Internet Printing Protocol (IPP):
Job Progress Attributes

Status of this Memo

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]. 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))

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 in combination with the IPP/1.1 "job-impressions-completed" attribute as useful job progress 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

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94

1   New Job Template attribute

1.1   "sheet-collate" (*boolean*type2 keyword*)

```
+==================+=====================+=====================+
| Job Attribute    |Printer: Default Value| Printer: Supported |
|                  |     Attribute        |  Values Attribute  |
+==================+=====================+=====================+
| sheet-collate    | sheet-collate-default| sheet-collate-     |
| (type2 keyword)  | (type2 keyword)     |  supported (1setOf  |
|                  |                     |    type2 keyword)   |
+------------------+---------------------+---------------------+
```

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.

Standard keyword values are:

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

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

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

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" Printer 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 the
'uncollated', 'collated', or both 'uncollated' and 'collated' values, respectively.

This attribute is affected by "multiple-document-handling." The "multiple-document-handling" attribute
describes the collation of documents, and the "sheet-collate" attribute describes the semantics of
collating individual pages within a document. To better explain the interaction between these two
attributes the term "set" is introduced. A "set" is a logical boundary between the delivered media sheets
of a printed job. For-example, in the case of a ten page single document with collated pages and a
request for 50 copies, each of the 50 printed copies of the document constitutes a "set." In the above
example if the pages were uncollated, then 50 copies of each of the individual pages within the
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 sequence, represents a "set."
'collated'	'single-document-new-sheet'	Each copy of the concatenated documents, with their pages 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 "s
'uncollated'	'single-document-new-sheet'	Each media sheet of the concatenated documents is printed 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 reje 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 reje 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

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

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

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

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.

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].

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].

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].

7   References

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307 **9 Change History**

308 **9.1 Changes made to the February 2, 2000 version to make the May 9, 2000 version**

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

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

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

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

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

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

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

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

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

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

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

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