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T. Hastings
Xerox Corporation
H. Lewis
IBM Printing Company
R. Bergman
Hitachi Koki Imaging Solutions
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IPP/1.1: Job Progress Attributes

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Abstract

This document defines four new Job Description attributes for monitoring job progress to be registered as extensions to IPP/1.0 [RFC2566] and IPP/1.1 [ipp-mod]. These attributes are drawn from the PWG Job Monitoring MIB [[rfc2707]]. This document also defines a new "sheet-collate" Job Template attribute to control sheet collation and to help with the interpretation of the job progress attributes. These new attributes may also be used by themselves as useful job progress monitoring attributes and/or may be passed in an IPP Notification (see [ipp-not]). The new Job Description attributes are:

    "job-collation-type" (type2 enum)
    "sheet-completed-copy-number" (integer(0:MAX))
    "sheet-completed-document-number" (integer(0:MAX))
    "impressions-completed-current-copy" (integer(0:MAX))
which in combination with the IPP/1.1 "job-impressions-completed" attribute in combination with the new Job Template attribute: :
    "sheet-collate" (boolean)
are used for job progress monitoring

37   The full set of IPP documents includes:

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

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

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

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

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

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

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

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

75

TABLE OF CONTENTS

94

1   New Job Template attribute

1.1   "sheet-collate" (boolean)

```
+===================+====================+====================+
| Job Attribute     |Printer: Default Value|  Printer: Supported |
|                   |     Attribute      |   Values Attribute   |
+===================+====================+====================+
| sheet-collate     | sheet-collate-default| sheet-collate-       |
| (boolean)         | (boolean)          |  supported (1setOf   |
|                   |                    |         boolean)     |
+-------------------+--------------------+--------------------+
```

This attribute specifies whether or not the media sheets of each copy of each printed document in a job are to be in sequence, when multiple copies of the document are specified by the 'copies' attribute. When "sheet-collate" is 'true', each copy of each document is printed with the print-stream sheets in sequence. When 'sheet-collate' is 'false', each print-stream sheet is printed a number of times equal to the value of the 'copies' attribute in succession. For example, suppose a document which produces two media sheets as output, and "copies" is equal to '6', in this case six copies of the first media sheet are printed followed by six copies of the second media sheet.

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

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

ISSUE 01 - Should we change the name from "sheet-collate" to "sheet-uncollate", since the absence of the attribute (and non-support of this attribute) is more likely to indicate collated sheets and so should be the 'false' value of the attribute, rather than the 'true' value?

ISSUE 02 - Should we change the "sheet-collate" data type from 'boolean' to 'type2 keyword' so that it could take on more values? This would also help with the name, say, "sheet-collation (type2 keyword) with values: 'uncollated' and 'collated'. The "sheet-collation-supported" (1setOf type2 keyword) would be more usual, than the unusual '1setOf boolean' also. In the future, we could define two collated values: 'multi-pass-collation' and 'output-bin-collation' to indicate which form is requested and/or supported, since some Printers MAY want to support both.

ISSUE 03 - If we change the attribute syntax to 'type2 keyword' should we have several values for the collated case now, i.e., define: 'multi-pass-collation' and 'output-bin-collation', instead of just 'collated'?

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

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

"sheet-collate"	"multiple-document-handling"	Semantics
'true'	'single-document'	Each copy of the concatenated documents, with their pages in sequence, represents a "set."
'true'	'single-document-new-sheet'	Each copy of the concatenated documents, with their pages in sequence, represents a "set."
'true'	'separate-documents-collated-copies'	Each copy of each separate document, with its pages in sequence, represents a "set."
'true'	'separate-documents-uncollated-copies	Each copy of each separate document, with its pages in sequence, represents a "set."
'false'	'single-document'	Each media sheet of the document is printed a number of times equal to the "copies" attribute; which constitutes a "set."
'false'	'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."
'false'	'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."
'false'	'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."

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

2   IPP Job Description attributes for monitoring Job Progress

146   The following IPP Job Description attributes are proposed to be added to IPP through the type2
147   registration procedures. They are useful for monitoring the progress of a job. They are also used at
148   attributes in the notification content in a notification report [ipp-not].

149   There are a number of Job Description attributes for monitoring the progress of a job. These objects and
150   attributes count the number of K octets, impressions, sheets, and pages requested or completed. For
151   impressions and sheets, "completed" means stacked, unless the implementation is unable to detect when
152   each sheet is stacked, in which case stacked is approximated when processing of each sheet completes.

153   There are objects and attributes for the overall job and for the current copy of the document currently
154   being stacked. For the latter, the rate at which the various objects and attributes count depends on the
155   sheet and document collation of the job.

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

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

160   2. "impressions-completed-current-copy" - counts the number of impressions stacked for the
161   current document copy

162   3. "sheet-completed-copy-number" - identifies the number of the copy for the current document
163   being stacked where the first copy is 1.

164   4. "sheet-completed-document-number" - identifies the current document within the job that is
165   being stacked where the first document in a job is 1. NOTE: this attribute SHOULD NOT be
166   implemented for implementations that only support one document per job.

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

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

171

"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

172

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

174

"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

175

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

177

"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

178

179   ### *2.1   "job-collation-type" (type2 enum)*

180   ISSUE 04 - Or should the attribute syntax by 'type2 keyword' to go with "multiple-document-
181   handling(type2 keyword)", instead of the Job MIB enum syntax?

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

186   The Standard enum values are:

187

188   '1'   'other': not one of the defined values

189

190   '2'   'unknown': the collation type is unknown

191   ISSUE 05 - Or should we use the IPP out-of-band 'unknown' value (see [ipp-mod] section 4.1)
192   instead of this unknown(2) enum Job Monitoring MIB value, i.e., "job-collation-type" (type2
193   keyword) instead of "job-collation-type" (type2 enum)?

194

195   '3'   'uncollated-sheets': No collation of the sheets within each document copy, i.e., each sheet
196   of a document that is to produce multiple copies is replicated before the next sheet

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197   in the document is processed and stacked. If the device has an output bin collator,
198   the 'uncollated-sheets(3)' value may actually produce collated sheets as far as the
199   user is concerned (in the output bins). However, when the job collation is the
200   'uncollated-sheets(3)' value, job progress is indistinguishable to a monitoring
201   application between a device that has an output bin collator and one that does not.
202
203   '4'   'collated-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, the i'th copy of each document is stacked before the j'th copy
207   of each document, i.e., the documents are collated within each job copy. For
208   example, if a job is submitted with documents, A and B, the job is made available
209   to the end user as: A, B, A, B, …. The 'collated-documents(4)' value corresponds
210   to the IPP [ipp-model] 'separate-documents-collated-copies' keyword value of the
211   "multiple-document-handling" attribute.
212
213   If the job's "copies" attribute is '1' (or not supplied), then the "job-collation-type"
214   attribute is defined to be '4'.
215
216   '5'   'uncollated-documents': Collation of the sheets within each document copy is performed
217   within the printing device by making multiple passes over either the source or an
218   intermediate representation of the document. In addition, when there are multiple
219   documents per job, all copies of the first document in the job are stacked before
220   the any copied of the next document in the job, i.e., the documents are uncollated
221   within the job. For example, if a job is submitted with documents, A and B, the
222   job is mad available to the end user as: A, A, …, B, B, …. The 'uncollated-
223   documents(5)' value corresponds to the IPP [ipp-model] 'separate-documents-
224   uncollated-copies' keyword value of the "multiple-document-handling" attribute.

225 2.2   "sheet-completed-copy-number" (integer(0:MAX))

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

231 2.3   "sheet-completed-document-number" (integer(0:MAX))

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

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

238 ### *2.4   "impressions-completed-current-copy" (integer(0:MAX))*

239 The number of impressions completed by the device for the current copy of the current document so far.
240 For printing, the impressions completed includes interpreting, marking, and stacking the output. For
241 other types of job services, the number of impressions completed includes the number of impressions
242 processed. See section 0. If the value is unknown, the Printer MUST return the 'unknown' out-of-band
243 value (see [ipp-mod] section 4.1), rather than the -2 value used in some MIBs [rfc2707].

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

245

3   Conformance Requirements

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

4   IANA Considerations

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

5   Internationalization Considerations

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

6   Security Considerations

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

7   References

260 [ipp-mod]

261 deBry, R., , Hastings, T., Herriot, R., Isaacson, S., Powell, P., "Internet Printing Protocol/1.1:
262 Model and Semantics", <draft-ietf-ipp-model-v11-04.txt>, work in progress, June 23, 1999.

263 [ipp-not]

264 Isaacson, S., Martin, J., deBry, R., Hastings, T., Shepherd, M., Bergman, R., " IPP Event
265 Notification Specification", <draft-ietf-ipp-not-spec-02.txt>, work in progress, September 10,
266 1999.

267 [rfc2566]

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

270 [rfc2707]

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

8   Change History

8.1   Changes made to the September 13, 1999 version to make the February 2, 2000 version

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

1. Deleted the "impressions-interpreted" (integer(-2:MAX)) in favor of using the IPP "job-impressions-completed" attribute that is already defined in IPP/1.1.

2. Changed the lower bound for the "sheet-completed-copy-number" (integer(0:MAX)), "sheet-completed-document-number" (integer(0:MAX)), and "impressions-completed-current-copy" (integer(0:MAX)) from -2 to 0, and use the 'unknown' out-of-band value to indicate unknown.

3. Added the explicit interactions of "sheet-collate" with "multiple-document-handling.

4. Added Conformance, IANA Considerations, Internationalization Considerations, and Security Considerations sections

8.2   Changes made to the May 19, 1999 version to make the September 13, 1999 version

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

1. Changed it from a PWG to an IETF specification so that it can be cited from the IETF Notification documents.

2. Removed the reference to the long Notification spec from 1998, since it isn't going to be an IETF document.

3. Removed the notification content section, since the Notification specification now includes the 'job-progress' event and the associated notification content.

8.3   Changes made to the April 16, 1999 version to make the May 19, 1999 version

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

1. Added the "sheet-collate" Job Template attribute.

2. Added the 'job-progress-event' report content type.

9   Full Copyright Statement

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