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## 10 **IPP: Job Progress Attributes**

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### 22 **Abstract**

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

26 "job-collation-type" (type2 enum)  
27 "sheet-completed-copy-number" (integer(0:MAX))  
28 "sheet-completed-document-number" (integer(0:MAX))  
29 "impressions-completed-current-copy" (integer(0:MAX))  
30

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

35 The full set of IPP documents includes:

- 36 Design Goals for an Internet Printing Protocol [RFC2567]
- 37 Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
- 38 Internet Printing Protocol/1.1: Model and Semantics [ipp-mod]
- 39 Internet Printing Protocol/1.1: Encoding and Transport [ipp-pro]
- 40 Internet Printing Protocol/1.1: Implementer's Guide [ipp-iig]
- 41 Mapping between LPD and IPP Protocols [RFC2569]
- 42 Internet Printing Protocol/1.0 & 1.1: Event Notification Specification [ipp-ntfy]

43 The "Design Goals for an Internet Printing Protocol" document takes a broad look at distributed printing  
44 functionality, and it enumerates real-life scenarios that help to clarify the features that need to be  
45 included in a printing protocol for the Internet. It identifies requirements for three types of users: end  
46 users, operators, and administrators. It calls out a subset of end user requirements that are satisfied in  
47 IPP/1.0. A few OPTIONAL operator operations have been added to IPP/1.1.

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

52 The "Internet Printing Protocol/1.1: Model and Semantics" document describes a simplified model with  
53 abstract objects, their attributes, and their operations that are independent of encoding and transport. It  
54 introduces a Printer and a Job object. The Job object optionally supports multiple documents per Job. It  
55 also addresses security, internationalization, and directory issues.

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

61 The "Internet Printing Protocol/1.1: Implementer's Guide" document gives insight and advice to  
62 implementers of IPP clients and IPP objects. It is intended to help them understand IPP/1.1 and some of  
63 the considerations that may assist them in the design of their client and/or IPP object implementations.  
64 For example, a typical order of processing requests is given, including error checking. Motivation for  
65 some of the specification decisions is also included.

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

68 The "Event Notification Specification" document defines OPTIONAL operations that allow a client to  
69 subscribe to printing related events. Subscriptions include "Per-Job subscriptions" and "Per-Printer  
70 subscriptions". Subscriptions are modeled as Subscription objects. Four other operations are defined  
71 for subscription objects: get attributes, get subscriptions, renew a subscription, and cancel a  
72 subscription.

73

74

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94

95 **1 New Job Template attribute**

96 **1.1 "sheet-collate" (boolean)**

97	+=====+		
98	Job Attribute	Printer: Default Value	Printer: Supported
99		Attribute	Values Attribute
100	+=====+		
101	sheet-collate	sheet-collate-default	sheet-collate-
102	(type2 keyword)	(type2 keyword)	supported (1setOf
103			type2 keyword)
104	+-----+		

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

107 Standard keyword values are:

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

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

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

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

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

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

133 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."

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

## 137 2 IPP Job Description attributes for monitoring Job Progress

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

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

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

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

- 152           2. "impressions-completed-current-copy" - counts the number of impressions stacked for the  
153           current document copy
- 154           3. "sheet-completed-copy-number" - identifies the number of the copy for the current document  
155           being stacked where the first copy is 1.
- 156           4. "sheet-completed-document-number" - identifies the current document within the job that is  
157           being stacked where the first document in a job is 1. NOTE: this attribute SHOULD NOT be  
158           implemented for implementations that only support one document per job.
- 159   For each of the three types of job collation, a job with three copies of two documents (1, 2), where each  
160   document consists of 3 impressions, the four variables have the following values as each sheet is stacked  
161   for one-sided printing:

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

163

"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

164

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

166

"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

167



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

169

"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

170

## 171 **2.1 "job-collation-type" (type2 enum)**

172 Job Collation includes sheet collation and document collation. Sheet collation is defined to be the  
 173 ordering of sheets within a document copy. Document collation is defined to be ordering of document  
 174 copies within a multi-document job. The value of the "job-collation-type" is affected by the value of the  
 175 "sheet-collate" Job Template attribute (see section 1.1), if supplied and supported.

176 The Standard enum values are:

177

178 '1' 'other': not one of the defined values

179

180 '2' 'unknown': the collation type is unknown

181

182 '3' 'uncollated-sheets': No collation of the sheets within each document copy, i.e., each sheet  
 183 of a document that is to produce multiple copies is replicated before the next sheet  
 184 in the document is processed and stacked. If the device has an output bin collator,  
 185 the 'uncollated-sheets(3)' value may actually produce collated sheets as far as the  
 186 user is concerned (in the output bins). However, when the job collation is the  
 187 'uncollated-sheets(3)' value, job progress is indistinguishable to a monitoring  
 188 application between a device that has an output bin collator and one that does not.

189

190 '4' 'collated-documents': Collation of the sheets within each document copy is performed  
191 within the printing device by making multiple passes over either the source or an  
192 intermediate representation of the document. In addition, when there are multiple  
193 documents per job, the i'th copy of each document is stacked before the j'th copy  
194 of each document, i.e., the documents are collated within each job copy. For  
195 example, if a job is submitted with documents, A and B, the job is made available  
196 to the end user as: A, B, A, B, .... The 'collated-documents(4)' value corresponds  
197 to the IPP [ipp-mod] 'separate-documents-collated-copies' keyword value of the  
198 "multiple-document-handling" attribute.  
199

200 If the job's "copies" attribute is '1' (or not supplied), then the "job-collation-type"  
201 attribute is defined to be '4'.  
202

203 '5' 'uncollated-documents': Collation of the sheets within each document copy is performed  
204 within the printing device by making multiple passes over either the source or an  
205 intermediate representation of the document. In addition, when there are multiple  
206 documents per job, all copies of the first document in the job are stacked before  
207 the any copied of the next document in the job, i.e., the documents are uncollated  
208 within the job. For example, if a job is submitted with documents, A and B, the  
209 job is mad available to the end user as: A, A, ..., B, B, .... The 'uncollated-  
210 documents(5)' value corresponds to the IPP [ipp-mod] 'separate-documents-  
211 uncollated-copies' keyword value of the "multiple-document-handling" attribute.

## 212 **2.2 "sheet-completed-copy-number" (integer(0:MAX))**

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

## 218 **2.3 "sheet-completed-document-number" (integer(0:MAX))**

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

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

## 225 **2.4 "impressions-completed-current-copy" (integer(0:MAX))**

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

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

232

### 233 **3 Conformance Requirements**

234 This section summarizes the Conformance Requirements detailed in the definitions in this document. In  
235 general each of the attributes defined in this document are OPTIONAL for a Printer to support, so that  
236 Printer implementers MAY implement any combination of attributes.

### 237 **4 IANA Considerations**

238 IANA will be called on to register the attributes defined in this document, using the procedures outlined  
239 in [ipp-mod].

### 240 **5 Internationalization Considerations**

241 The IPP extensions defined in this document require the same internationalization considerations as any  
242 of the Job Template and Job Descriptions attributes defined in IPP/1.1 [ipp-mod].

### 243 **6 Security Considerations**

244 The IPP extensions defined in this document require the same security considerations as any of the Job  
245 Template attributes and Job Descriptions attributes defined in IPP/1.1 [ipp-mod].

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## 306 **9 Change History**

### 307 **9.1 Changes made to the February 2, 2000 version to make the May 9, 2000 version**

308 The following changes were made to the February 2, 2000 version to make the May 9, 2000 version:

- 309 1. Changed the attribute syntax for the "sheet-collate" attribute from 'boolean' to 'type2 keyword' so  
310 that additional values could be added in the future, besides 'uncollated' and 'collated'.

### 311 **9.2 Changes made to the September 13, 1999 version to make the February 2, 2000** 312 **version**

313 The following changes were made to the September 13, 1999 version to make the February 2, 2000  
314 version:

- 315 1. Deleted the "impressions-interpreted" (integer(-2:MAX)) in favor of using the IPP "job-impressions-  
316 completed" attribute that is already defined in IPP/1.1.
- 317 2. Changed the lower bound for the "sheet-completed-copy-number" (integer(0:MAX)), "sheet-  
318 completed-document-number" (integer(0:MAX)), and "impressions-completed-current-copy"  
319 (integer(0:MAX)) from -2 to 0, and use the 'unknown' out-of-band value to indicate unknown.
- 320 3. Added the explicit interactions of "sheet-collate" with "multiple-document-handling."
- 321 4. Added Conformance, IANA Considerations, Internationalization Considerations, and Security  
322 Considerations sections

### 323 **9.3 Changes made to the May 19, 1999 version to make the September 13, 1999** 324 **version**

325 The following changes were made to the May 19, 1999 version to make the September 13, 1999 version:

- 326 1. Changed it from a PWG to an IETF specification so that it can be cited from the IETF Notification  
327 documents.
- 328 2. Removed the reference to the long Notification spec from 1998, since it isn't going to be an IETF  
329 document.
- 330 3. Removed the notification content section, since the Notification specification now includes the 'job-  
331 progress' event and the associated notification content.

### 332 **9.4 Changes made to the April 16, 1999 version to make the May 19, 1999 version**

333 The following changes were made to the April 16, 1999 version to make the May 19, 1999 version:

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[page 13]

- 334 1. Added the "sheet-collate" Job Template attribute.  
335 2. Added the 'job-progress-event' report content type.

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