for the new Job, just as if the Client  
602 had sent a Create-Job request. Operation and Job Template attributes from the original Job  
603 are copied to the new Job unless overridden in the Resubmit-Job request. If any of the  
604 Documents in the Job were passed by reference (Print-URI or Send-URI), the Printer MUST  
605 re-fetch the data.

606 Printers MUST reject a Resubmit-Job request if the Job is not retained or is in the 'pending',  
607 'pending-held', 'processing', or 'processing-stopped' states with the status 'client-error-not-  
608 possible'. Otherwise, the Printer returns a status code as defined for the Print-Job [STD92]  
609 operation.

610 Access Rights: The authenticated user [STD92] performing this operation must be either the  
611 Job owner or an Operator or Administrator of the Printer. Otherwise, the Printer MUST reject  
612 the operation and return 'client-error-forbidden', 'client-error-not-authenticated', or 'client-  
613 error-not-authorized' as appropriate.

#### 614 **4.4.1 Resubmit-Job Request**

615 The following attributes are part of a Resubmit-Job request.

##### 616 Group 1: Operation Attributes

617 "attributes-charset" (charset) and  
618 "attributes-natural-language" (naturalLanguage):

619 The Client MUST supply and the Printer MUST support both of these  
620 attributes.

621 "printer-uri" (uri) and "job-id" (integer(1:MAX)):

622 The Client MUST supply and the Printer MUST support the "printer-uri" and  
623 "job-id" operation attributes which are the target Job for the operation.

624 "requesting-user-name" (name(MAX)) and  
625 "requesting-user-uri" (uri):

626 The Client SHOULD supply and the Printer MUST support these attributes.

627 "ipp-attribute-fidelity" (boolean) or "job-mandatory-attributes" (1setOf keyword):

628 The Client MAY supply and the Printer MUST support either of these  
629 attributes.

##### 630 Group 2: Job Template Attributes

631 The Client MAY supply and the Printer MUST support Job Template attributes to  
632 apply to the newly created Job. The 'delete-attribute' out-of-band value MAY be  
633 used to remove an attribute that was specified in the original Job.

#### 634 **4.4.2 Resubmit-Job Response**

635 The following attributes are part of a Close-Job response.

##### 636 Group 1: Operation Attributes

637 "attributes-charset" (charset) and  
638 "attributes-natural-language" (naturalLanguage):

639 The Printer MUST return both of these attributes.

640 "status-message" (text(255)) and/or  
641 "detailed-status-message" (text(MAX)):

642 The Printer MAY return one or both of these attributes.

## 643 Group 2: Unsupported Attributes

644 See [STD92] for details on returning Unsupported Attributes.

## 645 Group 3: Job Attributes

646 "job-id" (integer(1:MAX)):

647 The Printer MUST return the new Job's "job-id" attribute.

648 "job-state" (type1 enum):

649 The Printer MUST return the Job's REQUIRED "job-state" attribute. The  
650 value of this attribute along with the value of the "job-state-reasons" attribute  
651 is a "snapshot" of the new Job's state when the Printer returns the response.

652 "job-state-reasons" (1setOf type2 keyword):

653 The Printer MUST return the Job's REQUIRED "job-state-reasons" attribute.

654 "job-state-message" (text(MAX)):

655 The Printer SHOULD return the Job's RECOMMENDED "job-state-message"  
656 attribute. If the Printer supports this attribute, then it MUST be returned in the  
657 response. If this attribute is not returned in the response, the Client can  
658 assume that the "job-state-message" attribute is not supported and will not  
659 be returned in a subsequent Job query.

660 "job-uri" (uri):

661 The Printer MUST return the new Job's "job-uri" attribute.

662 "number-of-intervening-jobs" (integer(0:MAX)):

663 The Printer SHOULD return the Job's RECOMMENDED "number-of-  
664 intervening-jobs" attribute. If the Printer supports this attribute, then it MUST  
665 be returned in the response. If this attribute is not returned in the response,  
666 the Client can assume that the "number-of-intervening-jobs" attribute is not  
667 supported and will not be returned in a subsequent Job query.

## 668 **5. Attributes**

### 669 **5.1 Operation Attributes**

#### 670 **5.1.1 job-hold-until-time (dateTime)**

671 This RECOMMENDED attribute specifies the date and time after which the Job MUST  
672 become a candidate for processing. Printers that support this attribute MUST support the  
673 "job-hold-until" [STD92] operation attribute.

674 Clients MUST NOT supply both the "job-hold-until-time" and "job-hold-until" [STD92]  
675 operation attributes in a Hold-Job request. If a Client supplies both attributes, the Printer  
676 MUST reject the request and return the 'client-error-conflicting-attributes' status code.

#### 677 **5.1.2 job-ids (1setOf integer(1:MAX))**

678 This REQUIRED attribute specifies a list of "job-id" [STD92] values for the Cancel-Jobs  
679 (section 4.1), Cancel-My-Jobs (section 4.2), and Get-Jobs (section 6.1) operations.

#### 680 **5.1.3 job-mandatory-attributes (1setOf keyword)**

681 This REQUIRED attribute identifies which Job Template attributes the Printer MUST support  
682 in the Job Creation request in order to accept the Job. The values are the names of Job  
683 Template attributes, for example, 'job-hold-until', 'copies', and 'media'. In order to identify a  
684 member attribute of a collection attribute, the keyword names of both the collection attribute  
685 and the member attribute are given separated by a period (.) character. For example, to  
686 make the "media" attribute of the "cover-front" collection attribute mandatory, supply the  
687 keyword value 'cover-front.media'.

688 Note: As with "ipp-attribute-fidelity", the "job-mandatory-attributes" attribute does not  
689 determine whether the Printer overrides the PDL with the identified Job Template attributes,  
690 as that functionality is defined by the "pdl-override-supported" Printer Description attribute  
691 [STD92].

### 692 **5.2 Document and Job Status Attributes**

#### 693 **5.2.1 errors-count (integer(0:MAX))**

694 This RECOMMENDED attribute reports the number of errors encountered processing the  
695 Job as a whole. An error is reported when some portion of the printed output is not present,  
696 such as a glyph encountered which isn't in a Printer's font or an image in a page was in a  
697 format that the Printer didn't support, though the Printer did support the overall Document  
698 format.

**699 5.2.2 print-content-optimize-actual (1setOf type2 keyword)**

700 This RECOMMENDED attribute reports the “print-content-optimize” value(s) that the Printer  
701 actually used to produce the Job.

**702 5.2.3 warnings-count (integer(0:MAX))**

703 This RECOMMENDED attribute reports the number of warnings encountered processing  
704 the Job as a whole. A warning is reported when no information is lost but the appearance  
705 of the printed output might not be as expected.

**706 5.3 Document and Job Template Attributes****707 5.3.1 output-device (name(127))**

708 This attribute requests a named Output Device for a Printer that fans-out to multiple devices.  
709 If omitted, the Printer selects the best Output Device for the Job in an implementation  
710 dependent manner.

**711 5.3.2 print-content-optimize (type2 keyword)**

712 This RECOMMENDED attribute specifies the type of content optimization to perform on the  
713 Document data. Keyword values specify the type of content to optimize, including:

714 'graphics': Graphs and line drawings.

715 'photo': Photographs.

716 'text': Text.

717 'text-and-graphics': Text and graphics.

**718 5.4 Job Template Attributes****719 5.4.1 job-cancel-after (integer(0:MAX))**

720 This RECOMMENDED attribute specifies the maximum number of seconds allowed for  
721 processing a Job. When specified, the Printer cancels the Job automatically if it cannot be  
722 completed within the specified timeframe. The completion timer does not begin until the Job  
723 enters the 'processing' state'.

**724 5.4.2 job-delay-output-until (type2 keyword | name(MAX))**

725 This RECOMMENDED attribute specifies a time period in the future when the Printer will  
726 produce the output for the Job. If the specified time period has not yet arrived, the Printer  
727 MUST set the Job's "job-state-reasons" value to 'job-delay-output-until-specified'. The  
728 Printer MUST NOT produce any output until the time period arrives but MAY perform pre-



729 processing. When the time period arrives, the Job MUST become a candidate for output,  
730 including any processing required to produce the output. The only way to alter the delay  
731 period for a Job is by using the Set-Job-Attributes [RFC3380] operation.

732 Standard keyword values for named time periods are:

733 'day-time': Delay output until daylight, typically 6am to 6pm.

734 'evening': Delay output until the evening, typically from 6pm to 12am.

735 'indefinite': Delay output indefinitely; the time period can be changed using the Set-  
736 Job-Attributes [RFC3380] operation.

737 'night': Delay output until the night, typically from 12am to 6am.

738 'no-delay-output': Do not delay the output.

739 'second-shift': Delay output until the second work shift, typically from 4pm to 12am.

740 'third-shift': Delay output until the third work shift, typically from 12am to 8am.

741 'weekend': Delay output until the weekend.

742 Clients MUST NOT supply both the "job-delay-output-until" and "job-delay-output-until-time"  
743 (section 5.4.3) Job Template attributes in a Job Creation request. If a Client supplies both  
744 attributes, the Printer MUST reject the request and return the 'client-error-conflicting-  
745 attributes' status code.

746 Note: Unlike the "job-hold-until" [STD92] Job Template attribute, the "job-delay-output-until"  
747 attribute does not cause the Job to enter the 'pending-held' state.

#### 748 **5.4.3 job-delay-output-until-time (dateTime)**

749 This RECOMMENDED attribute specifies a date and time when the Printer will produce the  
750 output for the Job. If the specified time period has not yet arrived, the Printer MUST set the  
751 Job's "job-state-reasons" value to 'job-delay-output-until-specified'. The Printer MUST NOT  
752 produce any output until the time period arrives but MAY perform pre-processing. When the  
753 time period arrives, the Job MUST become a candidate for output, including any processing  
754 required to produce the output. The only way to alter the delay period for a Job is by using  
755 the Set-Job-Attributes [RFC3380] operation.

756 Clients MUST NOT supply both the "job-delay-output-until-time" and "job-delay-output-until"  
757 (section 5.4.2) Job Template attributes in a Job Creation request. If a Client supplies both  
758 attributes, the Printer MUST reject the request and return the 'client-error-conflicting-  
759 attributes' status code.

760 Note: Unlike the "job-hold-until-time" (section 5.4.4) Job Template attribute, the "job-delay-  
761 output-until-time" attribute does not cause the Job to enter the 'pending-held' state.

**762 5.4.4 job-hold-until-time (dateTime)**

763 This RECOMMENDED attribute specifies the date and time after which the Job MUST  
764 become a candidate for processing. Printers that support this attribute MUST support the  
765 "job-hold-until" [STD92] Job Template attribute.

766 Clients MUST NOT supply both the "job-hold-until-time" and "job-hold-until" [STD92] Job  
767 Template attributes in a Job Creation request. If a Client supplies both attributes, the Printer  
768 MUST reject the request and return the 'client-error-conflicting-attributes' status code.

**769 5.4.5 job-retain-until (type2 keyword | name(MAX))**

770 This RECOMMENDED attribute specifies how long the Job remains in the Job Retention  
771 phase of a Job's life cycle [STD92]. Standard values include:

772 'end-of-day': Retain the Job until the end of the current day.

773 'end-of-month': Retain the Job until the end of the current month.

774 'end-of-week': Retain the Job until the end of the current week.

775 'indefinite': Retain the Job indefinitely.

776 'none': Do not retain the Job.

777 Clients MUST NOT supply the "job-retain-until", "job-retain-until-interval" (section 5.4.6),  
778 and/or "job-retain-until-time" (section 0) Job Template attributes together in a Job Creation  
779 request. If a Client supplies more than one of these attributes, the Printer MUST reject the  
780 request and return the 'client-error-conflicting-attributes' status code.

**781 5.4.6 job-retain-until-interval (integer(0:MAX))**

782 This RECOMMENDED attribute specifies the number of seconds the Job remains in the Job  
783 Retention phase of a Job's life cycle [STD92].

784 Clients MUST NOT supply the "job-retain-until" (section 5.4.5), "job-retain-until-interval",  
785 and/or "job-retain-until-time" (section 0) Job Template attributes together in a Job Creation  
786 request. If a Client supplies more than one of these attributes, the Printer MUST reject the  
787 request and return the 'client-error-conflicting-attributes' status code.

**788 5.4.7 job-retain-until-time (dateTime)**

789 This RECOMMENDED attribute specifies the date and time when the Job can leave the Job  
790 Retention phase of a Job's life cycle [STD92].

791 Clients MUST NOT supply the "job-retain-until" (section 5.4.5), "job-retain-until-interval"  
792 (section 5.4.6), and/or "job-retain-until-time" Job Template attributes together in a Job

793 Creation request. If a Client supplies more than one of these attributes, the Printer MUST  
794 reject the request and return the 'client-error-conflicting-attributes' status code.

## 795 **5.5 Printer Description Attributes**

### 796 **5.5.1 document-charset-default (charset)**

797 This CONDITIONALLY REQUIRED attribute specifies the default charset that the Printer  
798 will assume for charset-ambiguous Document formats when the Client omits the “document-  
799 charset” operation attribute [PWG5100.5]. Printers that support the "document-charset"  
800 operation attribute MUST support this attribute.

### 801 **5.5.2 document-charset-supported (1setOf charset)**

802 This CONDITIONALLY REQUIRED attribute lists the charsets that the Printer supports for  
803 charset-ambiguous Document formats. Printers that support the "document-charset"  
804 operation attribute [PWG5100.5] MUST support this attribute.

### 805 **5.5.3 document-natural-language-default (naturalLanguage)**

806 This CONDITIONALLY REQUIRED attribute specifies the default natural language that the  
807 Printer will assume for Document data when the Client omits the “document-natural-  
808 language” operation attribute [STD92]. Printers that support the "document-natural-  
809 language" attribute MUST support this attribute.

### 810 **5.5.4 document-natural-language-supported (1setOf naturalLanguage)**

811 This CONDITIONALLY REQUIRED attribute lists the natural languages supported for  
812 Printer-supported Document formats. Printers that support the "document-natural-language"  
813 attribute MUST support this attribute.

### 814 **5.5.5 job-cancel-after-default (integer(0:MAX) | no-value)**

815 This CONDITIONALLY REQUIRED attribute specifies the default value for the "job-cancel-  
816 after" (section 5.4.1) Job Template attribute. Printers that support the "job-cancel-after"  
817 attribute MUST support this attribute.

### 818 **5.5.6 job-cancel-after-supported (rangeOfInteger(0:MAX))**

819 This CONDITIONALLY REQUIRED attribute specifies the range of values supported for the  
820 "job-cancel-after" (section 5.4.1) Job Template attribute. Printers that support the "job-  
821 cancel-after" attribute MUST support this attribute.

### 822 **5.5.7 job-creation-attributes-supported (1setOf keyword)**

823 This REQUIRED attribute lists the names of the operation and Job Template attributes that  
824 can be sent in a Job Creation or Validate-Job request.

**825 5.5.8 job-delay-output-until-default (type2 keyword | name(MAX))**

826 This CONDITIONALLY REQUIRED attribute specifies the default value of the "job-delay-  
827 output-until" (section 5.4.2) Job Template attribute. Printers that support the "job-delay-  
828 output-until" attribute MUST support this attribute.

**829 5.5.9 job-delay-output-until-supported (1setOf (type2 keyword | name(MAX)))**

830 This CONDITIONALLY REQUIRED attribute lists the supported values of the "job-delay-  
831 output-until" (section 5.4.2) Job Template attribute. Printers that support the "job-delay-  
832 output-until" attribute MUST support this attribute.

**833 5.5.10 job-delay-output-until-time-supported (rangeOfInteger(0:MAX))**

834 This CONDITIONALLY REQUIRED attribute specifies the range of time values supported  
835 by the "job-delay-output-until-time" (section 5.4.3) Job Template attribute. Printers that  
836 support the "job-delay-output-until-time" attribute MUST support this attribute.

**837 5.5.11 job-history-attributes-configured (1setOf keyword)**

838 This REQUIRED attribute lists the Job attributes that will be retained in the history phase of  
839 each Job. IPP/1.1 [STD92] specifies that at least the "job-id", "job-printer-uri", "job-state",  
840 and "job-state-reasons" attributes MUST be retained in the history phase. Printers that  
841 support the "job-history-attributes-supported" (section N.M.P) attribute MUST support this  
842 attribute.

**843 5.5.12 job-history-attributes-supported (1setOf keyword)**

844 This REQUIRED attribute lists the Job attributes that can be retained in the history phase of  
845 each Job. Printers that support the "job-history-attributes-configured" (section N.M.P)  
846 attribute MUST support this attribute.

**847 5.5.13 job-history-interval-configured (integer(0:MAX))**

848 This REQUIRED attribute specifies the minimum number of seconds that a Job will remain  
849 in the history phase of its lifecycle [STD92]. Printers SHOULD have a default configured  
850 value of at least 60 seconds to allow Clients to discover the disposition of any Jobs that have  
851 reached a terminating state. Printers that support the "job-history-interval-supported"  
852 (section N.M.P) attribute MUST support this attribute.

**853 5.5.14 job-history-interval-supported (rangeOfInteger(0:MAX))**

854 This REQUIRED attribute specifies the range of values that are supported for the "job-  
855 history-interval-configured" Printer Description attribute. Printers that support the "job-  
856 history-interval-configured" (section N.M.P) attribute MUST support this attribute.

**857 5.5.15 job-ids-supported (boolean)**

858 This REQUIRED attribute specifies whether the "job-ids" operation attribute (section 5.1.2)  
859 is supported.

**860 5.5.16 job-mandatory-attributes-supported (boolean)**

861 This REQUIRED attribute specifies that the "job-mandatory-attributes" operation attribute  
862 (section 5.1.3) is supported. Printers MUST report a value of 'true' for this attribute.

**863 5.5.17 job-retain-until-default (type2 keyword | name(MAX))**

864 This CONDITIONALLY REQUIRED attribute specifies the default value of the "job-retain-  
865 until" (section 5.4.5) Job Template attribute. Printers that support the "job-retain-until"  
866 attribute MUST support this attribute.

**867 5.5.18 job-retain-until-interval-default (integer(0:MAX) | no-value)**

868 This CONDITIONALLY REQUIRED attribute specifies the default value of the "job-retain-  
869 until-interval" (section 5.4.6) Job Template attribute. Printers that support the "job-retain-  
870 until-interval" attribute MUST support this attribute.

**871 5.5.19 job-retain-until-interval-supported (rangeOfInteger(0:MAX))**

872 This CONDITIONALLY REQUIRED attribute specifies the supported values of the "job-  
873 retain-until-interval" (section 5.4.6) Job Template attribute. Printers that support the "job-  
874 retain-until-interval" attribute MUST support this attribute.

**875 5.5.20 job-retain-until-supported (1setOf (type2 keyword | name(MAX)))**

876 This CONDITIONALLY REQUIRED attribute lists the supported values of the "job-retain-  
877 until" (section 5.4.5) Job Template attribute. Printers that support the "job-retain-until"  
878 attribute MUST support this attribute.

**879 5.5.21 job-retain-until-time-supported (rangeOfInteger(0:MAX))**

880 This CONDITIONALLY REQUIRED attribute specifies the supported values of the "job-  
881 retain-until-time" (section 5.4.7) Job Template attribute. Printers that support the "job-retain-  
882 until-time" attribute MUST support this attribute.

**883 5.5.22 job-spooling-supported (type2 keyword)**

884 This REQUIRED attribute specifies whether Jobs are spooled before the Document data is  
885 processed. The value of this attribute returned in a Get-Printer-Attributes response MAY  
886 depend on the "document-format" attribute supplied in the Get-Printer-Attributes request  
887 [STD92]. If the Printer does not support this attribute, then the spooling behavior is  
888 implementation dependent.

889 Standard keyword values include:

890 'automatic': The Printer chooses whether to process the Document data as it is  
891 received or after spooling (storage).

892 'spool': The printer processes the Document data after it has been spooled (stored).

893 'stream': The printer processes the Document data as it is received.

### 894 5.5.23 media-col-database (1setOf collection)

895 This REQUIRED attribute lists the set of pre-defined "media-col" collections available in the  
896 Printer's media database. This attribute is similar to "media-col-ready" [PWG5100.3] but  
897 returns the entire set of pre-defined "media-col" collections known by the Printer instead of  
898 just the media loaded in the Printer. If this attribute is supported, the members of the  
899 collections correspond to the supported members of the "media-col" [PWG5100.3]  
900 Job/Document Template attribute.

901 Because the number and size of values of this attribute can be very large, the Printer MUST  
902 NOT return this attribute in the response to the Get-Printer-Attributes operation unless the  
903 Client explicitly requests it by including the 'media-col-database' value in the "requested-  
904 attributes" [STD92] operation attribute.

905 In order to limit the number and size of values of this attribute, Printers MAY exclude the  
906 "media-source" and/or "media-type" member attributes from collection values when all  
907 values of the corresponding member attribute are supported when combined with the other  
908 member attributes and values.

909 For example, a Printer that supports ISO A4, ISO DL Envelope, US Letter, US Legal, and  
910 US #10 Envelope media, a single removable tray and a multi-purpose tray, and cardstock,  
911 envelopes, plain paper, labels, letterhead, and transparency media types might report the  
912 following attributes and values:

```
913 media-size-supported={...}
914 media-source-supported='by-pass-tray', 'main', 'manual'
915 media-type-supported='cardstock', 'envelope', 'labels', 'stationery',
916                       'stationery-letterhead', 'transparency'
917 media-col-database={
918   /* ISO A4 cardstock only from manual feed */
919   media-size={
920     x-dimension=21000
921     y-dimension=29700
922   }
923   media-source='manual'
924   media-type='cardstock'
925 }, {
926   /* ISO A4 transparency only from manual feed */
927   media-size={
928     x-dimension=21000
929     y-dimension=29700
```

```
930     }
931     media-source='manual'
932     media-type='transparency'
933 },{
934     /* ISO A4 plain paper from any source */
935     media-size={
936         x-dimension=21000
937         y-dimension=29700
938     }
939     media-type='stationery'
940 },{
941     /* ISO A4 letterhead from any source */
942     media-size={
943         x-dimension=21000
944         y-dimension=29700
945     }
946     media-type='stationery-letterhead'
947 },... /* Lots of other values */
```

#### 948 **5.5.24 output-device-supported (1setOf name(127))**

949 This CONDITIONALLY REQUIRED attribute lists the supported “output-device” values.  
950 Printers MUST support this attribute if the "output-device" Job Template attribute (section  
951 5.3.1) is supported.

#### 952 **5.5.25 print-content-optimize-default (type2 keyword)**

953 This CONDITIONALLY REQUIRED attribute specifies the default “print-content-optimize”  
954 (section 5.3.2) value. Printers that support the "print-content-optimize" attribute MUST  
955 support this attribute.

#### 956 **5.5.26 print-content-optimize-supported (1setOf type2 keyword)**

957 This CONDITIONALLY REQUIRED attribute lists the supported “print-content-optimize”  
958 (section 5.3.2) values. Printers that support the "print-content-optimize" attribute MUST  
959 support this attribute.

#### 960 **5.5.27 which-jobs-supported (1setOf type2 keyword)**

961 This REQUIRED attribute lists the supported values for the "which-jobs" operation attribute  
962 [STD92] that is used with the Get-Jobs operation [STD92].

## 963 **5.6 Printer Status Attributes**

### 964 **5.6.1 printer-detailed-status-messages (1setOf text(MAX))**

965 This attribute specifies additional detailed and technical information about the Printer,  
966 including information such as fault and warning messages, in the same way that the “job-  
967 detailed-status-messages” [STD92] Job Status attribute provides additional information

968 about a Job. Because the messages are human-readable text, Clients MUST NOT attempt  
969 to parse the value(s) of this attribute.

## 970 **6. Additional Semantics for Existing Operations**

### 971 **6.1 Create-Job, Print-Job, Print-URI, Validate-Job: job-mandatory- 972 attributes**

973 This specification extends the Create-Job, Print-Job, Print-URI, and Validate-Job operations  
974 to support the "job-mandatory-attributes" operation attribute (section 5.1.3) in the request  
975 sent by the Client, which specifies a list of Job Template attributes that MUST be supported  
976 by the Printer for the request to be accepted.

977 The Client MAY supply and the Printer MUST accept the "job-mandatory-attributes"  
978 operation attribute in any Job Creation or Validate-Job request.

979 The Printer MUST reject the Job Creation request if the Client supplies an unsupported Job  
980 Template attribute or value in the request that is included in this list of "job-mandatory-  
981 attributes" values.

982 If the Client supplies both the "job-mandatory-attributes" and "ipp-attribute-fidelity" operation  
983 attributes, the Printer MUST ignore the "job-mandatory-attributes" attribute.

### 984 **6.2 Create-Job, Print-Job, Print-URI: server-error-too-many-jobs Status 985 Code**

986 This specification extends the Job Creation operations to return the 'server-error-too-many-  
987 jobs' status code value when the Printer is currently unable to create a new Job object.

### 988 **6.3 Get-Jobs Operation: "job-ids (1setOf integer(1:MAX))"**

989 The "job-ids" (section 5.1.2) operation attribute, if supplied, specifies a list of target Jobs to  
990 be returned in the response to a Get-Jobs [STD92] request. Printers MUST support it in Get-  
991 Jobs requests to limit the list of Jobs that are returned.

992 If the Client supplies the "job-ids" operation attribute in a Get-Jobs request, the Client MUST  
993 NOT also supply any of the following operation attributes in the same request: "limit", "my-  
994 jobs", or "which-jobs". If the Client does supply prohibited operation attributes, the Printer  
995 MUST reject the request and return the 'client-error-conflicting-attributes' status code.

### 996 **6.4 Hold-Job Operation: "job-hold-until-time (dateTime)"**

997 The "job-hold-until-time" (section 5.1.1) operation attribute can be provided to specify a date  
998 and time when the Job will become a candidate for processing. Printers that support the



999 "job-hold-until-time" attribute and Hold-Job operation MUST support its use with the Hold-  
1000 Job operation. If accepted, the "job-hold-until-time" operation attribute is copied to the Job,  
1001 replacing any existing "job-hold-until" [STD92] or "job-hold-until-time" attribute.

1002 Clients MUST NOT send both the "job-hold-until" [STD92] and "job-hold-until-time" operation  
1003 attributes in a Hold-Job request. If both attributes are sent, Printers MUST reject the request  
1004 and return the 'client-error-conflicting-attributes' status code.

## 1005 **6.5 Print-Job, Print-URI, Send-Document, Send-URI: server-error-too-** 1006 **many-documents Status Code**

1007 This specification extends the Document Creation operations to return the 'server-error-too-  
1008 many-documents' status code value when the Printer is currently unable to create a new  
1009 Document object.

## 1010 **6.6 Set-Job-Attributes Operation: "job-hold-until-time (dateTime)"**

1011 The "job-hold-until-time" (section 5.4.4) Job Template attribute can be provided to specify a  
1012 date and time when the Job will become a candidate for processing. Printers that support  
1013 the "job-hold-until-time" attribute and Set-Job-Attributes operation MUST support its use with  
1014 the Set-Job-Attributes operation. If accepted, the "job-hold-until-time" operation attribute is  
1015 copied to the Job, replacing any existing "job-hold-until" [STD92] or "job-hold-until-time"  
1016 attribute.

1017 Clients MUST NOT send both the "job-hold-until" [STD92] and "job-hold-until-time" Job  
1018 Template attributes in a Set-Job-Attributes request. If both attributes are sent, Printers  
1019 MUST reject the request and return the 'client-error-conflicting-attributes' status code.

## 1020 **7. Additional Values for Existing Attributes**

### 1021 **7.1 job-state-reasons (1setOf type2 keyword)**

1022 This specification adds the following new keyword values for the "job-state-reasons" Job  
1023 Status attribute [STD92]:

1024 'digital-signature-did-not-verify': One or more documents in the Job contains a  
1025 digital signature that could not be verified by the Printer.

1026 'errors-detected': The Printer has detected one or more errors during processing of  
1027 the Job.

1028 'job-delay-until-specified': The Job's output is delayed because the "job-delay-  
1029 output-until" or "job-delay-output-until-time" Job Template attribute was specified.

1030 'warnings-detected': The Printer has detected one or more warnings during  
1031 processing of the Job.

## 1032 **7.2 media (type2 keyword | name(MAX))**

1033 This specification adds the following new keyword value for the "media" Job Template  
1034 attribute [STD92]:

1035 'choice\_iso\_a4\_210x297mm\_na\_letter\_8.5x11in': Print using US Letter or ISO A4  
1036 media (whichever is available).

1037 Note: The semantics of the 'choice' prefix are documented in the PWG Media Standardized  
1038 Names v2.0 (MSN2) specification [PWG5101.1].

## 1039 **7.3 media-col (collection)**

1040 This specification adds the "media-grain", "media-thickness", and "media-tooth" member  
1041 attributes to the "media-col" Job/Document Template attribute.

### 1042 **7.3.1 media-grain (type2 keyword | name(MAX))**

1043 This member attribute specifies the desired grain of the media being specified [ISO10175].  
1044 Grain affects the curl and the folding of the media. Some marking engines are sensitive to  
1045 the resulting curl. Standard keyword values for "media-grain" include:

1046 'x-direction': The direction of the paper fibers is in the cross-feed direction of the  
1047 media.

1048 'y-direction': The direction of the paper fibers is in the feed direction of the media.

### 1049 **7.3.2 media-thickness (integer(1:MAX))**

1050 This member attribute specifies the thickness of the media [JDF] in hundreds of millimeters  
1051 (1/2540th of an inch).

### 1052 **7.3.3 media-tooth (type2 keyword | name(MAX))**

1053 This member attribute specifies the tooth (or roughness) of the media [ISO10175]. The tooth  
1054 is particularly important for marking engines that use pens (e.g. plotters) to mark the media  
1055 - the type of pen used matches the tooth of the media for best resolution.

1056 Standard keyword values for "media-tooth" include:

1057 'antique': Rougher than 'vellum' [JDF].

1058 'calendared': Extra smooth or polished, uncoated paper [JDF].

- 1059 'coarse': Rough finish.
- 1060 'fine': Smoother finish than 'smooth'.
- 1061 'linen': Finish like coarse woven cloth [JDF].
- 1062 'medium': Regular finish.
- 1063 'smooth': Smooth finish [JDF].
- 1064 'stipple': Fine pebble finish [JDF].
- 1065 'uncalendared': Rough, unpolished and uncoated papers [JDF].
- 1066 'vellum': Slightly rough surface [JDF].

#### 1067 **7.4 pdl-override-supported (type2 keyword)**

1068 This specification defines a new 'guaranteed' value for the "pdl-override-supported" [STD92]  
1069 Printer Description attribute. This value indicates that the Printer guarantees that:

- 1070 1. Document and/or Job Template attribute values take precedence over instructions of  
1071 any form embedded anywhere in the Document data;
- 1072 2. Document and/or Job Template attributes that have only a single supported value  
1073 take precedence over instructions of any form embedded anywhere in the Document  
1074 data, even if the attribute is not included in the Job or Document Creation request;  
1075 and
- 1076 3. No PDL instruction is performed that does not correspond to a current value in the  
1077 corresponding "xxx-supported" Printer Description attribute.

1078 If a Printer cannot honor the advertised "pdl-override-supported" value for a Job, it can abort  
1079 the Job, stop the Printer, hold the Job, or substitute a supported value. This choice can be  
1080 fixed by the implementation or configurable by the Administrator and can depend on the  
1081 Document and/or Job Template attribute.

#### 1082 **7.5 which-jobs (type2 keyword)**

1083 This specification adds the following new keyword values for the "which-jobs" operation  
1084 attribute [STD92]:

- 1085 'aborted': Any Job in the 'aborted' state.
- 1086 'all': All Jobs regardless of state.
- 1087 'canceled': Any Job in the 'canceled' state.

1088 'pending': Any Job in the 'pending' state.

1089 'pending-held': Any Job in the 'pending-held' state.

1090 'processing': Any Job in the 'processing' state.

1091 'processing-stopped': Any Job in the 'processing-stopped' state.

## 1092 **8. New Status Codes**

1093 This section defines additional status code values.

### 1094 **8.1 server-error-too-many-jobs (0x050B)**

1095 The Client has attempted to create a Job using any of the Job Creation operations which  
1096 would exceed the capacity of the Printer. The Client can retry the unmodified request.

### 1097 **8.2 server-error-too-many-documents (0x050C)**

1098 The Client has attempted to create a Document using any of the Document Creation  
1099 operations which would exceed the capacity of the Printer for this Job. The Client can retry  
1100 the unmodified request.

1101

1102 **9. Obsolete Attributes**1103 **9.1 Obsolete Operation Attributes**

1104 Table 1 lists the operation attributes from the previous version of this specification  
 1105 [PWG5100.7-2003] which are now obsolete.

1106 **Table 1 - Obsolete Operation Attributes**

Attribute	Notes
document-digital-signature (type2 keyword)	Not usable
document-format-details (1setOf collection)	Interoperability issues and privacy concerns
document-format-version (text(127))	Interoperability issues

1107 **9.2 Obsolete Job Status Attributes**

1108 Table 2 lists the Job Status attributes from the previous version of this specification  
 1109 [PWG5100.7-2003] which are now obsolete.

1110 **Table 2 - Obsolete Job Status Attributes**

Attribute	Notes
compression-supported (type2 keyword)	Not usable
document-charset-supported (charset)	Superseded by PWG 5100.5
document-digital-signature-supplied (type2 keyword)	Obsolete parent attribute
document-format-details-supported (1setOf collection)	Obsolete parent attribute
document-format-supplied (mimeMediaType)	Superseded by PWG 5100.5
document-format-version-supplied (text(127))	Obsolete parent attribute
document-message-supplied (text(MAX))	Superseded by PWG 5100.5
document-name-supplied	Superseded by PWG 5100.5
document-natural-language-supplied (naturalLanguage)	Superseded by PWG 5100.5
ipp-attribute-fidelity (boolean)	Only used at time of creation
job-copies-actual (integer(1:MAX))	Obsolete parent attribute
job-cover-back-actual (collection)	Obsolete parent attribute
job-cover-front-actual (collection)	Obsolete parent attribute
job-finishings-actual (1setOf type2 enum)	Obsolete parent attribute
job-finishings-col-actual (1setOf collection)	Obsolete parent attribute
job-mandatory-attributes (1setOf keyword)	Only used at time of creation
output-device-actual (1setOf name(127))	Redundant

### 1111 9.3 Obsolete Job Template Attributes

1112 Table 3 lists the Job Templates attributes from the previous version of this specification  
1113 [PWG5100.7-2003] which are now obsolete.

1114 **Table 3 - Obsolete Job Template Attributes**

Attribute	Notes
job-copies (integer(1:MAX))	Interoperability issues
job-cover-back (collection)	Interoperability issues
job-cover-front (collection)	Interoperability issues
job-finishings (1setOf type2 enum)	Interoperability issues
job-finishings-col (1setOf collection)	Interoperability issues

### 1115 9.4 Obsolete Printer Description Attributes

1116 The following Printer Description attributes from the previous version of this specification  
1117 [PWG5100.7-2003] which are now obsolete.

1118 **Table 4 - Obsolete Printer Description Attributes**

Attribute	Notes
document-digital-signature-default (type2 keyword)	Obsolete parent attribute
document-digital-signature-supported (1setOf type2 keyword)	Obsolete parent attribute
document-format-details-default (collection)	Obsolete parent attribute
document-format-details-supported (1setOf keyword)	Obsolete parent attribute
document-format-version-default (text(127))	Obsolete parent attribute
document-format-version-supported (1setOf text(127))	Obsolete parent attribute
job-copies-default (integer(1:MAX))	Obsolete parent attribute
job-copies-supported (rangeOfInteger(1:MAX))	Obsolete parent attribute
job-cover-back-default (collection)	Obsolete parent attribute
job-cover-back-supported (1setOf keyword)	Obsolete parent attribute
job-cover-front-default (collection)	Obsolete parent attribute
job-cover-front-supported (1setOf keyword)	Obsolete parent attribute
job-finishings-col-default (1setOf collection)	Obsolete parent attribute
job-finishings-col-ready (1setOf collection)	Obsolete parent attribute
job-finishings-col-supported (1setOf keyword)	Obsolete parent attribute
job-finishings-default (1setOf type2 enum)	Obsolete parent attribute
job-finishings-ready (1setOf type2 enum)	Obsolete parent attribute
job-finishings-supported (1setOf type2 enum)	Obsolete parent attribute

## 1119 **10. Obsolete Values**

### 1120 **10.1 Obsolete "job-state-reasons" Values**

1121 The 'digital-signature-type-not-supported' and 'job-digital-signature-wait' keyword values  
1122 from the previous version of this specification [PWG5100.7-2003] are now obsolete because  
1123 the corresponding Job Template attribute is obsolete.

## 1124 **11. Conformance Requirements**

### 1125 **11.1 Printer Conformance Requirements**

1126 In order for a Printer to claim conformance to this specification, a Printer MUST support:

- 1127 1. The new operations defined in section 4;
- 1128 2. The operation attributes defined in 5.1;
- 1129 3. The Job Status attributes defined in section 5.2 that correspond to any  
1130 supported Job Template attributes defined in section 5.3;
- 1131 4. The Document Status attributes defined in section 5.2 that correspond to any  
1132 supported Document Template attributes defined in section 5.3;
- 1133 5. The Printer Description attributes defined in section 5.5 that correspond to any  
1134 supported Document/Job Template attributes defined in section 5.3;
- 1135 6. The additional semantics defined in section 6;
- 1136 7. The additional values defined in section 7;
- 1137 8. The internationalization considerations defined in section 12; and
- 1138 9. The security considerations defined in section 13.

### 1139 **11.2 Client Conformance Requirements**

1140 In order for a Client to claim conformance to this specification, a Client MUST support:

- 1141 1. The internationalization considerations defined in section 12; and
- 1142 2. The security considerations defined in section 13.

## 1143 **12. Internationalization Considerations**

1144 For interoperability and basic support for multiple languages, conforming implementations  
1145 MUST support:

- 1146 1. The Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8)  
1147 [STD63] encoding of Unicode [UNICODE] [ISO10646]; and
- 1148 2. The Unicode Format for Network Interchange [RFC5198] which requires  
1149 transmission of well-formed UTF-8 strings and recommends transmission of  
1150 normalized UTF-8 strings in Normalization Form C (NFC) [UAX15].

1151 Unicode NFC is defined as the result of performing Canonical Decomposition (into base  
1152 characters and combining marks) followed by Canonical Composition (into canonical  
1153 composed characters wherever Unicode has assigned them).

1154 WARNING – Performing normalization on UTF-8 strings received from Clients and  
1155 subsequently storing the results (e.g., in Job objects) could cause false negatives in Client  
1156 searches and failed access (e.g., to Printers with percent-encoded UTF-8 URIs now  
1157 'hidden').

1158 Implementations of this specification SHOULD conform to the following standards on  
1159 processing of human-readable Unicode text strings, see:

1160 Unicode Bidirectional Algorithm [UAX9] – left-to-right, right-to-left, and vertical

1161 Unicode Line Breaking Algorithm [UAX14] – character classes and wrapping

1162 Unicode Normalization Forms [UAX15] – especially NFC for [RFC5198]

1163 Unicode Text Segmentation [UAX29] – grapheme clusters, words, sentences

1164 Unicode Identifier and Pattern Syntax [UAX31] – identifier use and normalization

1165 Unicode Collation Algorithm [UTS10] – sorting

1166 Unicode Locale Data Markup Language [UTS35] – locale databases

1167 Implementations of this specification are advised to also review the following informational  
1168 documents on processing of human-readable Unicode text strings:

1169 Unicode Character Encoding Model [UTR17] – multi-layer character model

1170 Unicode Character Property Model [UTR23] – character properties

1171 Unicode Conformance Model [UTR33] – Unicode conformance basis

### 1172 **13. Security Considerations**

1173 The IPP extensions defined in this document require the same security considerations as  
1174 defined in the Internet Printing Protocol/1.1 [STD92].

1175 Implementations of this specification SHOULD conform to the following standard on  
1176 processing of human-readable Unicode text strings, see:

1177 Unicode Security Mechanisms [UTS39] – detecting and avoiding security attacks

1178 Implementations of this specification are advised to also review the following informational  
1179 document on processing of human-readable Unicode text strings:



1180 Unicode Security FAQ [UNISECFAQ] – common Unicode security issues

## 1181 14. IANA Considerations

### 1182 14.1 Attribute Registrations

1183 The attributes defined in this specification will be published by IANA according to the  
1184 procedures in the Internet Printing Protocol/1.1 [STD92] in the following file:

1185 <http://www.iana.org/assignments/ipp-registrations>

1186 The registry entries will contain the following information:

1187	Document Status attributes:	Reference
1188	-----	-----
1189	compression-supplied(obsolete) (type2 keyword)	[PWG5100.7]
1190	document-charset-supplied(obsolete) (charset)	[PWG5100.7]
1191	document-digital-signature-supplied(obsolete) (type2 keyword)	[PWG5100.7]
1192		
1193	document-format-details-supplied(obsolete) (1setOf collection)	[PWG5100.7]
1194		
1195	document-format-supplied(obsolete) (mimeMediaType)	[PWG5100.7]
1196	document-format-version-supplied(obsolete) (text(127))	[PWG5100.7]
1197	document-message-supplied(obsolete) (text(MAX))	[PWG5100.7]
1198	document-name-supplied(obsolete) (name(MAX))	[PWG5100.7]
1199	document-natural-language-supplied(obsolete) (naturalLanguage)	[PWG5100.7]
1200		
1201	errors-count (integer(0:MAX))	[PWG5100.7]
1202	output-device-actual(obsolete) (1setOf name(127))	[PWG5100.7]
1203	print-content-optimize-actual (1setOf type2 keyword)	[PWG5100.7]
1204	warnings-count (integer(0:MAX))	[PWG5100.7]
1205		
1206	Document Template attributes:	Reference
1207	-----	-----
1208	output-device (name(127))	[PWG5100.7]
1209	print-content-optimize (type2 keyword)	[PWG5100.7]
1210		
1211	Job Status attributes:	Reference
1212	-----	-----
1213	compression-supplied(obsolete) (type2 keyword)	[PWG5100.7]
1214	document-charset-supplied(obsolete) (charset)	[PWG5100.7]
1215	document-digital-signature-supplied(obsolete) (type2 keyword)	[PWG5100.7]
1216		
1217	document-format-details-supplied(obsolete) (1setOf collection)	[PWG5100.7]
1218		
1219	document-format-supplied(obsolete) (mimeMediaType)	[PWG5100.7]
1220	document-format-version-supplied(obsolete) (text(127))	[PWG5100.7]
1221	document-message-supplied(obsolete) (text(MAX))	[PWG5100.7]
1222	document-name-supplied(obsolete) (name(MAX))	[PWG5100.7]
1223	document-natural-language-supplied(obsolete) (naturalLanguage)	[PWG5100.7]
1224		
1225	errors-count (integer(0:MAX))	[PWG5100.7]
1226	ipp-attribute-fidelity(obsolete) (boolean)	[PWG5100.7]

1227	job-copies-actual(obsolete) (integer(1:MAX))	[PWG5100.7]
1228	job-cover-back-actual(obsolete) (collection)	[PWG5100.7]
1229	job-cover-front-actual(obsolete) (collection)	[PWG5100.7]
1230	job-finishings-actual(obsolete) (1setOf type2 enum)	[PWG5100.7]
1231	job-finishings-col-actual(obsolete) (1setOf collection)	[PWG5100.7]
1232	job-mandatory-attributes(obsolete) (1setOf keyword)	[PWG5100.7]
1233	output-device-actual(obsolete) (1setOf name(127))	[PWG5100.7]
1234	print-content-optimize-actual (1setOf type2 keyword)	[PWG5100.7]
1235	warnings-count (integer(0:MAX))	[PWG5100.7]
1236		
1237	Job Template attributes:	Reference
1238	-----	-----
1239	job-cancel-after (integer(0:MAX))	[PWG5100.7]
1240	job-copies(obsolete) (integer(1:MAX))	[PWG5100.7]
1241	job-cover-back(obsolete) (collection)	[PWG5100.7]
1242	job-cover-front(obsolete) (collection)	[PWG5100.7]
1243	job-delay-output-until (type2 keyword   name(MAX))	[PWG5100.7]
1244	job-delay-output-until-time (dateTime)	[PWG5100.7]
1245	job-hold-until-time (dateTime)	[PWG5100.7]
1246	job-finishings(obsolete) (1setOf type2 enum)	[PWG5100.7]
1247	job-finishings-col(obsolete) (1setOf collection)	[PWG5100.7]
1248	job-retain-until (type2 keyword   name(MAX))	[PWG5100.7]
1249	job-retain-until-interval (integer(0:MAX))	[PWG5100.7]
1250	job-retain-until-time (dateTime)	[PWG5100.7]
1251	output-device (name(127))	[PWG5100.7]
1252	print-content-optimize (type2 keyword)	[PWG5100.7]
1253		
1254	Operation attributes:	Reference
1255	-----	-----
1256	document-digital-signature(obsolete) (type2 keyword)	[PWG5100.7]
1257	document-format-details(obsolete) (1setOf collection)	[PWG5100.7]
1258	document-format-version(obsolete) (text(127))	[PWG5100.7]
1259	job-hold-until-time (dateTime)	[PWG5100.7]
1260	job-ids (1setOf integer(1:MAX))	[PWG5100.7]
1261	job-mandatory-attributes (1setOf keyword)	[PWG5100.7]
1262		
1263	Printer Description attributes:	Reference
1264	-----	-----
1265	document-charset-default (charset)	[PWG5100.7]
1266	document-charset-supported (1setOf charset)	[PWG5100.7]
1267	document-digital-signature-default(obsolete) (type2 keyword)	[PWG5100.7]
1268		[PWG5100.7]
1269	document-digital-signature-supported(obsolete) (1setOf type2 keyword)	[PWG5100.7]
1270		[PWG5100.7]
1271	document-format-details-default(obsolete) (collection)	[PWG5100.7]
1272	document-format-details-supported(obsolete) (1setOf keyword)	[PWG5100.7]
1273		[PWG5100.7]
1274	document-format-version-default(obsolete) (text(127))	[PWG5100.7]
1275	document-format-version-supported(obsolete) (1setOf text(127))	[PWG5100.7]
1276		[PWG5100.7]
1277	document-natural-language-default (naturalLanguage)	[PWG5100.7]
1278	document-natural-language-supported (1setOf naturalLanguage)	[PWG5100.7]
1279		[PWG5100.7]
1280	job-cancel-after-default (integer(0:MAX)   no-value)	[PWG5100.7]
1281	job-cancel-after-supported (rangeOfInteger(0:MAX))	[PWG5100.7]
1282	job-copies-default(obsolete) (integer(1:MAX))	[PWG5100.7]

1283	job-copies-supported(obsolete) (rangeOfInteger(1:MAX))	[PWG5100.7]
1284	job-cover-back-default(obsolete) (collection)	[PWG5100.7]
1285	job-cover-back-supported(obsolete) (1setOf keyword)	[PWG5100.7]
1286	job-cover-front-default(obsolete) (collection)	[PWG5100.7]
1287	job-cover-front-supported(obsolete) (1setOf keyword)	[PWG5100.7]
1288	job-creation-attributes-supported (1setOf keyword)	[PWG5100.7]
1289	job-delay-output-until-default (type2 keyword   name(MAX))	[PWG5100.7]
1290	job-delay-output-until-interval-supported (rangeOfInteger(0:MAX))	
1291		[PWG5100.7]
1292	job-delay-output-until-supported (1setOf (type2 keyword   name(MAX)))	
1293		[PWG5100.7]
1294	job-delay-output-until-time-supported (rangeOfInteger(0:MAX))	
1295		[PWG5100.7]
1296	job-finishings-col-default(obsolete) (1setOf collection)	[PWG5100.7]
1297	job-finishings-col-ready(obsolete) (1setOf collection)	[PWG5100.7]
1298	job-finishings-col-supported(obsolete) (1setOf keyword)	[PWG5100.7]
1299	job-finishings-default(obsolete) (1setOf type2 enum)	[PWG5100.7]
1300	job-finishings-ready(obsolete) (1setOf type2 enum)	[PWG5100.7]
1301	job-finishings-supported(obsolete) (1setOf type2 enum)	[PWG5100.7]
1302	job-history-attributes-configured (1setOf keyword)	[PWG5100.7]
1303	job-history-attributes-supported (1setOf keyword)	[PWG5100.7]
1304	job-history-interval-configured (integer(0:MAX))	[PWG5100.7]
1305	job-history-interval-supported (rangeOfInteger(0:MAX))	[PWG5100.7]
1306	job-ids-supported (boolean)	[PWG5100.7]
1307	job-mandatory-attributes-supported (boolean)	[PWG5100.7]
1308	job-retain-until-default (type2 keyword   name(MAX))	[PWG5100.7]
1309	job-retain-until-interval-supported (rangeOfInteger(0:MAX))	[PWG5100.7]
1310	job-retain-until-supported (1setOf (type2 keyword   name(MAX)))	
1311		[PWG5100.7]
1312	job-retain-until-time-supported (rangeOfInteger(0:MAX))	[PWG5100.7]
1313	job-spooling-supported (type2 keyword)	[PWG5100.7]
1314	media-col-database (1setOf collection)	[PWG5100.7]
1315	output-device-supported (1setOf name(127))	[PWG5100.7]
1316	print-content-optimize-default (type2 keyword)	[PWG5100.7]
1317	print-content-optimize-supported (1setOf type2 keyword)	[PWG5100.7]
1318	which-jobs-supported (1setOf type2 keyword)	[PWG5100.7]
1319		
1320	Printer Status attributes:	Reference
1321	-----	-----
1322	printer-detailed-status-messages (1setOf text(MAX))	[PWG5100.7]

## 1323 14.2 Attribute Keyword Value Registrations

1324 The keyword values defined in this specification will be published by IANA according to the  
1325 procedures in the Internet Printing Protocol/1.1 [STD92] in the following file:

1326 <http://www.iana.org/assignments/ipp-registrations>

1327 The registry entries will contain the following information:

1328	Attributes (attribute syntax)	
1329	Keyword Attribute Value	Reference
1330	-----	-----
1331	job-delay-output-until (type2 keyword   name(MAX))	[PWG5100.7]

1332	day-time	[PWG5100.7]
1333	evening	[PWG5100.7]
1334	indefinite	[PWG5100.7]
1335	night	[PWG5100.7]
1336	no-delay-output	[PWG5100.7]
1337	second-shift	[PWG5100.7]
1338	third-shift	[PWG5100.7]
1339	weekend	[PWG5100.7]
1340	job-delay-output-until-default (type2 keyword   name(MAX))	[PWG5100.7]
1341	<Any "job-delay-output-until" value>	[PWG5100.7]
1342	job-delay-output-until-supported (1setOf (type2 keyword   name(MAX)))	[PWG5100.7]
1343		[PWG5100.7]
1344	<Any "job-delay-output-until" value>	[PWG5100.7]
1345		
1346	job-retain-until (type2 keyword   name(MAX))	[PWG5100.7]
1347	end-of-day	[PWG5100.7]
1348	end-of-month	[PWG5100.7]
1349	end-of-week	[PWG5100.7]
1350	indefinite	[PWG5100.7]
1351	none	[PWG5100.7]
1352	job-retain-until-default (type2 keyword   name(MAX))	[PWG5100.7]
1353	<Any "job-retain-until" value>	[PWG5100.7]
1354	job-retain-until-supported (1setOf (type2 keyword   name(MAX)))	[PWG5100.7]
1355		[PWG5100.7]
1356	<Any "job-retain-until" value>	[PWG5100.7]
1357		
1358	job-state-reasons (1setOf type2 keyword)	[RFC8011]
1359	digital-signature-did-not-verify	[PWG5100.7]
1360	digital-signature-type-not-supported(obsolete)	[PWG5100.7]
1361	errors-detected	[PWG5100.7]
1362	job-delay-output-until-specified	[PWG5100.7]
1363	job-digital-signature-wait(obsolete)	[PWG5100.7]
1364	warnings-detected	[PWG5100.7]
1365		
1366	media (type2 keyword   name(MAX))	[RFC8011]
1367	choice_iso_a4_210x297mm_na_letter_8.5x11in	[PWG5100.7]
1368		
1369	pdl-override-supported (type2 keyword)	[RFC8011]
1370	guaranteed	[PWG5100.7]
1371		
1372	print-content-optimize (type2 keyword)	[PWG5100.7]
1373	graphics	[PWG5100.7]
1374	photo	[PWG5100.7]
1375	text	[PWG5100.7]
1376	text-and-graphics	[PWG5100.7]
1377	print-content-optimize-actual (1setOf type2 keyword)	[PWG5100.7]
1378	<Any "print-content-optimize" value>	[PWG5100.7]
1379	print-content-optimize-default (type2 keyword)	[PWG5100.7]
1380	<Any "print-content-optimize" value>	[PWG5100.7]
1381	print-content-optimize-supported (1setOf type2 keyword)	[PWG5100.7]
1382	<Any "print-content-optimize" value>	[PWG5100.7]
1383		
1384	which-jobs (type2 keyword)	[RFC8011]
1385	aborted	[PWG5100.7]
1386	all	[PWG5100.7]
1387	canceled	[PWG5100.7]

1388	pending	[PWG5100.7]
1389	pending-held	[PWG5100.7]
1390	processing	[PWG5100.7]
1391	processing-stopped	[PWG5100.7]

### 1392 14.3 Type2 enum Registrations

1393 The attributes defined in this specification will be published by IANA according to the  
1394 procedures in the Internet Printing Protocol/1.1 [STD92] in the following file:

1395 <http://www.iana.org/assignments/ipp-registrations>

1396 The registry entries will contain the following information:

1397	Attributes (attribute syntax)		
1398	Enum Value	Enum Symbolic Name	Reference
1399	-----	-----	-----
1400	operations-supported (1setOf type2 enum)		[RFC8011]
1401	0x0038	Cancel-Jobs	[PWG5100.7]
1402	0x0039	Cancel-My-Jobs	[PWG5100.7]
1403	0x003A	Close-Job	[PWG5100.7]
1404	0x003B	Resubmit-Job	[PWG5100.7]

### 1405 14.4 Operation Registrations

1406 The operations defined in this specification will be published by IANA according to the  
1407 procedures in the Internet Printing Protocol/1.1 [STD92] in the following file:

1408 <http://www.iana.org/assignments/ipp-registrations>

1409 The registry entries will contain the following information:

1410	Operation Name	Reference
1411	-----	-----
1412	Cancel-Jobs	[PWG5100.7]
1413	Cancel-My-Jobs	[PWG5100.7]
1414	Close-Job	[PWG5100.7]
1415	Create-Job (Extension)	[PWG5100.7]
1416	Hold-Job (Extension)	[PWG5100.7]
1417	Print-Job (Extension)	[PWG5100.7]
1418	Print-URI (Extension)	[PWG5100.7]
1419	Resubmit-Job	[PWG5100.7]
1420	Send-Document (Extension)	[PWG5100.7]
1421	Send-URI (Extension)	[PWG5100.7]
1422	Set-Job-Attributes (Extension)	[PWG5100.7]
1423	Validate-Job (Extension)	[PWG5100.7]

**1424 14.5 Status Code Registrations**

1425 The status codes defined in this specification will be published by IANA according to the  
1426 procedures in the Internet Printing Protocol/1.1 [STD92] in the following file:

1427 <http://www.iana.org/assignments/ipp-registrations>

1428 The registry entries will contain the following information:

1429	Value	Status Code Name	Reference
1430	-----	-----	-----
1431	0x0500:0x05FF	- Server Error:	
1432	0x050B	server-error-too-many-jobs	[PWG5100.7]
1433	0x050C	server-error-too-many-documents	[PWG5100.7]

1434

## 1435 **15. Overview of Changes**

### 1436 **15.1 IPP Job Extensions v2.0**

1437 The following changes were made to the previous version of this specification [PWG5100.7-  
1438 2003]:

- 1439 • A rationale section was added, including use cases, exceptions, and requirements;
- 1440 • References now point to the current versions of dependent documents and  
1441 specifications at the time of publication;
- 1442 • Read-only attributes are now defined and registered as status attributes;
- 1443 • A REQUIRED "job-mandatory-attributes-supported" Printer Description attribute has  
1444 been added to indicate support for the "job-mandatory-attributes" Job Template  
1445 attribute;
- 1446 • The "job-hold-until-time" and "job-ids" operation attributes were moved from the  
1447 OBSOLETE IPP Job and Printer Extensions - Set 3 [PWG5100.11-2010]  
1448 specification;
- 1449 • The "job-delay-output-until", "job-delay-output-until-time", and "job-hold-until-time"  
1450 Job Template attributes were moved from the OBSOLETE IPP Job and Printer  
1451 Extensions - Set 3 [PWG5100.11-2010] specification;
- 1452 • The "job-creation-attributes-supported", "job-spooling-supported", "media-col-  
1453 database", "printer-detailed-status-messages", and "which-jobs-supported" Printer  
1454 attributes were moved from the OBSOLETE IPP Job and Printer Extensions - Set 3  
1455 [PWG5100.11-2010] specification;
- 1456 • The "media-grain", "media-thickness", and "media-tooth" member attributes of the  
1457 "media-col" Document/Job Template attribute were moved from the OBSOLETE IPP  
1458 Job and Printer Extensions - Set 3 [PWG5100.11-2010] specification;
- 1459 • RECOMMENDED "job-retain-until", "job-retain-until-interval", and "job-retain-until-  
1460 time" Job Template attributes were added to control the Job Retention phase of a  
1461 Job's lifecycle;
- 1462 • REQUIRED "job-history-attributes-configured", "job-history-attributes-supported",  
1463 "job-history-interval-configured", and "job-history-interval-supported" Printer  
1464 Description attributes were added to control the Job History phase of a Job's lifecycle;
- 1465 • The "document-charset" operation attribute and corresponding operation semantics  
1466 are now defined in PWG 5100.5: IPP Document Object v1.1;

- 1467 • The "document-digital-signature" operation attribute and corresponding Document  
1468 Status, Job Status, and Printer Description attributes have been made obsolete  
1469 because of interoperability issues;
- 1470 • The "document-format-details" operation attribute and corresponding Document  
1471 Status, Job Status, and Printer Description attributes have been made obsolete  
1472 because of interoperability issues and privacy concerns;
- 1473 • The "document-format-version" operation attribute and corresponding Document  
1474 Status, Job Status, and Printer Description attributes have been made obsolete  
1475 because of interoperability issues;
- 1476 • The "job-copies" Job Template attribute and corresponding Job Status and Printer  
1477 Description attributes have been made obsolete because of interoperability issues;
- 1478 • The "job-cover-back" Job Template attribute and corresponding Job Status and  
1479 Printer Description attributes have been made obsolete because of interoperability  
1480 issues;
- 1481 • The "job-cover-front" Job Template attribute and corresponding Job Status and  
1482 Printer Description attributes have been made obsolete because of interoperability  
1483 issues;
- 1484 • The "job-finishings" Job Template attribute and corresponding Job Status and Printer  
1485 Description attributes have been made obsolete because of interoperability issues;
- 1486 • The "job-finishings-col" Job Template attribute and corresponding Job Status and  
1487 Printer Description attributes have been made obsolete because of interoperability  
1488 issues; and
- 1489 • The 'digital-signature-type-not-supported' and 'job-digital-signature-wait' values for  
1490 the "job-state-reasons" attribute have been made obsolete because of interoperability  
1491 issues.

## 1492 16. References

### 1493 16.1 Normative References

- 1494 [BCP14] S. Bradner, "Key words for use in RFCs to Indicate Requirement  
1495 Levels", RFC 2119/BCP 14, March 1997,  
1496 <https://tools.ietf.org/html/bcp14>
- 1497 [ISO10646] "Information technology -- Universal Coded Character Set (UCS)",  
1498 ISO/IEC 10646:2011



- 1499 [PWG5100.3] K. Ocke, T. Hastings, "Internet Printing Protocol (IPP): Production  
1500 Printing Attributes – Set 1", PWG 5100.3-2001, February 2001,  
1501 [https://ftp.pwg.org/pub/pwg/candidates/cs-ippprodprint10-20010212-  
1502 5100.3.pdf](https://ftp.pwg.org/pub/pwg/candidates/cs-ippprodprint10-20010212-5100.3.pdf)
- 1503 [PWG5100.5] M. Sweet, "IPP Document Object v1.1", PWG 5100.5-YYYY, Month  
1504 YYYY, [https://ftp.pwg.org/pub/pwg/candidates/cs-ippdocobject11-  
1505 YYYYMMDD-5100.5.pdf](https://ftp.pwg.org/pub/pwg/candidates/cs-ippdocobject11-YYYYMMDD-5100.5.pdf)
- 1506 [PWG5101.1] M. Sweet, R. Bergman, T. Hastings, "PWG Media Standardized  
1507 Names 2.0 (MSN2)", PWG 5101.1-2013, March 2013,  
1508 [https://ftp.pwg.org/pub/pwg/candidates/cs-pwgmsn20-20130328-  
1509 5101.1.pdf](https://ftp.pwg.org/pub/pwg/candidates/cs-pwgmsn20-20130328-5101.1.pdf)
- 1510 [RFC3380] T. Hastings, R. Herriot, C. Kugler, H. Lewis, "Internet Printing Protocol  
1511 (IPP): Job and Printer Set Operations", RFC 3380, September 2002,  
1512 <https://tools.ietf.org/html/rfc3380>
- 1513 [RFC5198] J. Klensin, M. Padlipsky, "Unicode Format for Network Interchange",  
1514 RFC 5198, March 2008, <https://tools.ietf.org/html/rfc5198>
- 1515 [RFC7230] R. Fielding, J. Reschke, "Hypertext Transfer Protocol (HTTP/1.1):  
1516 Message Syntax and Routing", RFC 7230, June 2014,  
1517 <https://tools.ietf.org/html/rfc7230>
- 1518 [STD63] F. Yergeau, "UTF-8, a transformation format of ISO 10646", RFC  
1519 3629/STD 63, November 2003, <https://tools.ietf.org/html/std63>
- 1520 [STD92] M. Sweet, I. McDonald, "Internet Printing Protocol/1.1", STD 92, June  
1521 2018, <https://tools.ietf.org/html/std92>
- 1522 [UAX9] Unicode Consortium, "Unicode Bidirectional Algorithm", UAX#9, May  
1523 2018, <https://www.unicode.org/reports/tr9>
- 1524 [UAX14] Unicode Consortium, "Unicode Line Breaking Algorithm", UAX#14,  
1525 May 2018, <https://www.unicode.org/reports/tr14>
- 1526 [UAX15] M. Davis, M. Duerst, "Unicode Normalization Forms", Unicode  
1527 Standard Annex 15, May 2018, <https://www.unicode.org/reports/tr15>
- 1528 [UAX29] Unicode Consortium, "Unicode Text Segmentation", UAX#29, May  
1529 2018, <https://www.unicode.org/reports/tr29>
- 1530 [UAX31] Unicode Consortium, "Unicode Identifier and Pattern Syntax",  
1531 UAX#31, June 2018, <https://www.unicode.org/reports/tr31>
- 1532 [UNICODE] Unicode Consortium, "Unicode Standard", Version 11.0.0, June 2018,  
1533 <https://www.unicode.org/versions/Unicode11.0.0/>

- 1534 [UTS10] Unicode Consortium, “Unicode Collation Algorithm”, UTS#10, May  
1535 2018, <https://www.unicode.org/reports/tr10>
- 1536 [UTS35] Unicode Consortium, “Unicode Locale Data Markup Language”,  
1537 UTS#35, March 2018, <https://www.unicode.org/reports/tr35>
- 1538 [UTS39] Unicode Consortium, “Unicode Security Mechanisms”, UTS#39, May  
1539 2018, <https://www.unicode.org/reports/tr39>

## 1540 16.2 Informative References

- 1541 [ISO10175] "Document Printing Application (DPA)", ISO/IEC 10175, June 1996
- 1542 [JDF] CIP4, "Job Definition Format (JDF) Specification Release 1.5",  
1543 December 2013, <https://www.cip4.org>
- 1544 [PWG5100.7-2003] T. Hastings, P. Zehler, "Standard for the Internet Printing Protocol  
1545 (IPP): Job Extensions", PWG 5100.7-2003, October 2003,  
1546 [https://ftp.pwg.org/pub/pwg/candidates/cs-ippjobext10-20031031-  
1547 5100.7.pdf](https://ftp.pwg.org/pub/pwg/candidates/cs-ippjobext10-20031031-5100.7.pdf)
- 1548 [PWG5100.11-2010]  
1549 T. Hastings, "Internet Printing Protocol (IPP): Job and Printer  
1550 Extensions - Set 2 (JPS2)", PWG 5100.11-2010, October 2010,  
1551 [https://ftp.pwg.org/pub/pwg/candidates/cs-ippjobprinterext10-  
1552 20101030-5100.11.pdf](https://ftp.pwg.org/pub/pwg/candidates/cs-ippjobprinterext10-20101030-5100.11.pdf)
- 1553 [UTR17] Unicode Consortium “Unicode Character Encoding Model”, UTR#17,  
1554 November 2008, <https://www.unicode.org/reports/tr17>
- 1555 [UTR23] Unicode Consortium “Unicode Character Property Model”, UTR#23,  
1556 May 2015, <https://www.unicode.org/reports/tr23>
- 1557 [UTR33] Unicode Consortium “Unicode Conformance Model”, UTR#33,  
1558 November 2008, <https://www.unicode.org/reports/tr33>
- 1559 [UNISECFAQ] Unicode Consortium “Unicode Security FAQ”, November 2013,  
1560 <https://www.unicode.org/faq/security.html>  
1561

1562 **17. Author's Address**

1563 Primary author:

1564 Michael Sweet  
1565 Apple Inc.  
1566 One Apple Park Way  
1567 MS 111-HOMC  
1568 Cupertino CA 95014  
1569 USA

1570 Send comments to the PWG IPP Mailing List:

1571 [ipp@pwg.org](mailto:ipp@pwg.org) (subscribers only)

1572 To subscribe, see the PWG web page:

1573 <http://www.pwg.org/>

1574 Implementers of this specification document are encouraged to join the IPP Mailing List in  
1575 order to participate in any discussions of clarification issues and review of registration  
1576 proposals for additional attributes and values.

1577 The editors would like to especially thank the following individuals who also contributed  
1578 significantly to the development of this document:

1579 Tom Hastings (author of v1.0)

1580 Peter Zehler (author of v1.0)

1581

## 1582 **18. Change History**

### 1583 **18.1 March 15, 2019**

- 1584 • Version: 2.0
- 1585 • Section 2.1: OBSOLETE -> OBSOLETE
- 1586 • Section 2.4: Cleaned out unused terms, added definitions of Completed Job, Not  
1587 Completed Job, and Retained Job
- 1588 • Sections 5 and 6: Updated conformance requirements

### 1589 **18.2 March 8, 2019**

- 1590 • Status: Prototype
- 1591 • Abstract: Reworded for updated scope
- 1592 • Section 1: Reworded for updated scope, added discussion of obsolete JPS2 bits  
1593 moving here
- 1594 • Section 2.1: Added definitions of OBSOLETE and DEPRECATED
- 1595 • Section 3: Added rationale, use cases, and design requirements for attributes and  
1596 operations from JPS2.
- 1597 • New section 4 for operations from JPS2
- 1598 • Section 5: Made most attributes RECOMMENDED, added job-creation-attributes-  
1599 supported, job-delay-output-until-xxx, job-history-xxx, job-retain-until-time, job-ids, job-  
1600 spooling-supported, media-col-database, printer-detail-status-messages from JPS2
- 1601 • Section 5: Added new job-history-xxx and job-retain-until-xxx attributes
- 1602 • New section 6 for additional semantics (imported from JPS2)
- 1603 • Section 7: Added pdl-override-supported, which-jobs values, media-col member  
1604 attributes.

### 1605 **18.3 October 23, 2018**

- 1606 • Status: Interim

- 1607 • Updated references to the first version of 5100.7 to include year and exclude the full  
1608 name.
- 1609 • Abstract and intro: Clarified that this specification is defining attributes and values.
- 1610 • Editorial changes
- 1611 • Added reference to the MSN2 spec.

#### 1612 **18.4 September 26, 2018**

- 1613 • Brought back the job-mandatory-attributes operation attribute, which is still needed.
- 1614 • Added a rationale, use case, and design requirement for selective fidelity/job-  
1615 mandatory-attributes.
- 1616 • Added Additional Semantics and Operation Registrations sections for using job-  
1617 mandatory-attributes with job creation/validation operations.
- 1618 • Added Additional Semantics and Operation Registrations sections for returning the  
1619 too-many-jobs/documents status codes.

#### 1620 **18.5 September 25, 2018**

- 1621 Initial revision.