



The Printer Working Group

October 23, 2018  
Working Draft

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### IPP Job Extensions v1.1 (JOBEXT)

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Abstract: This specification defines IPP attributes and values for fine-grained fidelity, Document processing, and status reporting for issues encountered during processing.

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<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-ippjobext11-20181023.docx>

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79 system providers, network connectivity vendors, and print management application  
80 developers. The PWG is chartered to make printers and the applications and operating  
81 systems supporting them work together better. All references to the PWG in this document  
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84 define print related protocols, interfaces, procedures, and conventions. A PWG standard is  
85 a stable, well understood, and technically competent specification that is widely used with  
86 multiple independent and interoperable implementations. Printer manufacturers and  
87 vendors of printer related software benefit from the interoperability provided by voluntary  
88 conformance to these standards.

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**Table of Contents**

98

99 1. Introduction..... 6

100 1.1 Document Natural Language and Character Set ..... 6

101 1.2 Attribute Fidelity ..... 6

102 1.3 Rendering Optimizations..... 6

103 1.4 Printing on a Specific Output Device..... 6

104 1.5 Results of Job/Document Processing ..... 6

105 1.6 Obsolete Attributes and Values..... 7

106 2. Terminology..... 7

107 2.1 Conformance Terminology..... 7

108 2.2 Printing Terminology ..... 7

109 2.3 Protocol Role Terminology ..... 7

110 2.4 Other Terminology ..... 8

111 2.5 Acronyms and Organizations ..... 8

112 3. Requirements ..... 9

113 3.1 Rationale..... 9

114 3.2 Use Cases ..... 9

115 3.2.1 Print a Plain Text File ..... 9

116 3.2.2 Print a Document Using a Matching Size ..... 9

117 3.2.3 Force a Document to Print on a Specific Media Size..... 9

118 3.2.4 Print a Presentation with Best Quality ..... 9

119 3.2.5 Print Using a Specific Output Device..... 10

120 3.2.6 Monitor Whether Jobs are Printed Correctly..... 10

121 3.3 Exceptions ..... 10

122 3.3.1 Too Many Jobs on a Printer ..... 10

123 3.3.2 Too Many Documents in a Job..... 10

124 3.4 Out of Scope..... 10

125 3.5 Design Requirements..... 10

126 4. New Attributes ..... 11

127 4.1 Operation Attributes ..... 11

128 4.1.1 job-mandatory-attributes (1setOf keyword) ..... 11

129 4.2 Document and Job Status Attributes..... 11

130 4.2.1 errors-count (integer(0:MAX))..... 11

131 4.2.2 print-content-optimize-actual (1setOf type2 keyword) ..... 11

132 4.2.3 warnings-count (integer(0:MAX))..... 11

133 4.3 Document and Job Template Attributes..... 11

134 4.3.1 output-device (name(127)) ..... 11

135 4.3.2 print-content-optimize (type2 keyword)..... 12

136 4.4 Printer Description Attributes ..... 12

137 4.4.1 document-charset-default (charset)..... 12

138 4.4.2 document-charset-supported (1setOf charset)..... 12

139 4.4.3 document-natural-language-default (naturalLanguage)..... 12

140 4.4.4 document-natural-language-supported (1setOf naturalLanguage)..... 12

141 4.4.5 job-mandatory-attributes-supported (boolean) ..... 12

142 4.4.6 output-device-supported (1setOf name(127))..... 13

143 4.4.7 print-content-optimize-default (type2 keyword)..... 13

144 4.4.8 print-content-optimize-supported (1setOf type2 keyword) ..... 13

145 5. New Values for Existing Attributes..... 13

146 5.1 job-state-reasons (1setOf type2 keyword) ..... 13

147 5.2 media (type2 keyword | name(MAX))..... 13

148 6. New Status Codes..... 14

149 6.1 server-error-too-many-jobs (0x050B)..... 14

150 6.2 server-error-too-many-documents (0x050C)..... 14

151 7. Obsolete Attributes ..... 14

152 7.1 Obsolete Operation Attributes ..... 14

153 7.2 Obsolete Job Status Attributes..... 14

154 7.3 Obsolete Job Template Attributes..... 16

155 7.4 Obsolete Printer Description Attributes ..... 16

156 8. Obsolete Values ..... 17

157 8.1 Obsolete "job-state-reasons" Values..... 17

158 9. Additional Semantics for Existing Operations ..... 18

159 9.1 Create-Job, Print-Job, Print-URI, Validate-Job: job-mandatory-attributes..... 18

160 9.2 Create-Job, Print-Job, Print-URI: server-error-too-many-jobs Status Code ..... 18

161 9.3 Print-Job, Print-URI, Send-Document, Send-URI: server-error-too-many-documents

162 Status Code ..... 18

163 10. Conformance Requirements..... 18

164 10.1 Printer Conformance Requirements..... 18

165 10.2 Client Conformance Requirements ..... 19

166 11. Internationalization Considerations..... 19

167 12. Security Considerations..... 20

168 13. IANA Considerations ..... 20

169 13.1 Attribute Registrations..... 20

170 13.2 Attribute Value Registrations..... 22

171 13.3 Operation Registrations ..... 24

172 13.4 Status Code Registrations ..... 24

173 14. Overview of Changes ..... 25

174 14.1 IPP Job Extensions v1.1 ..... 25

175 15. References ..... 26

176 15.1 Normative References ..... 26

177 15.2 Informative References..... 27

178 16. Author's Address ..... 28

179 17. Change History..... 29

180 17.1 October 23, 2018 ..... 29

181 17.2 September 26, 2018..... 29

182 17.3 September 25, 2018..... 29

183

184

185 **1. Introduction**

186 This specification defines [JPP attributes and values](#) for fine-grained fidelity, Document  
187 processing, and status reporting for issues encountered during processing.

188 [This specification obsoletes portions of the previous version of this specification](#)  
189 [\[PWG5100.7-2003\]. A list of changes can be found in section 14.](#)

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190 **1.1 Document Natural Language and Character Set**

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

198 **1.2 Attribute Fidelity**

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

203 **1.3 Rendering Optimizations**

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

209 **1.4 Printing on a Specific Output Device**

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

213 **1.5 Results of Job/Document Processing**

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

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

## 223 1.6 Obsolete Attributes and Values

224 The original [version of this specification](#) [PWG5100.7-2003] defines several attributes and  
225 values that have proven problematic from an interoperability and privacy standpoint. This  
226 specification obsoletes these attributes and values.

Deleted: Standard for the Internet Printing Protocol (IPP): Job Extensions

## 227 2. Terminology

### 228 2.1 Conformance Terminology

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

### 234 2.2 Printing Terminology

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

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

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

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

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

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

### 247 2.3 Protocol Role Terminology

248 This document also defines the following protocol roles to specify unambiguous  
249 conformance requirements:

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

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

## 257 **2.4 Other Terminology**

258 *Document Creation Operation*: operations that accept Document Content. Specifically:  
259 Print-Job, Print-URI, Send-Document and Send-URI. Note: Print-Job and Print-URI are  
260 both Job Creation and Document Creation operations.

261 *Finished Document*: the result that the Printer produces on Sheets after the operations of  
262 printing, folding, cutting, finishing, etc. are completed.

263 *Job Attribute*: an Operation attribute or a Job Template attribute that applies to the Job  
264 (object) as a whole. For example, "job-name" is an Operation attribute and "job-priority" is  
265 a Job Template attribute.

266 *Job Creation Operation*: operations that create Job objects, specifically: Print-Job, Print-URI,  
267 and Create-Job as defined in [rfc2911].

268 *Operation Attribute*: an attribute supplied by a client in the Operation Attribute group of a  
269 request in order to affect the behavior of the operation or an attribute returned by the Printer  
270 in the Operation Attributes group in an operation response in order to report the results of  
271 the operation. For some Operation attributes, the Printer copies the values supplied by the  
272 client to corresponding Job Description attributes.

273 *Page*: The term "Page" used throughout this document is a synonym for PDL page.

274 *PDL Page*: A "PDL Page" is a page according to the definition of pages in the language used  
275 to express the document data. Note: If the PDL contains multiple original source pages  
276 that have been placed on a single page by the client application, then the PDL page count  
277 is one. On the other hand, if the client requests that multiple PDL Pages are placed on a  
278 single side of media, by supplying "number-up" with a value greater than 1, then the PDL  
279 page count will be more than one. [rfc2911] uses the term "print stream page" for PDL Page.

280 *Sheet*: A Sheet is the unit of media that a printer puts marks on. It is the most basic unit of  
281 output from a printer. A printer may mark on one side or on both sides of a sheet.

## 282 **2.5 Acronyms and Organizations**

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

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



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

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

## 287 **3. Requirements**

### 288 **3.1 Rationale**

289 The Internet Printing Protocol/1.1 [STD92] defines many attributes and values for specifying  
290 how Jobs and Documents are processed by a Printer. Given the need for specifying  
291 Document processing options and retrieving processing status information, this specification  
292 should:

- 293 1. Define attributes and values that specify the Document character set and  
294 rendering optimizations;
- 295 2. Define an attribute for doing selective fidelity enforcement;
- 296 3. Define a media size for automatically printing Documents on the correct size;  
297 and
- 298 4. Define attributes and values that allow a Client to discover the results of  
299 Document processing.

### 300 **3.2 Use Cases**

#### 301 **3.2.1 Print a Plain Text File**

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

#### 305 **3.2.2 Print a Document Using a Matching Size**

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

#### 309 **3.2.3 Force a Document to Print on a Specific Media Size**

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

#### 313 **3.2.4 Print a Presentation with Best Quality**

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

316 **3.2.5 Print Using a Specific Output Device**

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

320 **3.2.6 Monitor Whether Jobs are Printed Correctly**

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

324 **3.3 Exceptions**

325 **3.3.1 Too Many Jobs on a Printer**

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

328 **3.3.2 Too Many Documents in a Job**

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

331 **3.4 Out of Scope**

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

- 333 1. Definition of new file formats; and  
334 2. Definition of new protocol bindings.

335 **3.5 Design Requirements**

336 The design requirements for this specification are:

- 337 1. Define attributes for supported languages and character sets in Document data;  
338 2. Define attributes and values to describe the kind of processing optimizations that  
339 should be performed on Document data;  
340 3. Define an attribute to specify fidelity requirements;  
341 4. Define attributes to select an Output Device for printing;  
342 5. Define attributes and values to report processing errors and warnings; and  
343 6. Define sections to register all attributes, values, and operations with IANA.  
344

## 345 4. New Attributes

### 346 4.1 Operation Attributes

#### 347 4.1.1 job-mandatory-attributes (1setOf keyword)

348 This attribute identifies which Job Template attributes the Printer MUST support in the Job  
349 Creation request in order to accept the Job. The values are the names of Job Template  
350 attributes, for example, 'job-hold-until', 'copies', and 'media'. In order to identify a member  
351 attribute of a collection attribute, the keyword names of both the collection attribute and the  
352 member attribute are given separated by a period (.) character. For example, to make the  
353 "media" attribute of the "cover-front" collection attribute mandatory, supply the keyword value  
354 'cover-front.media'.

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

### 359 4.2 Document and Job Status Attributes

#### 360 4.2.1 errors-count (integer(0:MAX))

361 This attribute reports the number of errors encountered processing the Job as a whole. An  
362 error [is reported when](#) some portion of the printed output is not present, such as a glyph  
363 encountered which isn't in a Printer's font or an image in a page was in a format that the  
364 Printer didn't support, though the Printer did support the overall Document format.

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#### 365 4.2.2 print-content-optimize-actual (1setOf type2 keyword)

366 This attribute reports the "print-content-optimize" value(s) that the Printer actually used to  
367 produce the Job.

#### 368 4.2.3 warnings-count (integer(0:MAX))

369 This attribute reports the number of warnings encountered processing the Job as a whole.  
370 A warning is [reported when](#) no information is lost but the appearance of the printed output  
371 [might](#) not be as expected.

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### 372 4.3 Document and Job Template Attributes

#### 373 4.3.1 output-device (name(127))

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

380 **4.3.2 print-content-optimize (type2 keyword)**

381 This attribute specifies the type of [content](#) optimization to perform on the Document data.  
382 Keyword values [specify the type of content to optimize, including:](#)

383 'graphics': [G](#)raphs and line drawings.

384 'photo': [P](#)hotographs.

385 'text': [T](#)ext.

386 'text-and-graphics': [T](#)ext and graphics.

- Deleted:** and/or processing
- Deleted:** and refines the value specified by the "print-quality" attribute [ST92]
- Deleted:** include
- Deleted:** Optimize for graphic clarity of g
- Deleted:** Optimize for p
- Deleted:** ic clarity
- Deleted:** Optimize for t
- Deleted:** clarity
- Deleted:** Optimize for both t
- Deleted:** clarity

387 **4.4 Printer Description Attributes**

388 **4.4.1 document-charset-default (charset)**

389 This attribute specifies the default charset that the Printer will assume for charset-ambiguous  
390 Document formats when the Client omits the "document-charset" operation attribute  
391 [PWG5100.5]. Printers that support the "document-charset" operation attribute MUST  
392 support this attribute.

393 **4.4.2 document-charset-supported (1setOf charset)**

394 This attribute lists the charsets that the Printer supports for charset-ambiguous Document  
395 formats. Printers that support the "document-charset" operation attribute [PWG5100.5]  
396 MUST support this attribute.

397 **4.4.3 document-natural-language-default (naturalLanguage)**

398 This attribute specifies the default natural language that the Printer will assume for  
399 Document data when the Client omits the "document-natural-language" operation attribute  
400 [STD92]. Printers that support the "document-natural-language" attribute MUST support this  
401 [attribute](#).

402 **4.4.4 document-natural-language-supported (1setOf naturalLanguage)**

403 This attribute lists the natural languages supported for Printer-supported Document formats.  
404 Printers that support the "document-natural-language" attribute MUST support this attribute.

405 **[4.4.5 job-mandatory-attributes-supported \(boolean\)](#)**

406 [This attribute specifies whether the "job-mandatory-attributes" operation attribute \(section](#)  
407 [4.1.1\) is supported. Printers that support the "job-mandatory-attributes" operation attribute](#)  
408 [SHOULD support this attribute.](#)

420 **4.4.6 output-device-supported (1setOf name(127))**

421 This attribute lists the supported “output-device” values. Printers MUST support this attribute  
422 if the "output-device" Job Template attribute (section 4.3.1) is supported.

423 **4.4.7 print-content-optimize-default (type2 keyword)**

424 This attribute specifies the default “print-content-optimize” (section 4.3.2) value. Printers that  
425 support the "print-content-optimize" attribute MUST support this attribute.

426 **4.4.8 print-content-optimize-supported (1setOf type2 keyword)**

427 This attribute lists the supported “print-content-optimize” (section 4.3.2) values. Printers that  
428 support the "print-content-optimize" attribute MUST support this attribute.

429 **5. New Values for Existing Attributes**

430 **5.1 job-state-reasons (1setOf type2 keyword)**

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

433 'digital-signature-did-not-verify': One or more documents in the Job contains a  
434 digital signature [that could not be verified by the Printer](#).

435 'errors-detected' : [The Printer has detected one or more errors during processing of](#)  
436 [the Job](#).

437 'warnings-detected' : [The Printer has detected one or more warnings during](#)  
438 [processing of the Job](#).

439 **5.2 media (type2 keyword | name(MAX))**

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

442 'choice\_iso\_a4\_210x297mm\_na\_letter\_8.5x11in': [Print using US Letter or ISO A4](#)  
443 [media \(whichever is available\)](#).

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

446

**Deleted:** type that is supported (see section 1.1), but the signature did not verify when

**Deleted:** attempted to verify the signature

**Deleted:** If the Printer supports this value, the Printer MUST add this value to “job-state-reasons” when the Printer generates the first error message. That is, a single occurrence of this value is present in the “job-state-reasons” Job Description attribute if the Printer has generated one or more errors. An error indicates loss of information, such as a page not imaged. See also the ‘warnings-detected’ value

**Deleted:** If the Printer supports this value, the Printer MUST add this value to “job-state-reasons” when the Printer generates the first warning message. That is, a single occurrence of this value is present in the “job-state-reasons” Job Description attribute if the Printer has generated one or more warnings. A warning indicates something did not go as expected, but there was no loss of information. For example, a font substitution. See also the ‘errors-detected’ value

**Deleted:** The Client has explicitly allowed a choice of media for the Job. The Printer MUST choose physical media of size na\_letter\_8.5x11in (215.9 x 279.4 mm) or iso\_a4\_210x297mm and MUST NOT choose physical media of any other size. The Printer MAY scale the Document data to fit, but any scaling MUST be isomorphic scaling and without image content loss

**Formatted:** IEEEStd Paragraph

## 480 6. New Status Codes

481 This section defines additional status code values.

### 482 6.1 server-error-too-many-jobs (0x050B)

483 The Client has attempted to create a Job using any of the Job Creation operations which  
484 would exceed the capacity of the Printer. The Client [can retry](#) the unmodified request.

**Deleted:** MAY  
**Deleted:** again at some later point in time with an expectation that the capacity condition may have changed

### 485 6.2 server-error-too-many-documents (0x050C)

486 The Client has attempted to create a Document using any of the Document Creation  
487 operations which would exceed the capacity of the Printer for this Job. The Client [can retry](#)  
488 the unmodified request.

**Deleted:** MAY  
**Deleted:** again at some later point in time with an expectation that the capacity condition may have changed

## 489 7. Obsolete Attributes

### 490 7.1 Obsolete Operation Attributes

491 The following operation attributes from [the previous version of this specification](#)  
492 [PWG5100.7-2003] are now obsolete:

**Deleted:** Standard for the Internet Printing Protocol (IPP): Job Extensions

493 "document-digital-signature" (type2 keyword): This attribute only identifies the type  
494 of signature that is present in the Document data, but that information can be  
495 determined by examining the Document data.

496 "document-format-details" (1setOf collection): The member attributes and values  
497 cause serious interoperability and privacy issues.

498 "document-format-version" (text(127)): Free form text values cause serious  
499 interoperability issues when used as identifiers for processing data.

### 500 7.2 Obsolete Job Status Attributes

501 The following Job Status attributes from [the previous version of this specification](#)  
502 [PWG5100.7-2003] are now obsolete:

**Deleted:** Standard for the Internet Printing Protocol (IPP): Job Extensions

503 "compression-supplied" (type2 keyword): Data compression is used over the HTTP  
504 transport during the submission of Document data. [Auditing](#) of Printer bandwidth  
505 usage requires additional information such as the size of the IPP request and  
506 attached compressed document data.

**Deleted:** and  
**Deleted:** auditing

507 "document-charset-supplied" (charset): [This attribute has been superseded by the](#)  
508 "document-charset" [Document Status](#) attribute.

**Deleted:** The  
**Deleted:** is only used for the internal processing of the Document data

- 526 "document-digital-signature-supplied" (type2 keyword): The corresponding Job  
527 Template attribute is obsolete.
- 528 "document-format-details-supplied" (1setOf collection): The corresponding Job  
529 Template attribute is obsolete.
- 530 "document-format-supplied" (mimeMediaType): This attribute has been superseded  
531 by the "document-format" Document Status attribute [PWG5100.5].
- 532 "document-format-version-supplied" (text(127)): The corresponding Job Template  
533 attribute is obsolete.
- 534 "document-message-supplied" (text(MAX)): This attribute has been superseded by  
535 the "document-message" Document Status attribute [PWG5100.5].
- 536 "document-name-supplied" (name(MAX)) : This attribute has been superseded by  
537 the "document-name" Document Status attribute [PWG5100.5].
- 538 "document-natural-language-supplied" (naturalLanguage): This attribute has been  
539 superseded by the "document-natural-language" Document Status attribute  
540 [PWG5100.5].
- 541 "ipp-attribute-fidelity" (boolean): This attribute is only used at time of Job creation.  
542 The "xxx-actual" Job Status attributes provide a receipt of attributes and values that  
543 were used when processing a Job and thus provide the necessary auditing  
544 information.
- 545 "job-copies-actual" (integer(1:MAX)): [The corresponding Job Template attribute is](#)  
546 [obsolete](#).
- 547 "job-cover-back-actual" (collection): [The corresponding Job Template attribute is](#)  
548 [obsolete](#).
- 549 "job-cover-front-actual" (collection): [The corresponding Job Template attribute is](#)  
550 [obsolete](#).
- 551 "job-finishings-actual" (1setOf type2 enum): [The corresponding Job Template](#)  
552 [attribute is obsolete](#).
- 553 "job-finishings-col-actual" (1setOf collection): [The corresponding Job Template](#)  
554 [attribute is obsolete](#).
- 555 "job-mandatory-attributes" (1setOf keyword): This attribute is only used at time of  
556 Job creation. The "xxx-actual" Job Status attributes provide a receipt of attributes  
557 and values that were used when processing a Job and thus provide the necessary  
558 auditing information.

**Deleted:** This attribute has poor interoperability with the "copies" Job Template attribute [STD92]

**Deleted:** This attribute has poor interoperability with the "cover-back" Job Template attribute [PWG5100.3]

**Deleted:** This attribute has poor interoperability with the "cover-front" Job Template attribute [PWG5100.3]

**Deleted:** This attribute has poor interoperability with the "finishings" Job Template attribute [STD92]

**Deleted:** This attribute has poor interoperability with the "finishings-col" Job Template attribute [PWG5100.3]

574 "output-device-actual" (1setOf name(127)): This attribute is redundant with the  
575 "output-device-assigned" attribute [STD92].

**Deleted:** provides the same functionality as

### 576 7.3 Obsolete Job Template Attributes

577 The following Job Templates attributes from the previous version of this specification  
578 [PWG5100.7-2003] are now obsolete:

**Deleted:** Standard for the Internet Printing Protocol (IPP): Job Extensions

579 "job-copies" (integer(1:MAX)): This attribute has poor interoperability with the  
580 "copies" Job Template attribute [STD92].

581 "job-cover-back" (collection): This attribute has poor interoperability with the "cover-  
582 back" Job Template attribute [PWG5100.3].

583 "job-cover-front" (collection): This attribute has poor interoperability with the "cover-  
584 front" Job Template attribute [PWG5100.3].

585 "job-finishings" (1setOf type2 enum): This attribute has poor interoperability with the  
586 "finishings" Job Template attribute [STD92].

587 "job-finishings-col" (1setOf collection): This attribute has poor interoperability with  
588 the "finishings-col" Job Template attribute [PWG5100.3].

### 589 7.4 Obsolete Printer Description Attributes

590 The following Printer Description attributes from the previous version of this specification  
591 [PWG5100.7-2003] are now obsolete:

**Deleted:** Standard for the Internet Printing Protocol (IPP): Job Extensions

592 "document-digital-signature-default" (type2 keyword): The corresponding Job  
593 Template attribute is obsolete.

594 "document-digital-signature-supported" (1setOf type2 keyword): The corresponding  
595 Job Template attribute is obsolete.

596 "document-format-details-default" (collection): The corresponding operation attribute  
597 is obsolete.

598 "document-format-details-supported" (1setOf keyword): The corresponding  
599 operation attribute is obsolete.

600 "document-format-version-default" (text(127)): The corresponding operation  
601 attribute is obsolete.

602 "document-format-version-supported" (1setOf text(127)): The corresponding  
603 operation attribute is obsolete.



609 "job-copies-default" (integer(1:MAX)): [The corresponding Job Template attribute is](#)  
610 [obsolete.](#)

**Deleted:** This attribute has poor interoperability with the "copies" Job Template attribute [STD92].

611 "job-copies-supported" (rangeOfInteger(1:MAX)): [The corresponding Job Template](#)  
612 [attribute is obsolete.](#)

**Deleted:** This attribute has poor interoperability with the "copies" Job Template attribute [STD92].

613 "job-cover-back-default" (collection): [The corresponding Job Template attribute is](#)  
614 [obsolete.](#)

**Deleted:** This attribute has poor interoperability with the "cover-back" Job Template attribute [PWG5100.3].

615 "job-cover-back-supported" (1setOf keyword): [The corresponding Job Template](#)  
616 [attribute is obsolete.](#)

**Deleted:** This attribute has poor interoperability with the "cover-back" Job Template attribute [PWG5100.3].

617 "job-cover-front-default" (collection): [The corresponding Job Template attribute is](#)  
618 [obsolete.](#)

**Deleted:** This attribute has poor interoperability with the "cover-front" Job Template attribute [PWG5100.3].

619 "job-cover-front-supported" (1setOf keyword): [The corresponding Job Template](#)  
620 [attribute is obsolete.](#)

**Deleted:** This attribute has poor interoperability with the "cover-front" Job Template attribute [PWG5100.3].

621 "job-finishings-default" (1setOf type2 enum): [The corresponding Job Template](#)  
622 [attribute is obsolete.](#)

**Deleted:** This attribute has poor interoperability with the "finishings" Job Template attribute [STD92].

623 "job-finishings-ready" (1setOf type2 enum): [The corresponding Job Template](#)  
624 [attribute is obsolete.](#)

**Deleted:** This attribute has poor interoperability with the "finishings" Job Template attribute [STD92].

625 "job-finishings-supported" (1setOf type2 enum): [The corresponding Job Template](#)  
626 [attribute is obsolete.](#)

**Deleted:** This attribute has poor interoperability with the "finishings" Job Template attribute [STD92].

627 "job-finishings-col-default" (1setOf collection): [The corresponding Job Template](#)  
628 [attribute is obsolete.](#)

**Deleted:** This attribute has poor interoperability with the "finishings-col" Job Template attribute [PWG5100.3].

629 "job-finishings-col-ready" (1setOf collection): [The corresponding Job Template](#)  
630 [attribute is obsolete.](#)

**Deleted:** This attribute has poor interoperability with the "finishings-col" Job Template attribute [PWG5100.3].

631 "job-finishings-col-supported" (1setOf keyword): [The corresponding Job Template](#)  
632 [attribute is obsolete.](#)

**Deleted:** This attribute has poor interoperability with the "finishings-col" Job Template attribute [PWG5100.3].

## 633 8. Obsolete Values

### 634 8.1 Obsolete "job-state-reasons" Values

635 The following keyword values from [the previous version of this specification](#) [PWG5100.7-  
636 [2003](#)] are now obsolete:

**Deleted:** Standard for the Internet Printing Protocol (IPP): Job Extensions

637 'digital-signature-type-not-supported': This value is obsolete because the  
638 corresponding "document-digital-signature" Job Template attribute is obsolete.

677 'job-digital-signature-wait': This value is obsolete because the corresponding  
678 "document-digital-signature" Job Template attribute is obsolete.

## 679 **9. Additional Semantics for Existing Operations**

### 680 **9.1 Create-Job, Print-Job, Print-URI, Validate-Job: job-mandatory-** 681 **attributes**

682 This specification extends the Create-Job, Print-Job, Print-URI, and Validate-Job operations  
683 to support the "job-mandatory-attributes" operation attribute (section 4.1.1) in the request  
684 sent by the Client, which specifies a list of Job Template attributes that **MUST** be supported  
685 by the Printer for the request to be accepted.

686 If the "job-mandatory-attributes" operation attribute is supported, the Client **MAY** supply and  
687 the Printer **MUST** accept the "job-mandatory-attributes" operation attribute in any Job  
688 Creation or Validate-Job request.

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

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

### 694 **9.2 Create-Job, Print-Job, Print-URI: server-error-too-many-jobs Status** 695 **Code**

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

### 698 **9.3 Print-Job, Print-URI, Send-Document, Send-URI: server-error-too-** 699 **many-documents Status Code**

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

## 703 **10. Conformance Requirements**

### 704 **10.1 Printer Conformance Requirements**

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

- 706 1. The Job Status attributes defined in section 4.2 that correspond to any  
707 supported Job Template attributes defined in section 4.3;  
708 2. The Document Status attributes defined in section 4.2 that correspond to any  
709 supported Document Template attributes defined in section 4.3;  
710 3. The Printer Description attributes defined in section 4.4 that correspond to any  
711 supported Document/Job Template attributes defined in section 4.3;  
712 4. The additional values defined in section 5;  
713 5. The internationalization considerations defined in section 11; and  
714 6. The security considerations defined in section 12.

715 Printers that support the "job-mandatory-attributes" operation attribute (section 4.1.1) MUST  
716 also support the additional semantics defined in section 9.1.

## 717 10.2 Client Conformance Requirements

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

- 719 1. The internationalization considerations defined in section 11; and  
720 2. The security considerations defined in section 12.

## 721 11. Internationalization Considerations

722 For interoperability and basic support for multiple languages, conforming implementations  
723 MUST support:

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

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

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

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

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

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

- 740 Unicode Normalization Forms [UAX15] – especially NFC for [RFC5198]
- 741 Unicode Text Segmentation [UAX29] – grapheme clusters, words, sentences
- 742 Unicode Identifier and Pattern Syntax [UAX31] – identifier use and normalization
- 743 Unicode Collation Algorithm [UTS10] – sorting
- 744 Unicode Locale Data Markup Language [UTS35] – locale databases
- 745 Implementations of this specification are advised to also review the following informational
- 746 documents on processing of human-readable Unicode text strings:
- 747 Unicode Character Encoding Model [UTR17] – multi-layer character model
- 748 Unicode Character Property Model [UTR23] – character properties
- 749 Unicode Conformance Model [UTR33] – Unicode conformance basis

750 **12. Security Considerations**

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

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

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

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

- 758 Unicode Security FAQ [UNISECFAQ] – common Unicode security issues

759 **13. IANA Considerations**

760 **13.1 Attribute Registrations**

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

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

764 The registry entries will contain the following information:

765 Document Status attributes:	Reference
766	

767	compression-supplied(obsolete) (type2 keyword)	[PWG5100.7]
768	document-charset-supplied(obsolete) (charset)	[PWG5100.7]
769	document-digital-signature-supplied(obsolete) (type2 keyword)	[PWG5100.7]
770		[PWG5100.7]
771	document-format-details-supplied(obsolete) (1setOf collection)	[PWG5100.7]
772		[PWG5100.7]
773	document-format-supplied(obsolete) (mimeMediaType)	[PWG5100.7]
774	document-format-version-supplied(obsolete) (text(127))	[PWG5100.7]
775	document-message-supplied(obsolete) (text(MAX))	[PWG5100.7]
776	document-name-supplied(obsolete) (name(MAX))	[PWG5100.7]
777	document-natural-language-supplied(obsolete) (naturalLanguage)	[PWG5100.7]
778		[PWG5100.7]
779	errors-count (integer(0:MAX))	[PWG5100.7]
780	output-device-actual(obsolete) (1setOf name(127))	[PWG5100.7]
781	print-content-optimize-actual (1setOf type2 keyword)	[PWG5100.7]
782	warnings-count (integer(0:MAX))	[PWG5100.7]
783		
784	Document Template attributes:	Reference
785	-----	-----
786	output-device (name(127))	[PWG5100.7]
787	print-content-optimize (type2 keyword)	[PWG5100.7]
788		
789	Job Status attributes:	Reference
790	-----	-----
791	compression-supplied(obsolete) (type2 keyword)	[PWG5100.7]
792	document-charset-supplied(obsolete) (charset)	[PWG5100.7]
793	document-digital-signature-supplied(obsolete) (type2 keyword)	[PWG5100.7]
794		[PWG5100.7]
795	document-format-details-supplied(obsolete) (1setOf collection)	[PWG5100.7]
796		[PWG5100.7]
797	document-format-supplied(obsolete) (mimeMediaType)	[PWG5100.7]
798	document-format-version-supplied(obsolete) (text(127))	[PWG5100.7]
799	document-message-supplied(obsolete) (text(MAX))	[PWG5100.7]
800	document-name-supplied(obsolete) (name(MAX))	[PWG5100.7]
801	document-natural-language-supplied(obsolete) (naturalLanguage)	[PWG5100.7]
802		[PWG5100.7]
803	errors-count (integer(0:MAX))	[PWG5100.7]
804	ipp-attribute-fidelity(obsolete) (boolean)	[PWG5100.7]
805	job-copies-actual(obsolete) (integer(1:MAX))	[PWG5100.7]
806	job-cover-back-actual(obsolete) (collection)	[PWG5100.7]
807	job-cover-front-actual(obsolete) (collection)	[PWG5100.7]
808	job-finishings-actual(obsolete) (1setOf type2 enum)	[PWG5100.7]
809	job-finishings-col-actual(obsolete) (1setOf collection)	[PWG5100.7]
810	job-mandatory-attributes(obsolete) (1setOf keyword)	[PWG5100.7]
811	output-device-actual(obsolete) (1setOf name(127))	[PWG5100.7]
812	print-content-optimize-actual (1setOf type2 keyword)	[PWG5100.7]
813	warnings-count (integer(0:MAX))	[PWG5100.7]
814		
815	Job Template attributes:	Reference
816	-----	-----
817	job-copies(obsolete) (integer(1:MAX))	[PWG5100.7]
818	job-cover-back(obsolete) (collection)	[PWG5100.7]
819	job-cover-front(obsolete) (collection)	[PWG5100.7]
820	job-finishings(obsolete) (1setOf type2 enum)	[PWG5100.7]
821	job-finishings-col(obsolete) (1setOf collection)	[PWG5100.7]
822	output-device (name(127))	[PWG5100.7]

823	print-content-optimize (type2 keyword)	[PWG5100.7]
824		
825	Operation attributes:	Reference
826	-----	-----
827	document-digital-signature(obsolete) (type2 keyword)	[PWG5100.7]
828	document-format-details(obsolete) (1setOf collection)	[PWG5100.7]
829	document-format-version(obsolete) (text(127))	[PWG5100.7]
830	job-mandatory-attributes (1setOf keyword)	[PWG5100.7]
831		
832	Printer Description attributes:	Reference
833	-----	-----
834	document-charset-default (charset)	[PWG5100.7]
835	document-charset-supported (1setOf charset)	[PWG5100.7]
836	document-digital-signature-default(obsolete) (type2 keyword)	[PWG5100.7]
837		[PWG5100.7]
838	document-digital-signature-supported(obsolete) (1setOf type2 keyword)	[PWG5100.7]
839		[PWG5100.7]
840	document-format-details-default(obsolete) (collection)	[PWG5100.7]
841	document-format-details-supported(obsolete) (1setOf keyword)	[PWG5100.7]
842		[PWG5100.7]
843	document-format-version-default(obsolete) (text(127))	[PWG5100.7]
844	document-format-version-supported(obsolete) (1setOf text(127))	[PWG5100.7]
845		[PWG5100.7]
846	document-natural-language-default (naturalLanguage)	[PWG5100.7]
847	document-natural-language-supported (1setOf naturalLanguage)	[PWG5100.7]
848		[PWG5100.7]
849	job-copies-default(obsolete) (integer(1:MAX))	[PWG5100.7]
850	job-copies-supported(obsolete) (rangeOfInteger(1:MAX))	[PWG5100.7]
851	job-cover-back-default(obsolete) (collection)	[PWG5100.7]
852	job-cover-back-supported(obsolete) (1setOf keyword)	[PWG5100.7]
853	job-cover-front-default(obsolete) (collection)	[PWG5100.7]
854	job-cover-front-supported(obsolete) (1setOf keyword)	[PWG5100.7]
855	job-finishings-col-default(obsolete) (1setOf collection)	[PWG5100.7]
856	job-finishings-col-ready(obsolete) (1setOf collection)	[PWG5100.7]
857	job-finishings-col-supported(obsolete) (1setOf keyword)	[PWG5100.7]
858	job-finishings-default(obsolete) (1setOf type2 enum)	[PWG5100.7]
859	job-finishings-ready(obsolete) (1setOf type2 enum)	[PWG5100.7]
860	job-finishings-supported(obsolete) (1setOf type2 enum)	[PWG5100.7]
861	output-device-supported (1setOf name(127))	[PWG5100.7]
862	print-content-optimize-default (type2 keyword)	[PWG5100.7]
863	print-content-optimize-supported (1setOf type2 keyword)	[PWG5100.7]

## 864 13.2 Attribute Value Registrations

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

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

868 The registry entries will contain the following information:

869	Attributes (attribute syntax)	
870	Keyword Attribute Value	Reference
871	-----	-----

872 job-state-reasons (1setOf type2 keyword) [RFC8011]  
873 digital-signature-did-not-verify [PWG5100.7]  
874 digital-signature-type-not-supported (obsolete) [PWG5100.7]  
875 errors-detected [PWG5100.7]  
876 job-digital-signature-wait (obsolete) [PWG5100.7]  
877 warnings-detected [PWG5100.7]  
878  
879 media (type2 keyword | name (MAX)) [RFC8011]  
880 choice\_iso\_a4\_210x297mm\_na\_letter\_8.5x11in [PWG5100.7]  
881  
882 print-content-optimize (type2 keyword) [PWG5100.7]  
883 graphics [PWG5100.7]  
884 photo [PWG5100.7]  
885 text [PWG5100.7]  
886 text-and-graphics [PWG5100.7]  
887 print-content-optimize-actual (1setOf type2 keyword) [PWG5100.7]  
888 <Any "print-content-optimize" value> [PWG5100.7]  
889 print-content-optimize-default (type2 keyword) [PWG5100.7]  
890 <Any "print-content-optimize" value> [PWG5100.7]  
891 print-content-optimize-supported (1setOf type2 keyword) [PWG5100.7]  
892 <Any "print-content-optimize" value> [PWG5100.7]  
893

894 **13.3 Operation Registrations**

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

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

898 The registry entries will contain the following information:

899	Operation Name	Reference
900	-----	-----
901	Create-Job (Extension)	[PWG5100.7]
902	Print-Job (Extension)	[PWG5100.7]
903	Print-URI (Extension)	[PWG5100.7]
904	Send-Document (Extension)	[PWG5100.7]
905	Send-URI (Extension)	[PWG5100.7]
906	Validate-Job (Extension)	[PWG5100.7]

907 **13.4 Status Code Registrations**

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

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

911 The registry entries will contain the following information:

912	Value	Status Code Name	Reference
913	-----	-----	-----
914	0x0500:0x05FF	- Server Error:	
915	0x050B	server-error-too-many-jobs	[PWG5100.7]
916	0x050C	server-error-too-many-documents	[PWG5100.7]

917



## 918 14. Overview of Changes

### 919 14.1 IPP Job Extensions v1.1

920 The following changes were made to [the previous version of this specification](#) [PWG5100.7-  
921 [2003](#)]:

**Deleted:** PWG 5100.7-2003: Standard for the Internet Printing Protocol (IPP): Job Extensions

- 922 • A rationale section was added, including use cases, exceptions, and requirements;
- 923 • References now point to the current versions of dependent documents and  
924 specifications at the time of publication;
- 925 • Read-only attributes are now defined and registered as status attributes;
- 926 • [A RECOMMENDED "job-mandatory-attributes-supported" Printer Description](#)  
927 [attribute has been added;](#)
- 928 • The "document-charset" operation attribute and corresponding operation semantics  
929 are now defined in PWG 5100.5: IPP Document Object v1.1;
- 930 • The "document-digital-signature" operation attribute and corresponding Document  
931 Status, Job Status, and Printer Description attributes have been made obsolete;
- 932 • The "document-format-details" operation attribute and corresponding Document  
933 Status, Job Status, and Printer Description attributes have been made obsolete;
- 934 • The "document-format-version" operation attribute and corresponding Document  
935 Status, Job Status, and Printer Description attributes have been made obsolete;
- 936 • The "job-copies" Job Template attribute and corresponding Job Status and Printer  
937 Description attributes have been made obsolete;
- 938 • The "job-cover-back" Job Template attribute and corresponding Job Status and  
939 Printer Description attributes have been made obsolete;
- 940 • The "job-cover-front" Job Template attribute and corresponding Job Status and  
941 Printer Description attributes have been made obsolete;
- 942 • The "job-finishings" Job Template attribute and corresponding Job Status and Printer  
943 Description attributes have been made obsolete;
- 944 • The "job-finishings-col" Job Template attribute and corresponding Job Status and  
945 Printer Description attributes have been made obsolete; and
- 946 • The 'digital-signature-type-not-supported' and 'job-digital-signature-wait' values for  
947 the "job-state-reasons" attribute have been made obsolete.

950 **15. References**951 **15.1 Normative References**

- 952 [BCP14] S. Bradner, "Key words for use in RFCs to Indicate Requirement  
953 Levels", RFC 2119/BCP 14, March 1997,  
954 <https://tools.ietf.org/html/bcp14>
- 955 [ISO10646] "Information technology -- Universal Coded Character Set (UCS)",  
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1017 Implementers of this specification document are encouraged to join the IPP Mailing List in  
1018 order to participate in any discussions of clarification issues and review of registration  
1019 proposals for additional attributes and values.

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1021 significantly to the development of this document:

1022 Tom Hastings (author of v1.0)  
1023 Peter Zehler (author of v1.0)

1024

1025 **17. Change History**

1026 **[17.1 October 23, 2018](#)**

- 1027
  - [Status: Interim](#)
- 1028
  - [Updated references to the first version of 5100.7 to include year and exclude the full](#)
- 1029
  - [name.](#)
- 1030
  - [Abstract and intro: Clarified that this specification is defining attributes and values.](#)
- 1031
  - [Editorial changes](#)
- 1032
  - [Added reference to the MSN2 spec.](#)

1033 **17.2 September 26, 2018**

- 1034
  - Brought back the job-mandatory-attributes operation attribute, which is still needed.
- 1035
  - Added a rationale, use case, and design requirement for selective fidelity/job-
- 1036
  - mandatory-attributes.
- 1037
  - Added Additional Semantics and Operation Registrations sections for using job-
- 1038
  - mandatory-attributes with job creation/validation operations.
- 1039
  - Added Additional Semantics and Operation Registrations sections for returning the
- 1040
  - too-many-jobs/documents status codes.

1041 **17.3 September 25, 2018**

1042 Initial revision.