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



Version 0.4, January 31, 2003



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

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Version 0.4, January 31, 2003

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

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44 This version of the PWG Proposed Standard is available electronically at:
45 ftp://ftp.pwg.org/pub/pwg/ipp/new_ACT/pwg-ipp-actual-attribs-v04-030131.pdf, .doc

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

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107 To subscribe to the ipp mailing list, send the following email:

- 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.

117

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146 1 Introduction

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

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 This extension is applicable to IPP/1.0 and IPP/1.1, as well as all future IPP/1.x versions.

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

159 1.1 Problem

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

165 Using the “pdl-override-supported” Printer Description attribute [RFC2911], it is possible for a Printer to indicate that it
166 will attempt to override instructions in the PDL with values given by the Job Template attributes. Imagine a job that
167 was submitted with Job Template attribute “copies” set to 5, but the PDL contained in the job specified 3 copies. A
168 Printer that supports PDL override (that is, returns a value of ‘attempted’ for the “pdl-override-supported” attribute)
169 promises to attempt to print that job with 5 copies rather than 3.

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

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

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

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

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

186 1.2 Solution

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

192 1.3 Alternative solutions

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

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

201 1.4 Scope

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

204 2 Terminology

205 This section defines terminology used throughout this document.

206 2.1 Conformance Terminology

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

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

217 **RECOMMENDED** - an adjective used to indicate that a conforming IPP Printer implementation is recommended to
218 support the indicated operation, object, attribute, attribute value, status code, or out-of-band value in requests and
219 responses. *Since support of this entire specification is OPTIONAL for conformance to IPP/1.1, the use of the term*
220 *RECOMMENDED in this document means “RECOMMENDED if this OPTIONAL specification is implemented”.*

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

224 2.2 Other Terminology

225 This document uses the same terminology as [RFC2911], such as “**client**”, “**Printer**”, “**attribute**”, “**attribute value**”,
 226 “**keyword**”, “**Job Template attribute**”, “**Operation attribute**”, “**operation**”, “**request**”, and “**support**” with the same
 227 meaning.

228 3 “-actual” attributes

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

237 The only exception to the rule that each value of the “-actual” attribute has the same syntax as the corresponding Job
 238 Template attribute is for Job Template attributes that are themselves multi-valued. For example, the “finishings”
 239 (1setOf (type2 enum)) attribute has a corresponding “finishings-actual” (1setOf (type2 enum)) attribute.

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

241 Table 1 lists the “-actual” Job Description attributes for all Job Template attributes in existence in approved IPP
 242 specifications as of the date of this document.

243 **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

Job Template Attribute	“-actual” Job Description attribute	Reference
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
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

244

245 Note that Table 1 is not meant to be an exhaustive list of the “-actual” attributes a Printer might implement, as it lists
246 only those attributes in existence in approved IPP standard documents as of the date of this document. For any Job

247 Template attributes created by past, present, or future IPP standard documents, this specification states that a
248 corresponding “-actual” Job Description attribute exists and can be implemented by a Printer or queried by a client.

249 **3.1 Overall philosophy**

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

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

260 **3.2 Relationship between “-actual” attributes and Job Template attributes**

261 A very important point about the new “-actual” attributes is that support for them is not in any way tied to the support
262 for the corresponding Job Template attributes. For example, a Printer that does not support the “copies” Job
263 Template attribute SHOULD support the “copies-actual” Job Description attribute if the Printer knows how many
264 copies printed for a job.

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

267 **3.3 Timeline of values**

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

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

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

281 **3.4 Implementation of multiple values**

282 As discussed above, all “-actual” attributes are multi-valued. If a certain attribute has more than one value for a Job,
283 such as a job that prints partly simplex and partly duplex, the Printer SHOULD include all values, in the order they
284 were used. For a given attribute, a printer MUST return a value that is a “true” set, with no duplicates.

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

289 **3.5 Existing attributes that are similar to “-actual” attributes**

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

295 **4 New attribute group name**

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

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

301 To conform to this specification, a Printer MUST support the ‘job-actual’ keyword.

302 **5 Conformance Requirements**

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

304 To conform to this specification, a printer SHOULD support an “-actual” attribute if it knows the value through any
305 means, such as through the value of the corresponding Job Template attribute, through the value specified on an IPP
306 “Set” operation [RFC3380], through the PDL, or through some means external to IPP or the PDL.

307 Although a number of optional extensions to IPP are referred to in this document, support for those extensions is not
308 required in order to support the “-actual” attributes extension defined in this specification. For example, although this
309 specification defines new Job Description attributes to go along with the Job Template attributes defined in the
310 “Production Printing Attributes – Set 1” optional extension to IPP [PWG5100.3], a Printer or client could implement or
311 use “-actual” attributes without implementing the Job Template attributes defined in [PWG5100.3].

312 **6 Security Considerations**

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

314 **7 References**315 **7.1 Normative References**

316 [PWG5100.1]

317 Hastings, T., and D. Fullman, “Internet Printing Protocol (IPP): “finishings” attribute value extension”, IEEE-
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336 [RFC3380]

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341 3381, September 2002.342 **7.2 Informative References**

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345 RFC 2565, April 1999.

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348 Semantics”, RFC 2566, April 1999.

349 8 IANA Considerations

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

353 8.1 Attribute Registrations

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

356 Job Description attributes:
357 copies-actual (1setOf integer(1:MAX))
358 cover-back-actual (1setOf (collection))
359 cover-front-actual (1setOf (collection))
360 document-overrides-actual (1setOf collection)
361 finishings-actual (1setOf (type2 enum))
362 finishings-col-actual (1setOf (collection))
363 force-front-side-actual (1setOf (1setOf integer(1:MAX)))
364 imposition-template-actual (1setOf (type3 keyword | name(MAX)))
365 insert-sheet-actual (1setOf (collection))
366 job-account-id-actual (1setOf (name(MAX)))
367 job-accounting-sheets-actual (1setOf (collection))
368 job-accounting-user-id-actual (1setOf (name(MAX)))
369 job-error-sheet-actual (1setOf (collection))
370 job-hold-until-actual (1setOf (type3 keyword | name))
371 job-message-to-operator-actual (1setOf (text(MAX)))
372 job-priority-actual (1setOf integer(1:100))
373 job-sheets-actual (1setOf (type3 keyword | name))
374 job-sheets-col-actual (1setOf (collection))
375 job-sheet-message-actual (1setOf (text(MAX)))
376 media-actual (1setOf (type3 keyword | name(MAX)))
377 media-col-actual (1setOf (collection))
378 media-input-tray-check-actual (1setOf (type3 keyword | name(MAX)))
379 multiple-document-handling-actual (1setOf (type2 keyword))
380 number-up-actual (1setOf integer(1:MAX))
381 orientation-requested-actual (1setOf (type2 enum))
382 output-bin-actual (1setOf (type2 keyword | name(MAX)))
383 page-delivery-actual (1setOf (type2 keyword))
384 page-order-received-actual (1setOf (type2 keyword))
385 page-overrides-actual (1setOf collection)
386 page-ranges-actual (1setOf rangeOfInteger(1:MAX))
387 pages-per-subset-actual (1setOf integer)
388 presentation-direction-number-up-actual (1setOf (type2 keyword))
389 print-quality-actual (1setOf (type2 enum))
390 printer-resolution-actual (1setOf resolution)
391 separator-sheets-actual (1setOf (collection))
392 sheet-collate-actual (1setOf (type2 keyword))
393 sides-actual (1setOf (type2 keyword))

```

394 x-image-position-actual (1setOf (type2 keyword))
395 x-image-shift-actual (1setOf (integer (MIN:MAX)))
396 x-side1-image-shift-actual (1setOf (integer (MIN:MAX)))
397 x-side2-image-shift-actual (1setOf (integer (MIN:MAX)))
398 y-image-position-actual (1setOf (type2 keyword))
399 y-image-shift-actual (1setOf (integer (MIN:MAX)))
400 y-side1-image-shift-actual (1setOf (integer (MIN:MAX)))
401 y-side2-image-shift-actual (1setOf (integer (MIN:MAX)))

```

402 8.2 Attribute Group name Registrations

403 The following table lists the one new attribute group names defined in this document. This is to be registered
404 according to the procedures in [RFC2911] section 6.2.

```

405 Attribute Group name:
406 job-actual

```

407 9 Author’s Address

```

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430 10 Appendix A: Change Log (informative)

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431 Version 0.4, 31 January 2003, as a result of a last call running from 09 January 2003 to 31 January 2003:
432 1. Updated all places that referred to IPP/1.0 and its RFCs. Essentially, changed to have only one reference to
433 IPP/1.0 (in a new paragraph in section1), and moved IPP/1.0 RFCs from Normative References section to
434 Informative References section.
435 2. Made a few small editorial updates.
436
437 Version 0.3, 16 December 2002, as a result of the PWG Semantic Model telecon, December 12, 2002:
438 1. Removed all references to the document object. Extending this concept to the document object will be done
439 in the document object specification only. In this way, moving this specification forward on the standards
440 track will not be held up.

```

- 441 2. Clarified in section 3.4 that multi-valued “-actual” attributes are “true” sets.
- 442 3. Changed the title of section 3.4 to better match the content.
- 443 4. In section 4, made it extra clear that the new attribute group value is only required if an implementation wants
- 444 to be conformant to this specification.
- 445 5. Slightly reworked section 5 to make the conformance requirements more clear.
- 446 6. In sections 4 and 8.2, fixed wording to say “attribute group name” rather than “attribute group value” or
- 447 “attribute group tag”.
- 448