

1 INTERNET-DRAFT
2 <draft-ietf-ipp-job-prog-021.txt>
3 Category: standards track

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~~August 30, 2000~~
January 23, 2001

Internet Printing Protocol (IPP): 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 as
23 extensions to IPP/1.0 [RFC2566] and IPP/1.1 [~~ipp-mod~~[RFC2911](#)]. These attributes are drawn from the
24 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 to help
31 with the interpretation of the job progress attributes. These new attributes may also be used by themselves in
32 combination with the IPP/1.1 "job-impressions-completed" attribute as useful job progress monitoring
33 attributes and/or may be passed in an IPP Notification (see [ipp-ntfy]).

34

34 The full set of IPP documents includes:

35 Design Goals for an Internet Printing Protocol [RFC2567]

36 Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]

37 Internet Printing Protocol/1.1: Model and Semantics [~~ipp-mod~~[RFC2911](#)]

38 Internet Printing Protocol/1.1: Encoding and Transport [~~ipp-pro~~[RFC2910](#)]

39 Internet Printing Protocol/1.1: Implementer's Guide [ipp-iig]

40 Mapping between LPD and IPP Protocols [RFC2569]

41 Internet Printing Protocol/1.0 & 1.1: Event Notification Specification [ipp-ntfy]

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

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

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

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

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

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

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

70

70

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87

88 1 New Job Template attribute

89 1.1 sheet-collate (type2 keyword)

90	+	=====+	=====+	=====+
91		Job Attribute	Printer: Default Value	Printer: Supported
92			Attribute	Values Attribute
93		+	+	+
94		sheet-collate	sheet-collate-default	sheet-collate-
95		(type2 keyword)	(type2 keyword)	supported (1setOf
96				type2 keyword)
97		+	+	+

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

100 Standard keyword values are:

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

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

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

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

113 Note: IPP/1.0 [RFC2566] and IPP/1.1 [~~ipp-mod~~[RFC2911](#)] is silent on whether or not sheets within
114 documents are collated. The "sheet-collate-supported" Printer attribute permits a Printer object to indicate
115 whether or not it collates sheets with each document and whether it allows the client to control sheet collation.
116 An implementation is able to indicate that it supports uncollated sheets, collated sheets, or both, using the
117 'uncollated', 'collated', or both 'uncollated' and 'collated' values, respectively.

118 This attribute is affected by "multiple-document-handling." The "multiple-document-handling" attribute
119 describes the collation of documents, and the "sheet-collate" attribute describes the semantics of collating
120 individual pages within a document. To better explain the interaction between these two attributes the term
121 "set" is introduced. A "set" is a logical boundary between the delivered media sheets of a printed job. For-

122 example, in the case of a ten page single document with collated pages and a request for 50 copies, each of
 123 the 50 printed copies of the document constitutes a "set." In the above example if the pages were uncollated,
 124 then 50 copies of each of the individual pages within the document would represent each "set".

125 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."

126

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

130 2 IPP Job Description attributes for monitoring Job Progress

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

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

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

- 143 1. "job-impressions-completed" - counts the total number of impressions stacked for the job (see [~~ipp-~~
144 [modRFC2911](#)] section 4.3.18.2)
- 145 2. "impressions-completed-current-copy" - counts the number of impressions stacked for the current
146 document copy
- 147 3. "sheet-completed-copy-number" - identifies the number of the copy for the current document being
148 stacked where the first copy is 1.
- 149 4. "sheet-completed-document-number" - identifies the current document within the job that is being
150 stacked where the first document in a job is 1. NOTE: this attribute SHOULD NOT be implemented
151 for implementations that only support one document per job.

152 For each of the three types of job collation, a job with three copies of two documents (1, 2), where each
153 document consists of 3 impressions, the four variables have the following values as each sheet is stacked for
154 one-sided printing:

155

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

156

"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

157

158

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

159

"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

160

161

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

162

"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

163

164 **2.1 job-collation-type (type2 enum)**

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

169 The Standard enum values are:

170 '1' 'other': not one of the defined values

171

172 '2' 'unknown': the collation type is unknown

173

174 '3' 'uncollated-sheets': No collation of the sheets within each document copy, i.e., each sheet of a
 175 document that is to produce multiple copies is replicated before the next sheet in the
 176 document is processed and stacked. If the device has an output bin collator, the
 177 'uncollated-sheets(3)' value may actually produce collated sheets as far as the user is
 178 concerned (in the output bins). However, when the job collation is the 'uncollated-

179 sheets(3)' value, job progress is indistinguishable to a monitoring application between
180 a device that has an output bin collator and one that does not.

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

191
192 If the job's "copies" attribute is '1' (or not supplied), then the "job-collation-type"
193 attribute is defined to be '4'.

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

204 2.2 sheet-completed-copy-number (integer(0:MAX))

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

209 2.3 sheet-completed-document-number (integer(0:MAX))

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

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

2.4 impressions-completed-current-copy (integer(0:MAX))

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

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

3 Conformance Requirements

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

4 IANA Considerations

~~IANA will be called on to register the attributes defined in this document, using the procedures outlined in [ipp-mod].~~ This section contains the exact information for IANA to add to the IPP Registries according to the procedures defined in RFC 2911 [RFC2911] section 6.

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

4.1 Attribute Registrations

The attributes defined in this document will be published by IANA according to the procedures in RFC 2911 [RFC2911] section 6.2 with the following path:

<ftp.isi.edu/iana/assignments/ipp/attributes/>

The registry entry will contain the following information:

Job Template attributes:	Ref.	Section:
sheet-collate (type2 keyword)	RFC NNNN	1.1
Job Description attributes:	Ref.	Section:
job-collation-type (type2 enum)	RFC NNNN	2.1
sheet-completed-copy-number (integer(0:MAX))	RFC NNNN	2.2
sheet-completed-document-number (integer(0:MAX))	RFC NNNN	2.3
impressions-completed-current-copy (integer(0:MAX))	RFC NNNN	2.4

247

248 **5 Internationalization Considerations**

249 The IPP extensions defined in this document require the same internationalization considerations as any of the
250 Job Template and Job Descriptions attributes defined in IPP/1.1 [~~ipp-mod~~[RFC2911](#)].

251 **6 Security Considerations**

252 The IPP extensions defined in this document require the same security considerations as any of the Job
253 Template attributes and Job Descriptions attributes defined in IPP/1.1 [~~ipp-mod~~[RFC2911](#)].

254 **7 References**

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