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The Printer Working Group (PWG)
Proposed Standard for
Internet Printing Protocol (IPP):
"-actual" attributes



Version 0.2, December 5, 2002



Industry Standards and Technology Organization (IEEE-ISTO)

445 Hoes Lane ? P.O. Box 1331 ? Piscataway, NJ 08855-1331, USA
Phone +1.732.981.3434 ? Fax +1.732.562.1571 ? <http://www.ieee-isto.org>

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The Printer Working Group (PWG) Proposed Standard for Internet Printing Protocol (IPP): "-actual" attributes

Version 0.2, December 5, 2002

Abstract: This document defines an extension to the Internet Printing Protocol/1.0 (IPP/1.0) [RFC2566, RFC2565] & IPP/1.1 [RFC2911, RFC2910] for the OPTIONAL "-actual" set of Job Description attributes that correspond to Job Template attributes defined in IPP. These "-actual" attributes allow the client to determine the true results of a print job regardless of what was specified in the Create-Job or Print-Job operation.

This version of the PWG Proposed Standard is available electronically at:
ftp://ftp.pwg.org/pub/pwg/ipp/new_ACT/pwg-ipp-actual-attribs-v02-021205.pdf, .doc

This document is an IEEE-ISTO PWG Proposed standard. For a definition of a "PWG Proposed Standard" and its transition to a "PWG Draft Standard", see: <ftp://ftp.pwg.org/pub/pwg/general/pwg-process.pdf>. After approval by the PWG (by a Last Call) to transition this Proposed Standard to a Draft Standard, an IEEE-ISTO number will be assigned and this PWG Draft Standard will be available electronically at:

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- 108 1) send it to majordomo@pwg.org
- 109 2) leave the subject line blank
- 110 3) put the following two lines in the message body:
111 subscribe ipp
112 end

113
114 Implementers of this specification are encouraged to join the IPP Mailing List in order to participate in any
115 discussions of clarifications or review of registration proposals for additional names. Requests for additional media
116 names, for inclusion in this specification, should be sent to the IPP Mailing list for consideration.

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145 1 Introduction

146 This document specifies an extension to the Internet Printing Protocol/1.0 (IPP) [RFC2565, RFC2566] and IPP/1.1
147 [RFC2910, RFC2911]. This extension consists of a set of OPTIONAL Job Description attributes that correspond to
148 the set of Job Template attributes defined in IPP. Specifically, for each Job Template attribute, there is a
149 corresponding “-actual” attribute that reports the value that was actually used, or will be used, in the processing of the
150 job. As an example, along with the “copies” Job Template attribute would be the new “copies-actual” Job Description
151 attribute, which would have a value corresponding to the actual number of copies of the job that were printed (or are
152 going to print).

153 These attributes permit an IPP Printer to report much more accurate status to an IPP client. There are two aspects
154 to this. First, the client can determine the true results of a print job regardless of what was specified in the Create-
155 Job or Print-Job operation. But second, a client can often find out *in advance* what the true results are expected to
156 be; for example, it can tell a user “Copy 3 of 7” rather than simply “Copy 3”.

157 Similarly, the “-actual” concept extends to Document Template attributes as well; that is, for each Document
158 Template attribute, there is a corresponding “-actual” Document Description attribute. Document Template and
159 Document Description attributes are part of the Document Object extension to IPP that is specified in [docobj].

160 These new attributes are OPTIONAL for a Printer to support, and are OPTIONAL for a client to use.

161 1.1 Problem

162 In IPP/1.0 and IPP/1.1, it is possible for a client to request specific job processing behavior, through the use of the
163 Job Template attributes. Some examples of Job Template attributes are “copies”, “sides”, and “media”. The client
164 specifies these attributes in the Job Creation operation—for example, the Print-Job operation. It is also possible to
165 query the values of those Job Template attributes, using, for example, the Get-Job-Attributes operation. Note that
166 the value returned in a query is always the same as the value that was specified on the Job Creation operation.

167 Using the “pdl-override-supported” Printer Description attribute, it is possible for a Printer to indicate that it will
168 attempt to override instructions in the PDL with values given by the Job Template attributes. Imagine a job that was
169 submitted with Job Template attribute “copies” set to 5, but the PDL contained in the job specified 3 copies. A Printer
170 that supports PDL override (that is, returns a value of ‘attempted’ for the “pdl-override-supported” attribute) promises
171 to attempt to print that job with 5 copies rather than 3.

172 Thus, while IPP defines and facilitates a case where the client can request a number of copies through the “copies”
173 attribute and be confident that the request will be honored, in practice, this is not necessarily the most prevalent
174 case.

175 First, many clients either do not or cannot specify the Job Template attributes themselves. As an example, a client
176 integrated into the Windows print subsystem must be either, in Windows terms, a print provider or a print monitor.
177 Neither of these components in the print subsystem have GUIs set up for the user to provide processing behavior
178 requests. Instead, in Windows, these requests are typically made through the print driver and therefore embedded in
179 the PDL of the job.

180 Similarly, many Printers do not support PDL override, possibly due to architecture constraints or limits based on the
181 capabilities or cost of the Printer. For such Printers, a Job Template attribute value specified by the client does not
182 necessarily have any correlation with the actual value used; for example, specifying a “copies” value of 3 has
183 absolutely no effect on the number of copies produced.

184 Also note that even when the Printer supports PDL override, this is only an indication that the Printer will *attempt* to
185 override. There is no guarantee that the requested value will end up being the “actual” value.

186 Therefore, there is a need for a method to allow clients to find out what actually happened with a job: Did it actually
187 print 5 copies?

188 1.2 Solution

189 The solution to this problem is to add a set of Job Description attributes to report these “what actually happened”
190 values. There will be one such Job Description attribute for each Job Template attribute. This extends the pre-
191 existing concept that each Job Template attribute has a corresponding “-supported” and “-default” attribute; now
192 there will also be a corresponding “-actual” attribute. These new attributes can be queried using existing operations
193 to retrieve information on what actually happened, or what will actually happen, for a job.

194 1.3 Alternative solutions

195 There are a number of possible solutions to this problem. The solution discussed in this document is considered to
196 be the one with the least impact on the overall architecture of IPP, creating the least churn on the model while
197 providing full support to clients to discover the “actual” processing behavior.

198 Many have remarked that what is being described here is essentially what is currently in the industry being termed a
199 “Job Ticket”. Adding full job ticket support to IPP would be beneficial and would solve this problem. However, this
200 effort is expected to be complicated and result in a possibly significant update to the IPP architecture. Also, adding
201 full job ticket support might be too costly for smaller IPP implementations. The solution described here can be
202 thought of as an inexpensive alternative to a full job ticket solution.

203 1.4 Scope

204 While implementers of this specification may use the “-actual” attributes to perform accounting functions, this
205 specification is intended to address information that is displayed to a human user.

206 2 Terminology

207 This section defines terminology used throughout this document.

208 2.1 Conformance Terminology

209 Capitalized terms, such as **MUST**, **MUST NOT**, **REQUIRED**, **SHOULD**, **SHOULD NOT**, **MAY**, **NEED NOT**, and
210 **OPTIONAL**, have special meaning relating to conformance as defined in RFC 2119 [RFC2119] and [RFC2911]
211 section 12.1. If an implementation supports the extension defined in this document, then these terms apply;
212 otherwise, they do not. These terms define conformance to *this document (and [RFC2911]) only*, they do not affect
213 conformance to other documents, unless explicitly stated otherwise. To be more specific:

214 **REQUIRED** - an adjective used to indicate that a conforming IPP Printer implementation **MUST** support the indicated
215 operation, object, attribute, attribute value, status code, or out-of-band value in requests and responses. See
216 [RFC2911] “Appendix A - Terminology for a definition of “support”. *Since support of this entire specification is*
217 *OPTIONAL for conformance to IPP/1.1, the use of the term REQUIRED in this document means “REQUIRED if this*
218 *OPTIONAL Document Object specification is implemented”.*

219 **RECOMMENDED** - an adjective used to indicate that a conforming IPP Printer implementation is recommended to
220 support the indicated operation, object, attribute, attribute value, status code, or out-of-band value in requests and

221 responses. *Since support of this entire specification is OPTIONAL for conformance to IPP/1.1, the use of the term*
222 *RECOMMENDED in this document means “RECOMMENDED if this OPTIONAL Document Object specification is*
223 *implemented”.*

224 **OPTIONAL** - an adjective used to indicate that a conforming IPP Printer implementation MAY, but is NOT
225 REQUIRED to, support the indicated operation, object, attribute, attribute value, status code, or out-of-band value in
226 requests and responses.

227 2.2 Other Terminology

228 This document uses the same terminology as [RFC2911], such as “**client**”, “**Printer**”, “**attribute**”, “**attribute value**”,
229 “**keyword**”, “**Job Template attribute**”, “**Operation attribute**”, “**operation**”, “**request**”, and “**support**” with the same
230 meaning. In addition, terms such as “**Document Object**”, “**Document Template attribute**”, “**Job Creation**
231 **operation**”, and “**Document Creation operation**” are used with the same meaning as they have in [docobj].

232 3 “-actual” attributes

233 For each Job Template attribute defined in the IPP Model [RFC2566, RFC2911], or defined in any IPP extension
234 document, a new Job Description attribute is defined. This new attribute will be referred to as an “-actual” attribute,
235 since the name of such attributes is found by taking the name of the Job Template attribute and appending “-actual”.
236 The “-actual” attribute is multi-valued, where each value has the same syntax as the corresponding Job Template
237 attribute. For example, the “copies” (integer(1:MAX)) Job Template attribute has a new corresponding “copies-
238 actual” (1setOf integer(1:MAX)) Job Description attribute. Another example is the “media-col” (collection) Job
239 Template attribute, which now has a new corresponding “media-col-actual” (1setOf collection) Job Description
240 attribute, where each value in the 1setOf has the same collection syntax, with the same member attributes, as the
241 “media-col” attribute.

242 The only exception to the rule that each value of the “-actual” attribute has the same syntax as the corresponding Job
243 Template attribute is for Job Template attributes that are themselves multi-valued. For example, the “finishings”
244 (1setOf (type2 enum)) attribute has a corresponding “finishings-actual” (1setOf (type2 enum)) attribute that has the
245 same syntax; that is, the syntax is (1setOf (type2 enum)) instead of (1setOf (1setOf (type2 enum))).

246 As with Job Template attributes, for each Document Template attribute defined in [docobj], a new Document
247 Description attribute is defined, whose name is found by appending “-actual” to the Document Template attribute
248 name.

249 These new attributes are OPTIONAL for a Printer to support, and are OPTIONAL for a client to use.

250 Table 1 lists the “-actual” Job Description attributes for all Job Template attributes in existence in approved IPP
251 standard documents as of the date of this document.

252 Many of the Job Template attributes shown in Table 1 are also Document Template attributes—for such attributes,
253 the second column of Table 1 shows the name and type of the corresponding “-actual” Document Description
254 attribute. To know which attributes these are, see [docobj].

Table 1 – “-actual” Job Description attributes

| Job Template Attribute | “-actual” Job Description attribute | Reference |
|--|--|-------------------------------------|
| copies (integer(1:MAX)) | copies-actual (1setOf integer(1:MAX)) | [RFC2911] §4.2.5 |
| cover-back (collection) | cover-back-actual (1setOf (collection)) | [PWG5100.3] §3.1 |
| cover-front (collection) | cover-front-actual (1setOf (collection)) | [PWG5100.3] §3.1 |
| document-overrides (1setOf collection) | document-overrides-actual (1setOf collection) | [PWG5100.4] §5.1 |
| finishings (1setOf (type2 enum)) | finishings-actual (1setOf (type2 enum)) | [RFC2911] §4.2.6 and [PWG5100.1] §2 |
| finishings-col (collection) | finishings-col-actual (1setOf (collection)) | [PWG5100.3] §3.2 |
| force-front-side (1setOf integer(1:MAX)) | force-front-side-actual (1setOf (1setOf integer(1:MAX))) | [PWG5100.3] §3.3 |
| imposition-template (type3 keyword name(MAX)) | imposition-template-actual (1setOf (type3 keyword name(MAX))) | [PWG5100.3] §3.4 |
| insert-sheet (collection) | insert-sheet-actual (1setOf (collection)) | [PWG5100.3] §3.5 |
| job-account-id (name(MAX)) | job-account-id-actual (1setOf (name(MAX))) | [PWG5100.3] §3.6 |
| job-accounting-sheets (collection) | job-accounting-sheets-actual (1setOf (collection)) | [PWG5100.3] §3.8 |
| job-accounting-user-id (name(MAX)) | job-accounting-user-id-actual (1setOf (name(MAX))) | [PWG5100.3] §3.7 |
| job-error-sheet (collection) | job-error-sheet-actual (1setOf (collection)) | [PWG5100.3] §3.9 |
| job-hold-until (type3 keyword name) | job-hold-until-actual (1setOf (type3 keyword name)) | [RFC2911] §4.2.2 |
| job-message-to-operator (text(MAX)) | job-message-to-operator-actual (1setOf (text(MAX))) | [PWG5100.3] §3.10 |
| job-priority (integer(1:100)) | job-priority-actual (1setOf integer(1:100)) | [RFC2911] §4.2.1 |
| job-sheets (type3 keyword name) | job-sheets-actual (1setOf (type3 keyword name)) | [RFC2911] §4.2.3 |
| job-sheets-col (collection) | job-sheets-col-actual (1setOf (collection)) | [PWG5100.3] §3.11 |
| job-sheet-message (text(MAX)) | job-sheet-message-actual (1setOf (text(MAX))) | [PWG5100.3] §3.12 |
| media (type3 keyword name(MAX)) | media-actual (1setOf (type3 keyword name(MAX))) | [RFC2911] §4.2.11 |
| media-col (collection) | media-col-actual (1setOf (collection)) | [PWG5100.3] §3.13 |
| media-input-tray-check (type3 keyword name(MAX)) | media-input-tray-check-actual (1setOf (type3 keyword name(MAX))) | [PWG5100.3] §3.14 |
| multiple-document-handling (type2 keyword) | multiple-document-handling-actual (1setOf (type2 keyword)) | [RFC2911] §4.2.4 |
| number-up (integer(1:MAX)) | number-up-actual (1setOf integer(1:MAX)) | [RFC2911] §4.2.9 |
| orientation-requested (type2 enum) | orientation-requested-actual (1setOf (type2 enum)) | [RFC2911] §4.2.10 |
| output-bin (type2 keyword name(MAX)) | output-bin-actual (1setOf (type2 keyword name(MAX))) | [PWG5100.2] §2.1 |
| page-delivery (type2 keyword) | page-delivery-actual (1setOf (type2 keyword)) | [PWG5100.3] §3.15 |
| page-order-received (type2 keyword) | page-order-received-actual (1setOf (type2 keyword)) | [PWG5100.3] §3.16 |
| page-overrides (1setOf collection) | page-overrides-actual (1setOf collection) | [PWG5100.4] §5.2 |
| page-ranges (1setOf rangeOfInteger(1:MAX)) | page-ranges-actual (1setOf rangeOfInteger(1:MAX)) | [RFC2911] §4.2.7 |
| pages-per-subset (1setOf integer) | pages-per-subset-actual (1setOf integer) | [PWG5100.4] §5.3 |
| presentation-direction-number-up (type2 keyword) | Presentation-direction-number-up-actual (1setOf (type2 keyword)) | [PWG5100.3] §3.17 |
| print-quality (type2 enum) | print-quality-actual (1setOf (type2 enum)) | [RFC2911] §4.2.13 |
| printer-resolution (resolution) | printer-resolution-actual (1setOf resolution) | [RFC2911] §4.2.12 |
| separator-sheets (collection) | separator-sheets-actual (1setOf (collection)) | [PWG5100.3] §3.18 |
| sheet-collate (type2 keyword) | sheet-collate-actual (1setOf (type2 keyword)) | [RFC3381] §3.1 |
| sides (type2 keyword) | sides-actual (1setOf (type2 keyword)) | [RFC2911] §4.2.8 |

| Job Template Attribute | “-actual” Job Description attribute | Reference |
|---|---|---------------------|
| x-image-position (type2 keyword) | x-image-position-actual (1setOf (type2 keyword)) | [PWG5100.3] §3.19.2 |
| x-image-shift (integer (MIN:MAX)) | x-image-shift-actual (1setOf (integer (MIN:MAX))) | [PWG5100.3] §3.19.3 |
| x-side1-image-shift (integer (MIN:MAX)) | x-side1-image-shift-actual (1setOf (integer (MIN:MAX))) | [PWG5100.3] §3.19.4 |
| x-side2-image-shift (integer (MIN:MAX)) | x-side2-image-shift-actual (1setOf (integer (MIN:MAX))) | [PWG5100.3] §3.19.5 |
| y-image-position (type2 keyword) | y-image-position-actual (1setOf (type2 keyword)) | [PWG5100.3] §3.19.6 |
| y-image-shift (integer (MIN:MAX)) | y-image-shift-actual (1setOf (integer (MIN:MAX))) | [PWG5100.3] §3.19.7 |
| y-side1-image-shift (integer (MIN:MAX)) | y-side1-image-shift-actual (1setOf (integer (MIN:MAX))) | [PWG5100.3] §3.19.8 |
| y-side2-image-shift (integer (MIN:MAX)) | y-side2-image-shift-actual (1setOf (integer (MIN:MAX))) | [PWG5100.3] §3.19.9 |

256

257 Note that Table 1 is not meant to be an exhaustive list of the “-actual” attributes a Printer might implement, as it lists
 258 only those attributes in existence in approved IPP standard documents as of the date of this document. For any Job
 259 Template or Document Template attributes created by past, present, or future IPP standard documents, this
 260 specification states that a corresponding “-actual” Job Description or Document Description exists and can be
 261 implemented by a Printer or queried by a client.

262 3.1 Overall philosophy

263 These attributes are to be set on a “best effort” basis by the Printer. It cannot be expected that a Printer that can
 264 return a known value for some “-actual” attribute will never return the ‘unknown’ value for that attribute. Also, a
 265 Printer does not guarantee the accuracy of the value until the job/document has moved to a completion state (job-
 266 state/document-state is ‘completed’, ‘canceled’, or ‘aborted’).

267 In the same vein, a client SHOULD be robust in its use of these attributes, being able to handle both when the
 268 attribute is unknown and when the attribute changes value, including changing to a value different than that specified
 269 by the client. For example, the client might query for job attributes and present the status string “Printed page 2 of 4,
 270 Copy 3” since the “copies-actual” attribute was returned as ‘unknown’. Then, the very next query it makes might
 271 have an updated “copies-actual” value, since the Printer had just determined the value, so the next status string
 272 presented might be “Printed page 3 of 4, Copy 3 of 6”.

273 3.2 Relationship between “-actual” attributes and Job Template attributes

274 A very important point about the new “-actual” attributes is that support for them is not in any way tied to the support
 275 for the corresponding Job/Document Template attributes. For example, a Printer that does not support the “copies”
 276 Job/Document Template attribute SHOULD support the “copies-actual” Job/Document Description attribute if the
 277 Printer knows how many copies printed for a job/document.

278 Similarly, whether or not a value for a Job/Document Template attribute was included in the Job/Document Creation
 279 operation, the Printer SHOULD return the corresponding “-actual” attribute if the value is known.

280 3.3 Timeline of values

281 As with all Job/Document Description attributes, if the value of a supported “-actual” attribute is not yet known for a
 282 job, it MUST be returned with the out-of-band ‘unknown’ value in any query.

283 The value of an “-actual” attribute can change during the processing of a Job/Document. The most obvious possible
 284 change is from ‘unknown’ to an actual value, but other possibilities exist as well. For example, a Printer might be
 285 planning on printing 5 copies of a job, but due to some error or to the job being canceled, the job might only print 3
 286 copies. In this case, the “copies-actual” value would start at 5, then change to 3 at the point the Printer determines
 287 the final copy count will be 3.

288 A printer that supports a Job/Document Template attribute in such a way that the value of the attribute overrides any
289 instructions in the PDL SHOULD populate the corresponding “-actual” attribute at the time at which it reads the
290 Job/Document Template attribute. On the other hand, for an attribute where the PDL might override the value
291 provided for the Job/Document Template attribute, the Printer SHOULD wait until the PDL has been sufficiently
292 processed to determine the true value of the “-actual” attribute before populating it. In any case, a Printer MUST NOT
293 return a value that it does not believe is the correct value; that is, even though the Printer can change the value later,
294 it should never “guess” at the value.

295 **3.4 Multi-valued**

296 All “-actual” attributes are multi-valued. If a certain attribute has more than one value for a Job/Document, such as a
297 job that prints partly simplex and partly duplex, the Printer SHOULD include all values, in the order they were used.

298 To obtain more fine-grained information, the “page-overrides-actual” and “document-overrides-actual” attributes can
299 be used. For example, the “page-overrides-actual” attribute could be used to report that a job printed page 1 in
300 simplex and the rest of the job in duplex. For more information on the format of these two attributes, see
301 [PWG5100.4].

302 **3.5 Existing attributes that are similar to “-actual” attributes**

303 There are three existing attributes in IPP that function in a similar way to the new “-actual” attributes: the “job-k-
304 octets”, “job-impressions”, and “job-media-sheets” attributes. These attributes can be specified as operation
305 attributes of a Job Creation operation, and are also available as Job Description attributes. When queried, the
306 Printer can return the value that was specified in the creation operation, or can return a different value that it has
307 determined to be more accurate. For more information on these attributes, see [RFC2911], §4.3.17 and §3.2.1.1.

308 **4 New attribute group values**

309 To accommodate the ability of a client to query the “-actual” attributes, a new attribute group value is defined for use
310 with the Get-Job-Attributes and Get-Jobs operations. In addition to the existing attribute groups defined in
311 [RFC2911] §3.3.4, the following attribute group value is now defined:

312 - ‘job-actual’: the subset of the “-actual” Job Description attributes specified in this document that the
313 implementation supports for Job objects.

314 A Printer MUST support the ‘job-actual’ keyword.

315 Similarly, a new attribute group value is defined for use with the Get-Document-Attributes and Get-Documents
316 operations. In addition to the existing attribute groups defined in [docobj] §3.6, the following attribute group value is
317 now defined:

318 - ‘document-actual’: the subset of the “-actual” Document Description attributes specified in this document that
319 the implementation supports for Document objects.

320 A Printer that supports the Document Object MUST support the ‘document-actual’ keyword.

321 **5 Conformance Requirements**

322 A printer SHOULD support an “-actual” attribute if it knows the value through any means, such as through the value
323 of the corresponding Job/Document Template attribute, through the value specified on an IPP “Set” operation
324 [RFC3380], through the PDL, or through some means external to IPP or the PDL.

325 To conform to this specification, a Printer or client MUST comply with the descriptions in sections 3 and 4 above.

326 Although a number of optional extensions to IPP are referred to in this document, support for those extensions is not
327 required in order to support the “-actual” attributes extension defined in this specification. For example, although this
328 specification defines new Document Description attributes to go along with the Document Template attributes defined
329 in the Document Object optional extension to IPP, a Printer or client could implement or use “-actual” attributes
330 without implementing the Document object.

331 **6 Security Considerations**

332 This specification will have no impact on the security burden of or potential threats to the importing system.

333 **7 References**

334 **7.1 Normative References**

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341 [PWG5100.3]

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343 ISTO 5100.3-2001, February 12, 2001, <ftp://ftp.pwg.org/pub/pwg/standards/pwg5100.3.pdf>.

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345 Herriot, R., and K. Ocke, “Internet Printing Protocol (IPP): Override Attributes for Documents and Pages”,
346 IEEE-ISTO 5100.4-2001, February 7, 2001, <ftp://ftp.pwg.org/pub/pwg/standards/pwg5100.4.pdf>.

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351 RFC 2565, April 1999.

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356 Herriot, R., Butler, S., Moore, P., Turner, R. and J. Wenn, “Internet Printing Protocol/1.1: Encoding and
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359 Hastings, T., Herriot, R., deBry, R., Isaacson, S. and P. Powell, “Internet Printing Protocol/1.1: Model and
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361 [RFC3380]
362 Hastings, T., Herriot, R., Kugler, C. and H. Lewis, “Internet Printing Protocol (IPP): Job and Printer Set
363 Operations”, RFC 3380, September 2002.

364 [RFC3381]
365 Hastings, T., Lewis, H., and R. Bergman, “Internet Printing Protocol (IPP): Job Progress Attributes”, RFC
366 3381, September 2002.

367 7.2 Informative references

368 [docobj]
369 Hastings, T., and P. Zehler, “Internet Printing Protocol (IPP): Document Object”, ”, to become a PWG IEEE-
370 ISTO standard, work in progress, October 25, 2002, [ftp://ftp.pwg.org/pub/pwg/ipp/new_DOC/pwg-ipp-](ftp://ftp.pwg.org/pub/pwg/ipp/new_DOC/pwg-ipp-document-object-v05-021025.pdf)
371 [document-object-v05-021025.pdf](ftp://ftp.pwg.org/pub/pwg/ipp/new_DOC/pwg-ipp-document-object-v05-021025.pdf)

372 8 IANA Considerations

373 This section contains the registration information for IANA to add to the various IPP Registries according to the
374 procedures defined in [RFC2911] section 6 to cover the definitions in this document. The resulting registrations will
375 be published in the <http://www.iana.org/assignments/ipp-registrations-registry>.

376 8.1 Attribute Registrations

377 The following table lists all the attributes defined in this document. These are to be registered according to the
378 procedures in [RFC2911] section 6.2.

379 Job Description attributes:
380 copies-actual (1setOf integer(1:MAX))
381 cover-back-actual (1setOf (collection))
382 cover-front-actual (1setOf (collection))
383 document-overrides-actual (1setOf collection)
384 finishings-actual (1setOf (type2 enum))
385 finishings-col-actual (1setOf (collection))
386 force-front-side-actual (1setOf (1setOf integer(1:MAX)))
387 imposition-template-actual (1setOf (type3 keyword | name(MAX)))
388 insert-sheet-actual (1setOf (collection))
389 job-account-id-actual (1setOf (name(MAX)))

```

390 job-accounting-sheets-actual (1setOf (collection))
391 job-accounting-user-id-actual (1setOf (name(MAX)))
392 job-error-sheet-actual (1setOf (collection))
393 job-hold-until-actual (1setOf (type3 keyword | name))
394 job-message-to-operator-actual (1setOf (text(MAX)))
395 job-priority-actual (1setOf integer(1:100))
396 job-sheets-actual (1setOf (type3 keyword | name))
397 job-sheets-col-actual (1setOf (collection))
398 job-sheet-message-actual (1setOf (text(MAX)))
399 media-actual (1setOf (type3 keyword | name(MAX)))
400 media-col-actual (1setOf (collection))
401 media-input-tray-check-actual (1setOf (type3 keyword | name(MAX)))
402 multiple-document-handling-actual (1setOf (type2 keyword))
403 number-up-actual (1setOf integer(1:MAX))
404 orientation-requested-actual (1setOf (type2 enum))
405 output-bin-actual (1setOf (type2 keyword | name(MAX)))
406 page-delivery-actual (1setOf (type2 keyword))
407 page-order-received-actual (1setOf (type2 keyword))
408 page-overrides-actual (1setOf collection)
409 page-ranges-actual (1setOf rangeOfInteger(1:MAX))
410 pages-per-subset-actual (1setOf integer)
411 presentation-direction-number-up-actual (1setOf (type2 keyword))
412 print-quality-actual (1setOf (type2 enum))
413 printer-resolution-actual (1setOf resolution)
414 separator-sheets-actual (1setOf (collection))
415 sheet-collate-actual (1setOf (type2 keyword))
416 sides-actual (1setOf (type2 keyword))
417 x-image-position-actual (1setOf (type2 keyword))
418 x-image-shift-actual (1setOf (integer (MIN:MAX)))
419 x-side1-image-shift-actual (1setOf (integer (MIN:MAX)))
420 x-side2-image-shift-actual (1setOf (integer (MIN:MAX)))
421 y-image-position-actual (1setOf (type2 keyword))
422 y-image-shift-actual (1setOf (integer (MIN:MAX)))
423 y-side1-image-shift-actual (1setOf (integer (MIN:MAX)))
424 y-side2-image-shift-actual (1setOf (integer (MIN:MAX)))

```

425 8.2 Attribute Group tag Registrations

426 The following table lists all the attribute group tags defined in this document. These are to be registered according to
427 the procedures in [RFC2911] section 6.5.

```

428 Attribute Group tags:
429 job-actual
430 document-actual

```

431 9 Author’s Address

```

432 Dennis Carney
433 IBM Printing Systems
434 6300 Diagonal Highway
435 Boulder, CO 80301
436 Phone: 303 924 0565
437 Fax: 303 924 7434
438 e-mail: dcarney@us.ibm.com
439

```

440 Harry Lewis
441 IBM Printing Systems
442 6300 Diagonal Highway
443 Boulder, CO 80301
444 Phone: 303 924 5337
445 Fax: 303 924 7434
446 e-mail: harryl@us.ibm.com
447

448 Additional contributors:
449 Tom Hastings, Xerox
450 Ira McDonald, High North
451 Gail Songer, Peerless
452 Peter Zehler, Xerox