

1 Internet Printing Protocol WG  
2 INTERNET-DRAFT  
3 <draft-ietf-ipp-job-prog-03.txt>  
4 Updates: RFC 2910  
5 [Target Category: standards track]  
6 Expires: January 17, 2002  
7

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July 17, 2001

## 8 Internet Printing Protocol (IPP): 9 Job Progress Attributes

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### 21 Abstract

22 This document defines four new Job Description attributes for monitoring job progress to be registered  
23 as OPTIONAL extensions to IPP/1.0 [RFC2566] and IPP/1.1 [RFC2911]. These attributes are drawn  
24 from the PWG Job Monitoring MIB [rfc2707]. The new Job Description attributes are:

25 "job-collation-type" (type2 enum)  
26 "sheet-completed-copy-number" (integer(0:MAX))  
27 "sheet-completed-document-number" (integer(0:MAX))  
28 "impressions-completed-current-copy" (integer(0:MAX))  
29

30 This document also defines a new "sheet-collate" Job Template attribute to control sheet collation and  
31 to help with the interpretation of the job progress attributes. These new attributes may also be used by  
32 themselves in combination with the IPP/1.1 "job-impressions-completed" attribute as useful job progress  
33 monitoring attributes and/or may be passed in an IPP Notification (see [ipp-ntfy]).

34

34

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55

## 56 **1 Introduction**

57 This document defines four new Job Description attributes for monitoring job progress to be registered  
58 as OPTIONAL extensions to IPP/1.0 [RFC2566] and IPP/1.1 [RFC2911]. These attributes are drawn  
59 from the PWG Job Monitoring MIB [rfc2707]. See section 11 for a description of the base IPP  
60 documents. The new Job Description attributes are:

61 "job-collation-type" (type2 enum)  
62 "sheet-completed-copy-number" (integer(0:MAX))  
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67 to help with the interpretation of the job progress attributes. These new attributes may also be used by  
68 themselves in combination with the IPP/1.1 "job-impressions-completed" attribute as useful job progress  
69 monitoring attributes and/or may be passed in an IPP Notification (see [ipp-ntfy]).

## 70 **2 Terminology**

71 This section defines terminology used throughout this document.

### 72 **2.1 Conformance Terminology**

73 Capitalized terms, such as MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, MAY,  
74 NEED NOT, and OPTIONAL, have special meaning relating to conformance as defined in RFC 2119  
75 [RFC2119] and [RFC2911] section 12.1. If an implementation supports the extension defined in this  
76 document, then these terms apply; otherwise, they do not. These terms define conformance to *this*  
77 *document only*; they do not affect conformance to other documents, unless explicitly stated otherwise.

### 78 **2.2 Other terminology**

79 This document uses terms such as Job object (or Job), IPP Printer object (or Printer), "operation",  
80 "attribute", "keyword", "support", and "impression". These terms have special meaning and are defined  
81 in the model terminology [RFC2911] section 12.2.

## 82 3 Job Template attributes

### 83 3.1 sheet-collate (type2 keyword)

84	+-----+-----+-----+		
85	Job Attribute	Printer: Default Value	Printer: Supported
86		Attribute	Values Attribute
87	+-----+-----+-----+		
88	sheet-collate	sheet-collate-default	sheet-collate-
89	(type2 keyword)	(type2 keyword)	supported (1setOf
90			type2 keyword)
91	+-----+-----+-----+		

92 This attribute specifies whether or not the media sheets of each copy of each printed document in a job  
 93 are to be in sequence, when multiple copies of the document are specified by the 'copies' attribute.

94 Standard keyword values are:

95 'uncollated': each print-stream sheet is printed a number of times in succession equal to the value of  
 96 the 'copies' attribute, followed by the next print-stream sheet.

97 'collated': each copy of each document is printed with the print-stream sheets in sequence, followed  
 98 by the next document copy.

99 For example, suppose a document produces two media sheets as output, and "copies" is equal to '6',  
 100 For the 'uncollated' case, six copies of the first media sheet are printed followed by six copies of the  
 101 second media sheet. For the 'collated' case, one copy of each of the six sheets are printed followed by  
 102 another copy of each of the six media sheets.

103 Whether the effect of sheet collation is achieved by placing copies of a document in multiple output bins  
 104 or in the same output bin with implementation defined document separation is implementation  
 105 dependent. Also whether it is achieved by making multiple passes over the job or by using an output  
 106 sorter is implementation dependent.

107 Note: IPP/1.0 [RFC2566] and IPP/1.1 [RFC2911] is silent on whether or not sheets within documents  
 108 are collated. The "sheet-collate-supported" Printer attribute permits a Printer object to indicate whether  
 109 or not it collates sheets with each document and whether it allows the client to control sheet collation.  
 110 An implementation is able to indicate that it supports uncollated sheets, collated sheets, or both, using  
 111 the 'uncollated', 'collated', or both 'uncollated' and 'collated' values, respectively.

112 This attribute is affected by "multiple-document-handling." The "multiple-document-handling" attribute  
 113 describes the collation of documents, and the "sheet-collate" attribute describes the semantics of  
 114 collating individual pages within a document. To better explain the interaction between these two  
 115 attributes the term "set" is introduced. A "set" is a logical boundary between the delivered media sheets  
 116 of a printed job. For-example, in the case of a ten page single document with collated pages and a  
 117 request for 50 copies, each of the 50 printed copies of the document constitutes a "set." In the above  
 118 example if the pages were uncollated, then 50 copies of each of the individual pages within the  
 119 document would represent each "set".

120 The following table describes the interaction of "sheet-collate" with multiple document handling.

"sheet-collate"	"multiple-document-handling"	Semantics
'collated'	'single-document'	Each copy of the concatenated documents, with their pages in sequence, represents a "set."
'collated'	'single-document-new-sheet'	Each copy of the concatenated documents, with their pages in sequence, represents a "set."
'collated'	'separate-documents-collated-copies'	Each copy of each separate document, with its pages in sequence, represents a "set."
'collated'	'separate-documents-uncollated-copies'	Each copy of each separate document, with its pages in sequence, represents a "set."
'uncollated'	'single-document'	Each media sheet of the document is printed a number of times equal to the "copies" attribute; which constitutes a "set."
'uncollated'	'single-document-new-sheet'	Each media sheet of the concatenated documents is printed a number of times equal to the "copies" attribute; which constitutes a "set."
'uncollated'	'separate-documents-collated-copies'	This is a degenerate case, and the printer object MUST reject the job and return the status, "client-error-conflicting-attributes."
'uncollated'	'separate-documents-uncollated-copies'	This is a degenerate case, and the printer object MUST reject the job and return the status "client-error-conflicting-attributes."

121

122

123

124

From the above table it is obvious that the implicit value of the "sheet-collate" attribute in a printer that does not support the "sheet-collate" attribute, is 'collated.' The semantics of "multiple-document-handling" are otherwise nonsensical in the case of separate documents.

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#### 4 IPP Job Description attributes for monitoring Job Progress

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The following IPP Job Description attributes are proposed to be added to IPP through the type2 registration procedures. They are useful for monitoring the progress of a job. They are also used at attributes in the notification content in a notification report [ipp-ntfy].

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135

There are a number of Job Description attributes for monitoring the progress of a job. These objects and attributes count the number of K octets, impressions, sheets, and pages requested or completed. For impressions and sheets, "completed" means stacked, unless the implementation is unable to detect when each sheet is stacked, in which case stacked is approximated when processing of each sheet completes. There are objects and attributes for the overall job and for the current copy of the document currently being stacked. For the latter, the rate at which the various objects and attributes count depends on the sheet and document collation of the job.

136

137

Consider the following four Job Description attributes that are used to monitor the progress of a job's impressions:

138

139

1. "job-impressions-completed" - counts the total number of impressions stacked for the job (see [RFC2911] section 4.3.18.2)

- 140           2. "impressions-completed-current-copy" - counts the number of impressions stacked for the  
141           current document copy
- 142           3. "sheet-completed-copy-number" - identifies the number of the copy for the current document  
143           being stacked where the first copy is 1.
- 144           4. "sheet-completed-document-number" - identifies the current document within the job that is  
145           being stacked where the first document in a job is 1. NOTE: this attribute SHOULD NOT be  
146           implemented for implementations that only support one document per job.
- 147           For each of the three types of job collation, a job with three copies of two documents (1, 2), where each  
148           document consists of 3 impressions, the four variables have the following values as each sheet is stacked  
149           for one-sided printing:
- 150

150 **"job-collation-type" = 'uncollated-sheets(3)'**

151

"job-impressions-completed"	"impressions-completed-current-copy"	"sheet-completed-copy-number"	"sheet-completed-document-number"
0	0	0	0
1	1	1	1
2	1	2	1
3	1	3	1
4	2	1	1
5	2	2	1
6	2	3	1
7	3	1	1
8	3	2	1
9	3	3	1
10	1	1	2
11	1	2	2
12	1	3	2
13	2	1	2
14	2	2	2
15	2	3	2
16	3	1	2
17	3	2	2
18	3	3	2

152

153

153 **"job-collation-type" = 'collated-documents(4)'**

154

"job-impressions-completed"	"impressions-completed-current-copy"	"sheet-completed-copy-number"	"sheet-completed-document-number"
0	0	0	0
1	1	1	1
2	2	1	1
3	3	1	1
4	1	1	2
5	2	1	2
6	3	1	2
7	1	2	1
8	2	2	1
9	3	2	1
10	1	2	2
11	2	2	2
12	3	2	2
13	1	3	1
14	2	3	1
15	3	3	1
16	1	3	2
17	2	3	2
18	3	3	2

155

156



156 **"job-collation-type" = 'uncollated-documents(5)'**

157

"job-impressions-completed"	"impressions-completed-current-copy"	"sheet-completed-copy-number"	"sheet-completed-document-number"
0	0	0	0
1	1	1	1
2	2	1	1
3	3	1	1
4	1	2	1
5	2	2	1
6	3	2	1
7	1	3	1
8	2	3	1
9	3	3	1
10	1	1	2
11	2	1	2
12	3	1	2
13	1	2	2
14	2	2	2
15	3	2	2
16	1	3	2
17	2	3	2
18	3	3	2

158

159 **4.1 job-collation-type (type2 enum)**

160 Job Collation includes sheet collation and document collation. Sheet collation is defined to be the  
 161 ordering of sheets within a document copy. Document collation is defined to be ordering of document  
 162 copies within a multi-document job. The value of the "job-collation-type" is affected by the value of the  
 163 "sheet-collate" Job Template attribute (see section 3.1), if supplied and supported.

164 The Standard enum values are:

- 165 '1' 'other': not one of the defined values
- 166
- 167 '2' 'unknown': the collation type is unknown
- 168
- 169 '3' 'uncollated-sheets': No collation of the sheets within each document copy, i.e., each sheet of  
 170 a document that is to produce multiple copies is replicated before the next sheet  
 171 in the document is processed and stacked. If the device has an output bin  
 172 collator, the 'uncollated-sheets(3)' value may actually produce collated sheets as  
 173 far as the user is concerned (in the output bins). However, when the job

174 collation is the 'uncollated-sheets(3)' value, job progress is indistinguishable to a  
175 monitoring application between a device that has an output bin collator and one  
176 that does not.  
177

178 '4' 'collated-documents': Collation of the sheets within each document copy is performed within  
179 the printing device by making multiple passes over either the source or an  
180 intermediate representation of the document. In addition, when there are  
181 multiple documents per job, the i'th copy of each document is stacked before the  
182 j'th copy of each document, i.e., the documents are collated within each job  
183 copy. For example, if a job is submitted with documents, A and B, the job is  
184 made available to the end user as: A, B, A, B, .... The 'collated-documents(4)'  
185 value corresponds to the IPP [RFC2911] 'separate-documents-collated-copies'  
186 keyword value of the "multiple-document-handling" attribute.  
187

188 If the job's "copies" attribute is '1' (or not supplied), then the "job-collation-  
189 type" attribute is defined to be '4'.

190  
191 '5' 'uncollated-documents': Collation of the sheets within each document copy is performed  
192 within the printing device by making multiple passes over either the source or an  
193 intermediate representation of the document. In addition, when there are  
194 multiple documents per job, all copies of the first document in the job are  
195 stacked before the any copied of the next document in the job, i.e., the  
196 documents are uncollated within the job. For example, if a job is submitted with  
197 documents, A and B, the job is mad available to the end user as: A, A, ..., B, B,  
198 .... The 'uncollated-documents(5)' value corresponds to the IPP [RFC2911]  
199 'separate-documents-uncollated-copies' keyword value of the "multiple-  
200 document-handling" attribute.

#### 201 **4.2 sheet-completed-copy-number (integer(0:MAX))**

202 The number of the copy being stacked for the current document. This number starts at 0, is set to 1  
203 when the first sheet of the first copy for each document is being stacked and is equal to n where n is the  
204 nth sheet stacked in the current document copy. If the value is unknown, the Printer MUST return the  
205 'unknown' out-of-band value (see [RFC2911] section 4.1), rather than the -2 value used in some MIBs  
206 [rfc2707].

#### 207 **4.3 sheet-completed-document-number (integer(0:MAX))**

208 The ordinal number of the document in the job that is currently being stacked. This number starts at 0,  
209 increments to 1 when the first sheet of the first document in the job is being stacked, and is equal to n  
210 where n is the nth document in the job, starting with 1. If the value is unknown, the Printer MUST  
211 return the 'unknown' out-of-band value (see [RFC2911] section 4.1), rather than the -2 value used in  
212 some MIBs [rfc2707].

213 Implementations that only support one document jobs SHOULD NOT implement this attribute.

#### 214 4.4 impressions-completed-current-copy (integer(0:MAX))

215 The number of impressions completed by the device for the current copy of the current document so far.  
 216 For printing, the impressions completed includes interpreting, marking, and stacking the output. For  
 217 other types of job services, the number of impressions completed includes the number of impressions  
 218 processed. If the value is unknown, the Printer MUST return the 'unknown' out-of-band value (see  
 219 [RFC2911] section 4.1), rather than the -2 value used in some MIBs [rfc2707].

220 This value SHALL be reset to 0 for each document in the job and for each document copy.

## 221 5 Conformance Requirements

222 This section summarizes the Conformance Requirements detailed in the definitions in this document. In  
 223 general each of the attributes defined in this document are OPTIONAL for a client and/or a Printer to  
 224 support, so that client and Printer implementers MAY implement any combination of these attributes.

## 225 6 IANA Considerations

226 The following table provides registration information for all of the attributes defined in this document.  
 227 These are to be registered according to the procedures defined in RFC 2911 [RFC2911] section 6.2.

228 *Note to RFC Editors: Replace RFC NNNN below with the RFC number for this document, so that it*  
 229 *accurately reflects the content of the information for the IANA Registry.*

230	Job Template attributes:	Ref.	Section:
231	sheet-collate (type2 keyword)	RFC NNNN	3.1
232	sheet-default (type2 keyword)	RFC NNNN	3.1
233	sheet-supported (lsetOf type2 keyword)	RFC NNNN	3.1
234			
235	Job Description attributes:	Ref.	Section:
236	job-collation-type (type2 enum)	RFC NNNN	4.1
237	sheet-completed-copy-number (integer(0:MAX))	RFC NNNN	4.2
238	sheet-completed-document-number (integer(0:MAX))	RFC NNNN	4.3
239	impressions-completed-current-copy (integer(0:MAX))		
240		RFC NNNN	4.4

241

242 The resulting attribute registrations will be published in the  
 243 <ftp://ftp.iana.org/in-notes/iana/assignments/ipp/attributes/>  
 244 area.  
 245

## 246 **7 Internationalization Considerations**

247       The IPP extensions defined in this document require the same internationalization considerations as any  
248       of the Job Template and Job Descriptions attributes defined in IPP/1.1 [RFC2911].

## 249 **8 Security Considerations**

250       The IPP extensions defined in this document require the same security considerations as any of the Job  
251       Template attributes and Job Descriptions attributes defined in IPP/1.1 [RFC2911].

## 252 **9 References**

253       [ipp-iig]

254       Hastings, T., Manros, C., "Internet Printing Protocol/1.1: draft-ietf-ipp-implementers-guide-v11-  
255       03.txt, work in progress, July 17, 2001.

256       [ipp-ntfy]

257       Isaacson, S., Martin, J., deBry, R., Hastings, T., Shepherd, M., Bergman, R., " IPP Event  
258       Notification Specification", <draft-ietf-ipp-not-spec-07.txt>, work in progress, July 17, 2001.

259       [RFC2565]

260       Herriot, R., Butler, S., Moore, P., Tuner, R., "Internet Printing Protocol/1.0: Encoding and  
261       Transport", RFC 2565, April 1999.

262       [RFC2566]

263       deBry, R., , Hastings, T., Herriot, R., Isaacson, S., Powell, P., "Internet Printing Protocol/1.0:  
264       Model and Semantics", RFC 2566, April 1999.

265       [RFC2567]

266       Wright, D., "Design Goals for an Internet Printing Protocol", RFC 2567, April 1999.

267       [RFC2568]

268       Zilles, S., "Rationale for the Structure and Model and Protocol for the Internet Printing Protocol",  
269       RFC 2568, April 1999.

270       [RFC2569]

271       Herriot, R., Hastings, T., Jacobs, N., Martin, J., "Mapping between LPD and IPP Protocols", RFC  
272       2569, April 1999.

273       [RFC2707]

274       Bergman, R., Hastings, T., Isaacson, S., Lewis, H. "PWG Job Monitoring MIB - V1", RFC 2707,  
275       November, 1999.

- 276 [RFC2910]  
277 Herriot, R., Butler, S., Moore, P., Tuner, R., "Internet Printing Protocol/1.1: Encoding and  
278 Transport", RFC 2910, September, 2000.
- 279 [RFC2911]  
280 deBry, R., , Hastings, T., Herriot, R., Isaacson, S., Powell, P., "Internet Printing Protocol/1.1:  
281 Model and Semantics", RFC 2911, September, 2000.

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313 IPP Mailing List: [ipp@pwg.org](mailto:ipp@pwg.org)

314  
315 To subscribe to the ipp mailing list, send the following email:  
316 1) send it to [majordomo@pwg.org](mailto:majordomo@pwg.org)

317           2) leave the subject line blank  
318           3) put the following two lines in the message body:  
319                 subscribe ipp  
320                 end  
321

322           Implementers of this specification document are encouraged to join the IPP Mailing List in order to  
323           participate in any discussions of clarification issues and review of registration proposals for additional  
324           attributes and values. In order to reduce spam the mailing list rejects mail from non-subscribers, so you  
325           must subscribe to the mailing list in order to send a question or comment to the mailing list.

## 326   **11 Description of the Base IPP Documents**

327           The base set of IPP documents includes:

328                 Design Goals for an Internet Printing Protocol [RFC2567]  
329                 Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]  
330                 Internet Printing Protocol/1.1: Model and Semantics [RFC2911]  
331                 Internet Printing Protocol/1.1: Encoding and Transport [RFC2910]  
332                 Internet Printing Protocol/1.1: Implementer's Guide [IPP-IIG]  
333                 Mapping between LPD and IPP Protocols [RFC2569]  
334

335           The "Design Goals for an Internet Printing Protocol" document takes a broad look at distributed  
336           printing functionality, and it enumerates real-life scenarios that help to clarify the features that need to  
337           be included in a printing protocol for the Internet. It identifies requirements for three types of users:  
338           end users, operators, and administrators. It calls out a subset of end user requirements that are satisfied  
339           in IPP/1.0 [RFC2566, RFC2565]. A few OPTIONAL operator operations have been added to IPP/1.1  
340           [RFC2911, RFC2910].

341           The "Rationale for the Structure and Model and Protocol for the Internet Printing Protocol" document  
342           describes IPP from a high level view, defines a roadmap for the various documents that form the suite of  
343           IPP specification documents, and gives background and rationale for the IETF IPP working group's  
344           major decisions.

345           The "Internet Printing Protocol/1.1: Model and Semantics" document describes a simplified model with  
346           abstract objects, their attributes, and their operations. The model introduces a Printer and a Job. The  
347           Job supports multiple documents per Job. The model document also addresses how security,  
348           internationalization, and directory issues are addressed.

349           The "Internet Printing Protocol/1.1: Encoding and Transport" document is a formal mapping of the  
350           abstract operations and attributes defined in the model document onto HTTP/1.1 [RFC2616]. It also  
351           defines the encoding rules for a new Internet MIME media type called "application/ipp". This document  
352           also defines the rules for transporting over HTTP a message body whose Content-Type is  
353           "application/ipp". This document defines the 'ipp' scheme for identifying IPP printers and jobs.

354           The "Internet Printing Protocol/1.1: Implementer's Guide" document gives insight and advice to  
355           implementers of IPP clients and IPP objects. It is intended to help them understand IPP/1.1 and some

356 of the considerations that may assist them in the design of their client and/or IPP object  
357 implementations. For example, a typical order of processing requests is given, including error checking.  
358 Motivation for some of the specification decisions is also included.

359 The "Mapping between LPD and IPP Protocols" document gives some advice to implementers of  
360 gateways between IPP and LPD (Line Printer Daemon) implementations.

361 In addition to the base IPP documents, the "Event Notification Specification" document [ipp-ntfy]  
362 defines OPTIONAL operations that allow a client to subscribe to printing related events. Subscriptions  
363 include "Per-Job subscriptions" and "Per-Printer subscriptions". Subscriptions are modeled as  
364 Subscription objects. Four other operations are defined for subscription objects: get attributes, get  
365 subscriptions, renew a subscription, and cancel a subscription.

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## 384 **Acknowledgement**

385  
386 Funding for the RFC Editor function is currently provided by the Internet Society.