```
Agenda: IEEE-ISTO IPP WG Meeting in Chicago, Sept 13-14, 2000
======================================================================
File: Agenda-IEEE-ISTO-IPP-WG-Meeting-Chi-000913.doc
```

Please see the proposed agenda topics and document references for our upcoming meeting
in Chicago. We will discuss the exact order and the time allocation for these points
at the beginning of the meeting.

Agenda priorities:
A. Order and approval of the agenda
B. Driver down-load
C. Production Printing
D. Preparations for the October 17-20 bake-off in Boston
E. Notification
F. Resource object specification
G. Miscellaneous Attributes
H. Device Administrative operations

Nothing has been scheduled for Wednesday evening as yet.

All of the .pdf and .doc files have been copied to two separate zip files:

```
ftp://ftp.pwg.org/pub/pwg/ipp/meeting-000913/pdf-000913.zip
ftp://ftp.pwg.org/pub/pwg/ipp/meeting-000913/doc-000913.zip
```

For those files whose revision marks are limited, only the -rev.doc and -ref.pdf files
have been included. For those with many changes, both the version with revisions and
without revisions have been included in the .zip file.

The documents are given below in their usual new_XXX places, since the URL is shorter.
Names in parentheses indicate discussion leader for the meeting.

Detailed Agenda

A. Order and approval of the agenda

1. "Agenda: IEEE-ISTO IPP WG Meeting in Chicago, Sept 13-14, 2000" (Carl-Uno)
     Agenda-IEEE-ISTO-IPP-WG-Meeting-Chi-000913.doc
       Order to handle documents and time to allot for each

B. Driver down-load

2. "Print Driver Extension" (Hugo Parra)
     ftp://ftp.pwg.org/pub/pwg/ipp/new_DRV/draft-ietf-ipp-install-00-000713.pdf

C. Production Printing

3. "IPP: Exception Attributes for Documents and Pages" (Bob Herriot)
      ftp://ftp.pwg.org/pub/pwg/ipp/new_EXC/pwg-ipp-exceptions-model-000508.pdf

4. "IPP: Production Printing Attributes - Set1" (Tom Hastings)
      ftp://ftp.pwg.org/pub/pwg/ipp/new_PPE/pwg-ipp-prod-print-set1-000605.pdf

D. Preparations for the October 17-20 bake-off in Boston

5. "IPP Bake Off 3 Testing Outline" (P. Zehler)
      ftp://ftp.pwg.org/pub/pwg/ipp/new_TES/IPP-Test-Plan-000831.pdf

E. Notification

6. "IPP: The 'ippgetw' Delivery Method" (H. Lewis, R. Herriot)
      ftp://ftp.pwg.org/pub/pwg/ipp/new_NOT/ipp-notify-get-000907.doc

7. "Beginnings of Implementer's Guide section for IPP Event Notification" (Tom H.)
      ftp://ftp.pwg.org/pub/pwg/ipp/new_NOT/ipp-not-spec-for-IIG-000714-rev.doc

F. Resource object specification

8. "Internet Printing Protocol (IPP): Resource Objects" (T. Hastings)
      ftp://ftp.pwg.org/pub/pwg/ipp/new_RES/draft-ietf-ipp-get-resource-01-000901.doc

G. Miscellaneous Attributes

9. "IPP: finishings attribute values extension" (Tom Hastings)
     /pub/pwg/ipp/proposed-registrations/attribute-values/ipp-finishings-fold-trim-
bale-000608.pdf

10. "job-recipient-name" Job Template attribute" (Tom Hastings)
      21. "IPP: finishings attribute values extension" (Tom Hastings)
      /pub/pwg/ipp/proposed-registrations/attributes/ipp-job-recipient-name-attr-
000907.doc

```
H. Device operations
11. "IPP: Set3 Operations" (Tom Hastings)
     ftp://ftp.pwg.org/pub/pwg/ipp/new_OPS/ipp-ops-set3-991208.pdf




                        Documents NOT on the Agenda

The following documents are not intended to be part of the Agenda.  They have not been
printed and are included in a separate .zip file:

   ftp://ftp.pwg.org/pub/pwg/ipp/meeting-000913/not-on-agenda-doc-000913.zip

They are included for convenience only, in case members want to refer to them.


A. IPP Event Notification

20. "IPP: IPP Event Notification Specification" (Bob Herriot)
     ftp://ftp.pwg.org/pub/pwg/ipp/new_NOT/ipp-not-spec-000830-rev.pdf

21. "IPP: The 'mailto:' Notification Delivery Method (Bob Herriot)
     ftp://ftp.pwg.org/pub/pwg/ipp/new_NOT/ipp-notify-mailto-000830.pdf

22. "IPP: The INDP Event Notification Delivery Method (Parra, Hastings)
     ftp://ftp.pwg.org/pub/pwg/ipp/new_NOT/draft-ietf-indp-method-03-000829-rev.pdf

23. "IPP: The 'ipp' Notification Polling Method" (Bob Herriot)
     ftp://ftp.pwg.org/pub/pwg/ipp/new_NOT/ipp-notify-poll-000706.pdf

24. "IPP: Notifications over SNMP via Job Monitoring MIB" (Ron Bergman)
     ftp://ftp.pwg.org/pub/pwg/ipp/new_NOT/draft-ietf-ipp-not-over-snmp-04.pdf

25. "IPP: Requirements for IPP Notifications" (Carl-Uno Manros)
     ftp://ftp.pwg.org/pub/pwg/ipp/new_NOT/ipp-notification-requirements-000509.pdf

26. "IPP: IPP Notification Delivery Protocol (Parra)
     ftp://ftp.pwg.org/pub/pwg/ipp/new_NOT/draft-ietf-indp-000229.pdf

27. "IPP: Job Progress Attributes" (Tom Hastings, Harry Lewis)
 ftp://ftp.pwg.org/pub/pwg/ipp/new_NOT/ipp-job-prog-attr-000830.doc


B. IPP WG Last Call comments

28. Set spec:  Need 'any' or 'unknown' for "document-formats-supported" - Carl Kugler


C. Job and Printer Administrative operations

29.  "IPP: Job and Printer Administrative Operations" (Tom Hastings, Harry Lewis)
     ftp://ftp.pwg.org/pub/pwg/ipp/new_OPS/ipp-ops-set2-000719.pdf
```

D. Open source IPP clients (Carl-Uno Manros)

E. Miscellaneous

30. "Assignment of IPP operation-ids, status codes, out-of-band values, and attribute
group tags for IETF standards track documents" (Tom Hastings)
    ftp://ftp.pwg.org/pub/pwg/ipp/code_allocations/IPP-code-allocations.pdf

31. "IPP: attribute syntax for Collection" (Bob Herriot)
 ftp://ftp.pwg.org/pub/pwg/ipp/new_COL/ipp-collection-attr-syntax-000504.pdf

32. "IPP: output-bin attribute extension" (Tom Hastings)
    ftp://ftp.pwg.org/pub/pwg/ipp/proposed-registrations/attributes/ipp-output-bin-
attr-991021.pdf

F. New operations

33. "IPP: Job and Printer Set Operations" (Tom Hastings)
    ftp://ftp.pwg.org/pub/pwg/ipp/new_OPS/ipp-job-printer-set-ops-000323.pdf
    This document was sent for IPP WG Last Call, ending May 12, 2000.

H. IPP/1.1 Documents forwarded to the IESG to be proposed standards

34. "IPP/1.1: Model and Semantics" (Carl-Uno Manros, Bob Herriot)
    ftp://ftp.pwg.org/pub/pwg/ipp/new_MOD/ipp-model-v11-000522.pdf

35. "IPP/1.1: Encoding and Transport" (Bob Herriot)
    ftp://ftp.pwg.org/pub/pwg/ipp/new_PRO/ipp-pro-000530.pdf

36. "IPP/1.1: Implementer's Guide" (Carl-Uno Manros)
    Possible Input for IPP/1.1: IIG
    See email discussion
    ftp://ftp.pwg.org/pub/pwg/ipp/new_IIG/ipp-implementers-guide-000530-rev.pdf

V. Directory schema documents related to IPP

37. "Definition of the Printer Abstract Service Type v2.0 (Tom Hastings)
    ftp://ftp.pwg.org/pub/pwg/ipp/new_SLP/draft-ietf-svrloc-printer-scheme-06.pdf

38. "IPP: LDAP Schema for Printer Services" (Harry Lewis)
ftp://ftp.pwg.org/pub/pwg/ipp/new_LDAP/draft-ietf-ipp-ldap-printer-schema-02.pdf

Document Number 2

3   Hugo Parra
4   Novell, Inc.
5   Ted Tronson
6   Novell, Inc.
7   July 13, 2000

8   Internet Printing Protocol (IPP):

9   **Printer Installation Extension**

10

12   Status of this Memo

21   **Abstract**

22   Various client platforms require that some setting up take place at the workstation before the client can
23   properly submit jobs to a specific printer.   This setup process is sometimes referred to as printer installation.
24   Most clients need some information about the printer being installed as well as support files to complete the
25   printer installation. The nature of the support files varies depending on the specific client platform, from
26   simple configuration files to highly sophisticated printer drivers. This document refers to these support files
27   as "client print support files". Traditionally, the selection and installation of the correct client print support
28   files has been error prone. The selection and installation process can be simplified and even automated if the
29   workstation can learn some key information about the printer. This document describes the IPP extensions
30   that enable workstations to obtain the information needed to perform a proper printer driver installation
31   using IPP.

32   The full set of IPP documents includes:

33   Design Goals for an Internet Printing Protocol [RFC2567]
34   Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
35   Internet Printing Protocol/1.1: Model and Semantics [ipp-mod]
36   Internet Printing Protocol/1.1: Encoding and Transport [ipp-pro]
37   Internet Printing Protocol/1.1: Implementer's Guide [ipp-iig]
38   Mapping between LPD and IPP Protocols [RFC2569]
39
40   The "Design Goals for an Internet Printing Protocol" document takes a broad look at distributed printing
41   functionality, and it enumerates real-life scenarios that help to clarify the features that need to be included in
42   a printing protocol for the Internet. It identifies requirements for three types of users: end users, operators,
43   and administrators. It calls out a subset of end user requirements that are satisfied in IPP/1.0. A few
44   OPTIONAL operator operations have been added to IPP/1.1.

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

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

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

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

60

Table of Contents

80

81 **1   Introduction**

82 A common configuration for printing from a workstation requires that some client print support files (e.g.,
83 PPD, printer driver files) specific to the target printer be installed on that workstation. Selection and
84 configuration of the appropriate client print support files can be simplified and even automated if the
85 workstation can obtain some key information about the printer. With a few extensions, IPP provides a
86 simple and reliable vehicle for printers to convey this information to interested workstations. The IPP
87 extensions described in this document enable a flexible solution for installing client print support files on
88 workstations running different operating systems and for printers of all makes and models. It allows client
89 print support files to be downloaded from repositories of different sorts. A possible repository for the files is
90 the printer itself. The extensions necessary for getting client print support files from the printer are included
91 in this document.

92 **2   Terminology**

93 This document uses terms such as "attributes", "keywords", and "support". These terms have special
94 meaning and are defined in the model terminology [ipp-mod] section 12.2.

95 Capitalized terms, such as MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, MAY, NEED
96 NOT, and OPTIONAL, have special meaning relating to conformance. These terms are defined in [ipp-
97 mod] section 12.1 on conformance terminology, most of which is taken from RFC 2119 [RFC2119].

98 This section defines the following additional terms that are used throughout this document:

99 REQUIRED: if an implementation supports the extensions described in this document, it MUST support
100 a REQUIRED feature.
101 OPTIONAL: if an implementation supports the extensions described in this document, it MAY support
102 an OPTIONAL feature.

103 **3   Model Extensions**

104 To assist workstations in the printer installation process, an IPP printer needs to provide the workstation
105 with information about the client print support files, such as the their name and location/s. This information
106 needs to match the workstation's specific environment, such as its operating system, preferred natural
107 language, and preferred document format.

108 The following extensions to the IPP model enable assisted or automated printer installation. This section
109 describes each extension in detail.

110   -   A new REQUIRED printer-description attribute: "client-print-support-files-supported".

111   -   A new REQUIRED Get-Printer-Attributes operational attribute: "client-print-support-files-
112   request".

113   -   A new OPTIONAL printer operation: Get-Client-Print-Support-Files.

114 **3.1 "client-print-support-files-supported" (1setOf octetString(MAX))**

115 An IPP Printer uses the REQUIRED printer-description attribute "client-print-support-files-supported" to
116 represent relevant information about the client print support files it supports. Each value is a composite
117 ASCII string with well-defined fields (see Table 1). Each value string must be formatted as follows:

118   "uri=val$_1$< field-name$_2$=val$_{21}$,…,val$_{2p}$< … < field-name$_n$=val$_{n1}$,…,val$_{nq}$<".

Field name	Field value
"uri"	One REQUIRED string identifying the uri where to obtain the support files for each OS platform, document format, and natural language the printer supports. This MUST be the first field in each value. Examples of uri types that may be found here are FTP, HTTP, and IPP. FTP and HTTP uri's identify the archive file that contains all the necessary client support files. IPP uri's identify the printer object from which the archive file may be obtained (see section 3.3).
"os-type"	One or more REQUIRED comma-separated strings identifying the operating system types supported by this set of client print support files. Valid values include the operating system names defined in the IANA document [os-names].
"cpu-type"	One or more REQUIRED comma-separated strings identifying the CPU types supported by this set of client print support files. Valid values include the operating system names defined in the IANA document [cpu-names]. "unknown" is a valid value.
"document-format"	One or more REQUIRED comma-separated strings identifying the document formats supported by this set of client print support files. Valid values are the string representation of the IPP mimeMediaType syntax. "unknown" is a valid value.
"natural-language"	One or more REQUIRED comma-separated strings identifying the natural language used by this set of client print support files. Valid values are the string representation of the IPP naturalLanguage syntax. "unknown" is a valid value.
"compression"	One REQUIRED string identifying the mechanism used to compress this set of client print support files. All files needed for the installation of a printer driver MUST be compressed into a single file. Valid values are: "deflate", "gzip", "compress". "none" is allowed but limits the uncompressed client print support file to a single file.
"install-file-type"	One or more REQUIRED comma-separated strings identifying the type of the client print support files. Valid values are: "printer-driver", "ppd", "updf", "gpd".
"install-file-name"	One REQUIRED string identifying the name by which the client print support files will be installed on the workstation. For client print support files of type "printer-driver", this is also the name that identifies this printer driver in an .inf file.

119 **Table 1. client-print-support-files-supported fields**

120 Each value MUST refer to one and only one set of client print support files, even if the files are
121 downloadable from various repositories (i.e., even if they are associated with multiple uir's).

122 The following illustrates what two valid values of "client-print-support-files-supported" might look like,
123 ISSUE 1: What strings should be used for CPU types in the examples?

124   "uri=ipp://mycompany.com/myprinter< os-type=windows-95<
125   cpu-type=Intell-P5< document-format=application/postscript<
126   natural-language=en< compresion=gzip< install-file-type=printer-driver<
127   install-file-name=ManufacturerName<"

128   "uri=ftp://mycompany.com/root/drivers/win95/CompanyX/ModelY.zip<
129   os-type=windows-95< cpu-type=Intell-P5<
130   document-format=application/postscript,application/vnd.hp-PCL<
131   natural-language=en,fr< compresion=gzip< install-file-type=printer-driver<
132   install-file-name=ManufacturerName<"

133 The "client-print-support-files-supported" printer description attribute may be preset at manufacturing time
134 or set via the IPP set-printer-attribute operation or through administrative means outside the scope of IPP.

135 Clients SHOULD ignore fields they don't recognize in a given value. This allows for feature extensions to
136 the format of the string without breaking compatibility with earlier clients.

3.2   Get-Printer-Attributes Extension

138 The following extensions allow a workstation to retrieve information on the client print support files a
139 printer supports using the existing Get-Printer-Attributes operation.

3.2.1 Get-Printer-Attributes Request

141 A printer may contain information on multiple client print support files to match the different operating
142 systems, natural languages and document formats it supports. A workstation may query this information by
143 including "client-print-support-files-supported " in the "requested-attributes" operational attribute of the
144 Get-Printer-Attributes operation. The workstation can control what information a printer returns by
145 including the "client-print-support-files-request" operational attribute.

146 "client-print-support-files-request" (octetString(MAX)) is used as follows.

147 The IPP Printer is REQUIRED to support this operational attribute and all its member fields. An IPP Client
148 MAY supply the attribute if it wishes to restrict the printer driver information it receives from the printer.
149 Its text value is a composite string with the same format as that of "client-print-support-files-supported" (see
150 section 3.1). Table 2 describes the fields that may be included in this string.

151 If "client-print-support-files-request" is not specified by the client, the printer should behave as if the
152 attribute had been provided with all fields left empty (i.e., return an unfiltered list).

153 It is recommended that workstations first use Get-Printer-Attributes in combination with "client-print-
154 support-files-request" to get a list of the potential client print support files that meet the workstation's
155 requirements. The workstation can then choose from the returned list which client print support files to use
156 and where to get them. If one of the uri's returned is an IPP uri, the workstation can retrieve the client print
157 support files from an IPP printer via the Get-Client-Print-Support-Files operation (see section 3.3).

Field name	Field value
"uri-scheme"	One or more OPTIONAL strings instructing the printer to only return information on client print support files that can be located at uri's of the specified uri schemes. If not present, the printer does not filter the information it returns based on uri-scheme.
"os-type"	One or more OPTIONAL strings instructing the printer to only return information on client print support files that support the specified operating systems. If not present, the printer does not filter the information it returns based on os-type.
"cpu-type"	One or more OPTIONAL strings instructing the printer to only return information on client print support files that support the specified CPU types. If not present, the printer does not filter the information it returns based on cpu-type.
"document-format"	One or more OPTIONAL strings instructing the printer to only return information on client print support files that support the specified document formats. If not present, the printer does not filter the information it returns based on document format.
"natural-language"	One or more OPTIONAL strings instructing the printer to only return information on client print support files that support the specified natural languages. If not present, the printer does not filter the information it returns based on natural language.
"compression"	One or more OPTIONAL strings instructing the printer to only return information on client print support files that use the specified compressions. If not present, the printer does not filter the information it returns based on compression.

158 **Table 2. client-print-support-files-request fields**

159 **3.2.2 Get-Printer-Attributes Response**

160 A printer MUST return the "client-print-support-files-supported" attribute in the "printer-object" attribute
161 group when a requested by a client. Each returned attribute value must satisfy the criteria specified by the
162 client in the request.

163   **3.3   Get-Client-Print-Support-Files**

164   This OPTIONAL operation allows a client to download client print support files from an IPP Printer.

165   **3.3.1   Get-Client-Print-Support-Files Request**

166   The following sets of attributes are part of the Get-Client-Print-Support-Files request:

167   Group 1: Operation Attributes

168   Natural Language and Character Set:
169   The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod],
170   section 3.1.4.1.

171   Target:
172   The "printer-uri" (uri) operation attribute which is the target for this operation as described in
173   [ipp-mod], section 3.1.5.

174   Requesting User Name:
175   The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as
176   described in [ipp-mod], section 8.3.

177   "client-print-support-files-request" (octetString(MAX)) :
178   The client MUST supply this attribute specifying the criteria the returned client print support
179   files should meet. If more than one set of client print support files meet the specified criteria, the
180   printer returns the first one it encounters. The format and semantics of this attribute's value are
181   identical to those of the Get-Printer-Attributes operational attribute of the same name described
182   in section 3.2.1.

183   **3.3.2   Get-Client-Print-Support-Files Response**

184   The Printer object returns the following sets of attributes as part of the Get-Client-Print-Support-Files
185   Response:

186   Group 1: Operation Attributes

187   Status Message:
188   In addition to the REQUIRED status code returned in every response, the response
189   OPTIONALLY includes a "status-message" (text(255)) operation attribute as described in [ipp-
190   mod], sections 13 and 3.1.6.

191   Natural Language and Character Set:

192   The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod],
193   section 3.1.4.2.
194
195 Group 2: Unsupported Attributes
196   See [ipp-mod], section 3.1.7 for details on returning Unsupported Attributes.
197
198 Group 3: Printer Object Attributes
199   "client-print-support-files-supported" (octetString(MAX)).
200   The Printer object MUST return this attribute if the response includes Group 4 (i.e., if a set of
201   client print support files that meets the client's criteria was found and is included in the
202   response). The provided text string MUST use the format shown in section 3.1. This attribute
203   identifies the properties of the returned client print support files.
204
205 Group 4: Client Print Support Files
206   The printer MUST supply the client print support files that match the client's criteria following the
207   "end-of-attributes" tag. All necessary files must be compressed into a single file.

4   Encoding of the Operation Layer

209 This extension uses the operation layer encoding described in [ipp-pro].

5   Encoding of Transport Layer

211 This specification uses the transport layer encoding described in [ipp-pro] with the following extensions.

212 New Error codes:

213   0x0417   clnt-err-client-print-support-file-not-found

214 New Operation code

215   0x0021   Get-Client-Print-Support-Files

6   IANA Considerations

217 IANA-registered operating system names are required by this spec. All other IANA considerations are
218 already addressed by IPP. ISSUE 2: Should mention IANA's future support for CPU types?

7   Internationalization Considerations

220 All text representations introduced by this specification adhere to the internationalization-friendly
221 representation supported by IPP. This work is also accommodates the use of client print support files of
222 different languages.

223 **8   Security Considerations**

224 The IPP Model and Semantics document [ipp-mod] discusses high-level security requirements (Client
225 Authentication, Server Authentication and Operation Privacy). Client Authentication is the mechanism by
226 which the client proves its identity to the server in a secure manner. Server Authentication is the mechanism
227 by which the server proves its identity to the client in a secure manner. Operation Privacy is defined as a
228 mechanism for protecting operations from eavesdropping.

229 Only operators of a printer should be allowed to set the "printer-driver-supported" attribute and only users
230 of the printer should be allowed to query that information.

231 Printers that support the Get-Client-Print-Support-Files operation are REQUIRED to implement TLS to
232 enable users to reliably authenticate the source of the client print support files.

233 **9   References**

234
235 [cpu-names]
236   IANA Registry of CPU Names at ftp://ftp.isi.edu/in-notes/iana/assignments/XXX.

237 [ipp-mod]
238   R. deBry, T. Hastings, R. Herriot, S. Isaacson, P. Powell, "Internet Printing Protocol/1.0: Model and
239   Semantics", <draft-ietf-ipp-model-v11-06.txt>, March 1, 2000.

240 [ipp-pro]
241   Herriot, R., Butler, S., Moore, P., Tuner, R., "Internet Printing Protocol/1.1: Encoding and
242   Transport", draft-ietf-ipp-protocol-v11-05.txt, March 1, 2000.

243 [os-names]
244   IANA Registry of Operating System Names at ftp://ftp.isi.edu/in-notes/iana/assignments/operating-
245   system-names.

246 [rfc2026]
247   S. Bradner, "The Internet Standards Process -- Revision 3", RFC 2026, October 1996.

248 [rfc2616]
249   R. Fielding, J. Gettys, J. Mogul, H. Frystyk, L. Masinter, P. Leach, T. Berners-Lee, "Hypertext
250   Transfer Protocol - HTTP/1.1", RFC 2616, June 1999.

10 Author's Addresses

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11 Full Copyright Statement

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Document Number 3

IEEE-ISTO Printer Working Group (PWG)   Robert Herriot
PWG-DRAFT   Xerox Corporation
                                                                                    Kirk Ocke
                                                                             Xerox Corporation
                                                                                  May 8, 2000

Internet Printing Protocol (IPP): Exception Attributes for Documents and Pages
<pwg-ipp-exceptions-model-000508.doc, .pdf>

Status of this Memo

This document is a PWG-Draft of an IEEE-ISTO PWG Proposed Standard and is in full conformance with
all provisions of the PWG Process (see http://www.pwg.org/chair/pwg-process-990825.pdf). PWG-Drafts
are working documents of the IEEE-ISTO PWG and its working groups.

The list of current PWG-Drafts can be accessed at http://www.pwg.org/pub/pwg/

                                          Abstract

This document specifies an extension to the Internet Printing Protocol/1.0 (IPP) [RFC2565, RFC2566] and
IPP/1.1 [ipp-mod, ipp-pro]. This extension relaxes the restriction that each attribute value is the same for all
pages, all documents and all document copies within a job. For example, with this extension, page 1 of a
job could have a different media from the other pages in the job or document 2 of a job could be stapled
while the other documents of the job are not. As another example, the first ten copies of a document could
be printed on letter paper and stapled while the eleventh copy of the same document could be printed on
transparencies with no staple.

This extension supports document exceptions and page exceptions by adding two new Job Template
attributes: "document-exceptions" and "page-exceptions" -- both have a syntax type of "1setOf collection".
Each 'collection' value for "document-exceptions" contains an attribute that identifies the exception
documents, namely "input-documents" or "output-documents". The 'collection' value also contains one or
more attributes that are exceptions for the identified documents, e.g. "document-format", "finishings", and
"media". Each 'collection' value for "page-exceptions" contains two attributes that identify the exception
pages, namely "input-documents" or "output-documents" plus "pages". The 'collection' value also
contains one or more attributes that are exceptions for the identified pages, e.g. "sides" and "media". When
the exceptions applies to some but not all document copies, the 'collection' value for "document-
exceptions" or "page-exceptions" contains the attribute of "document-copies".

This extension also supports subset finishing by adding a new Job Template attribute "pages-per-subset",
which specifies the number of pages per subset. The extension allows finishing and other document
attributes to be applied to such subsets of pages.

The full set of IPP documents includes:
    -   Design Goals for an Internet Printing Protocol [RFC2567]

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

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41   -   Internet Printing Protocol/1.1: Model and Semantics (this document)

42   -   Internet Printing Protocol/1.1: Encoding and Transport [IPP-PRO]

43   -   Internet Printing Protocol/1.1: Implementer's Guide [IPP-IIG]

44   -   Mapping between LPD and IPP Protocols [RFC2569]

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 included
47   in a printing protocol for the Internet. It identifies requirements for three types of users: end users,
48   operators, and administrators. It calls out a subset of end user requirements that are satisfied in IPP/1.0. A
49   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: 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
56   encoding rules for a new Internet MIME media type called "application/ipp". This document also defines
57   the rules for transporting over HTTP a message body whose Content-Type is "application/ipp". This
58   document defines a 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
60   implementers of IPP clients and IPP objects. It is intended to help them understand IPP/1.1 and some of the
61   considerations that may assist them in the design of their client and/or IPP object implementations. For
62   example, a typical order of processing requests is given, including error checking. Motivation for some of
63   the specification 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   **Table of Contents**

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1. Introduction

The Internet Printing Protocol (IPP) is an application level protocol for distributed printing using Internet tools and technologies. IPP version 1.1 (IPP/1.1) requires that each attribute value be the same for all all pages, all documents and all document copies within a job. This document defines OPTIONAL extensions to the IPP/1.1 model which relax this restriction and allow pages, documents and document copies to have attributes that are exceptions. For example, with this extension, page 1 of a job could have a different media or different value of "sides" from the other pages in the job, or document 2 of a job could be stapled while the other documents of the job are not. As another example, the first ten copies of a document could be printed on letter paper and stapled while the eleventh copy of the same document could be printed on transparencies with no staple. This document is a proposal for an extension to IPP/1.0 and IPP/1.1.

This extension supports document exceptions and page exceptions by adding two new Job Template attributes: "document-exceptions" and "page-exceptions" -- both have a syntax type of "1setOf collection". Each 'collection' value for "document-exceptions" contains

    a)   an attribute that identifies the exception documents, namely "input-documents" or "output-documents".

    b)   an OPTIONAL attribute that identifies the document copies of the specified exception documents, i.e. "document-copies". If this attribute is absent, the exceptions apply to all document copies.

    c)   one or more attributes that are exceptions for the identified documents, e.g. "document-format", "finishings", and "media".

Each 'collection' value for "page-exceptions" contains

    a)   an attribute that identifies the documents containing the exception pages, namely "input-documents" or "output-documents".

    b)   an attribute that identifies the exception pages, namely "pages".

    c)   an OPTIONAL attribute that identifies the document copies of the specified documents, i.e. "document-copies". If this attribute is absent, the exceptions apply to all document copies.

    d)   The 'collection' value also contains one or more attributes that are exceptions for the identified pages, e.g. "sides" and "media".

This extension also supports subset finishing with a new Job Template attribute "pages-per-subset", which specifies the number of pages per subset. The extension allows finishing and other document attributes to be applied to such subsets of pages.

2. Terminology

This section defines the following additional terms that are used throughout this document:

2.1 REQUIRED

    If an implementation supports the extensions described in this document, it MUST support a REQUIRED feature.

198   2.2 OPTIONAL

199   If an implementation supports the extensions described in this document, it MAY support an
200   OPTIONAL feature.

201   2.3 Exception-Extension

202   The Exception-Extension is the extension proposed in this document that adds attribute exceptions
203   for documents and pages. This extension supports Document-Exceptions, Page-Exceptions and
204   Subset-Finishing, which are all defined later in this section.

205   2.4 Sheet

206   A Sheet is the unit of media that a printer puts marks on. It is the most basic unit of output from a
207   printer. A printer may mark on one side or on both sides of a sheet.

208   2.5 Output-Page

209   An Output-Page is the set of all markings that the author intended to be placed on one side of a
210   Sheet, including, but not limited to, text, drawings, images, footers and headers.

211   2.6 Impression:

212   An impression is the set of all markings that the Job submitter intended to be placed on one side of a
213   Sheet. Each impression contains one or more Output-Pages. Generally a Job submitter prints each
214   Output-Page as the author intended, namely one Output-Page per Impression. Sometimes, a Job
215   submitter prints several Output-Pages per Impression, perhaps to save paper or money. The IPP
216   attribute "number-up" specifies the number of Output-Pages per impression. When "number-up" is
217   greater than 1, an impression contains multiple Output-Pages.

218   2.7 Input-Page

219   An Input-Page is a sequence of bytes that describe how to mark a single Output-Page. IPP 1.1 [ipp-
220   mod] uses the term "print-stream-pages" to refer to both Input-Pages and Output-Pages. There is a
221   one to one relationship between Input-Pages and Output-Pages and they are in the same order. Both
222   Input-Pages and Output-Pages are numbered sequentially (see section 4.1) starting from 1 at the
223   beginning of each Input-Document or Output-Document, respectively. When the first Input-Page of
224   an Input-Document coincides with the first Output-Page of an Output-Document, the numbering of
225   Input-Pages and Output-Pages coincides; otherwise it doesn't.

226   2.8 Input-Document

227   An Input-Document is the entire sequence of bytes transmitted as the Document Content in the
228   Print-Job and Send-Document operations or referenced by the "document-uri" operation attribute in
229   the Print-URI and Send-URI operations. This sequence of bytes consists of one or more Input-
230   Pages.

231 2.9 Output-Document

232   An Output-Document is a set of one or more Sheets which either are permanently bound into a
233   single unit, e.g. with a staple, or are intended to be treated by an end-user as a single unit, e.g. for a
234   loose leaf binder. If an Output-Document is bound, it is uniformly bound; if it is not bound, no
235   subset of sheets within it are bound. The Output-Pages that comprise an Output-Document may
236   come from

237

238   a) all the Input-Pages of an Input-Document or
239   b) a proper subset of the Input-Pages of the Input-Document or
240   c) all the Input-Pages of several Input-Documents.

241

242   An Output-Document is *not* a set of sheets that are bound temporarily for shipping, e.g. with
243   banding.

244 2.10 Output-Document-Copy

245   When a Printer produces more than one or more copies of an Output-Document, each copy is called
246   an Output-Document-Copy. Sometimes this specification uses the phrase "copy of Output-
247   Document" to emphasize "copy", but the phrase is equivalent to "Output-Document-Copy".

248 2.11 Relationship between Input-Document and Output-Documents

249   Each relationship is named and defined below. The cases are derived from an analysis of possible
250   tree structures (see section 4.2). A client selects the desired case with the number of submitted
251   Input-Documents and the specific values of three attributes: the existing Job Template "multiple-
252   document-handling" and two new attributes "pages-per-subset" and "documents-per-subset". The
253   latter two attributes describe how the stream of Input-Pages or Input-Documents and are partitioned
254   into Output-Documents, respectively.

255

256   In this section, the number of copies produced for each Output-Document does not affect the
257   discussion, so it is easiest to assume that the number is 1.

258

259   The table below summarizes the relationship of Input-Documents to Output-Document in the five
260   cases:

261

Case	Number of	
	Input-Documents	Output-Documents
Degenerate	1	1
Separate-Documents	n	n
Single-Document	n	1
Page-Subset Documents	n	m (m >n)
Document-Subset Documents	n	m (m < n)

262

263   When n = 1 for the "Separate-Documents" and "Single-Document" become the "Degenerate" case.

264

265 The table below summarizes the attribute values that control the cases.

266

267 - The "separate" value means that "multiple-document-handling" is 'separate-documents-
268 collated-copies' or 'separate-documents-uncollated-copies'.
269 - The "single" value means that "multiple-document-handling" is 'single-document' or 'single-
270 document-new-sheet'.
271 - The "ignored" value means that the attribute need not be present and is ignored if it is present,
272 - The "present" value means that the attribute must be present. A different case is implied if it is
273 not present.
274 - The "not present" value means that the attribute must not be present. A different case is implied
275 if it is present.

276

Case	"multiple-document-handling"	"pages-per-subset"	"documents-per-subset"
Separate-Documents	separate	not present	not present
Single-Document	single	ignored	ignored
Page-Subset Documents	separate	present	not present
Document-Subset Documents	separate	not present	present

277

278 The Degenerate row is omitted because it follows the rules for the "Separate-Documents" and
279 "Single-Documents" rules when the number of Input-Documents is 1.
280 There is an error if both "page-per-subset" and "document-per-subset" are present in the "separate"
281 case.

2.11.1 Degenerate Case:

283 In the Degenerate Case, the Job consists of exactly one Output-Document and exactly one
284 Input-Document. The single Input-Document produces the single Output-Document. This
285 case represents the most common case of printing. For example, if a user is Printing a single
286 MS Word file, the MS Word file is the Input-Document and the printed pages are the
287 Output-Document. This case is the degenerate case of Separate-Documents and Single-
288 Document. It occurs when the number of Input-Documents is 1 and either

289

290 a) "multiple-document-handling" is 'separate-documents-collated-copies' or 'separate-
291 documents-uncollated-copies' and neither "pages-per-subset" nor "documents-per-
292 subset" are present or.
293 b) "multiple-document-handling" is 'single-document' or 'single-document-new-sheet', and
294 both "pages-per-subset" and "documents-per-subset" are ignored if present

2.11.2 Separate Documents Case

296 In the Separate Documents Case, the Job consists of one or more Output-Documents where
297 each Input-Document produces one Output-Document. For example, if a user prints 10 Java
298 files in one Job and wants 10 separately stapled Output-Documents, each of the 10 Java files

299   is an Input-Document, and the printed Output-Pages from each of the 10 Java files is a
300   separate Output-Document that is stapled separately. This case occurs when "multiple-
301   document-handling" is 'separate-documents-collated-copies' or 'separate-documents-
302   uncollated-copies' and the new attributes "pages-per-subset" and "documents-per-subset" are
303   not present.

304   ### 2.11.3 Single Document Case

305   In the Single Document Case, the job consists of a single Output-Document produced from
306   one or more Input-Documents. For example, if a user prints 10 Java files in one Job and
307   wants all Output-Pages of the 10 Java files to be produced as 1 stapled Output-Document,
308   then each of the 10 Java files is an Input-Document, and all printed Output-Pages from all of
309   the 10 Java files is a single Output-Document that is stapled. This case occurs when
310   "multiple-document-handling" is 'single-document' or 'single-document-new-sheet'; the
311   value of "pages-per-subset" and "documents-per-subset" are both ignored if present.

312   ### 2.11.4 Page-Subset Document Case:

313   In the Page-Subset Case, the Job consists of one or more Output-Documents and one or
314   more Input-Documents. The new attribute "pages-per-subset" contains a sequence of
315   integers which specifies how to partition the stream of Input-Pages into subsets, each of
316   which produces an Output Document. For example, if a user prints 1 PostScript file with
317   1000 pages, where each 4 Output-Pages represents an insurance policy, then the PostScript
318   file is the Input-Document and each group of 4 Output-Pages is an Output-Document. The
319   resulting Output-Documents would be the same if the same 1000 Input-Pages were spread
320   across 2 or more PostScript files. This case occurs when "multiple-document-handling" is
321   'separate-documents-collated-copies' or 'separate-documents-uncollated-copies' and the new
322   attribute "pages-per-subset" contains 1 or more integer values. The new attribute
323   "documents-per-subset" is not present.

324   ### 2.11.5 Document-Subset Document Case:

325   This case is defined here for completeness, but it is not supported by this extension.
326
327   In the Document-Subset Document Case, the Job consists of one or more Output-Documents
328   and one or more Input-Documents. The new attribute "documents-per-subset" contains a
329   sequence of integers which specifies how to partition Job's Input-Documents into subsets,
330   each of which produces an Output Document. For example, if a user prints 25 Java files in
331   one Job and wants 2 separately stapled Output-Documents, one with 15 Java files and one
332   with 10 Java files, then each of the Java files is an Input-Document, and the printed Output-
333   Pages from the first 15 Java files and next 10 Java files are two separate Output-Documents
334   that are stapled separately. This case occurs when "multiple-document-handling" is
335   'separate-documents-collated-copies' or 'separate-documents-uncollated-copies' and
336   "documents-per-subset" contains 1 or more integer values. The new attribute "pages-per-
337   subset" is not present.
338

2.12 Document-Exceptions

In IPP/1.1 each attribute value is the same for the entire Job. When an attribute is a "Document-Exceptions" attributes, it is different for identified Input-Documents or Output-Documents.

2.13 Page-Exceptions

In IPP/1.1 each attribute value is the same for the entire Job. When an attribute is a "Page-Exceptions" attributes, it is different for identified Input-Pages or Output-Pages.

2.14 Subset-Finishing

Subset-Finishing is the ability to subdivide the stream of Input-Pages from one or more Input-Documents into multiple Output-Documents and to apply the same or different finishing to each individual Output-Document.

2.15 Affects

Each attribute is said to 'affect' some part of a job. For example, "media" affects a sheet, "finishings" affects an Output-Document, "page-ranges" affects an Input-Document and "job-priority" affects a job. This nuance must be explicit in the Exceptions-Extension because the parts of a job that an attribute affects limit the parts of a job that an attribute can be associated with (see the next section for a definition of "associates"). For example, "job-priority" affects a job; so it can be associated with a Job, but not an Input-Document or Input-Page. Likewise, "finishings" affects and Output-Document; so it can be associated with a Job or an Output-Document, but not with an Output-Page.

2.16 Associates

The word "associates" combines the meaning of the two terms in subsections of this section, namely "directly associates" and "effectively associates". When an attribute is either directly associated or effectively associated with some part of a job, it is said to be "associated" with that part of a job.

2.16.1 Directly Associates

When an attribute is said to be 'directly associated' with some part of a job, it affects that part or some other part. The part that it affects depends on the attribute and what the attribute is directly associated with. For example if "media" is directly associated with a job, it affects all sheets in the job. If "media" is directly associated with an Output-Document, it affects all sheets in that Output-Document. If "media" is directly associated with an Output-Page, it affects the sheet containing that Output-Page.

2.16.2 Effectively Associates

When an attribute is said to be directly associated with some part of a job 'A' that is semantically connected with another part 'B', the attribute is said to be "effectively associated" with 'B'. For example, in the Separate-Documents Case, when an attribute is

373   directly associated with an Input-Document, it is effectively associated with the
374   corresponding Output-Document.

375   2.17 Job-Submission Operations:

376   The Job-Submission Operations are the IPP operations that create jobs and send document content,
377   namely Print-Job, Print-URI, Create-Job, Send-Document and Send-URI.

378   3. Requirements

379   The following is a list of requirements for the Exceptions-Extension.
380
381   1. The Exception-Extension MUST contain a mechanism for specifying Job attributes that are
382   exceptions for particular Input-Documents or Output-Documents. A Printer and a client
383   OPTIONALLY support this mechanism.
384   2. There MUST be a mechanism for specifying Job attributes that are exceptions for particular Input-
385   Pages or Output-Pages. A Printer and a client OPTIONALLY support this mechanism.
386   3. There MUST be a mechanism for specifying Job attributes that are exceptions for particular
387   document copies of Output-Documents. A Printer and a client OPTIONALLY support this
388   mechanism.
389   4. The mechanism for exceptions MUST be supported by all Job-Submission operations and Validate-
390   Job.
391   5. The extension MUST support the four relationships of Input-Documents and Output-Documents:
392   Degenerate Case, Separate-Documents Case, Single-Document Case and Page-Subset Document
393   Case.
394   6. The extension MUST support Subset-Finishing.

395   4. Overview

396   In IPP 1.1 all attributes that a client includes with job creation operations affect the entire Job in a uniform
397   way. That is, there is no way for one Output-Document in a given Job to be stapled and another drilled.
398   Also, there is no way for the first sheet of each Output-Document to be on a different media or to have a
399   different value of "sides" from the other Sheets in the Output-Document. In addition, there is no way for
400   one document copy to be printed on paper and another on transparencies. An IPP/1.1 client can specify
401   features, such as finishing, media and sides only at the job level.
402
403   The Exception Extension defined in this document allows some Output-Pages, some Output-Documents
404   and some Input-Documents to be affected by attribute values that are exceptions to those specified for the
405   Job as a whole. For example, the first Output-Page of an Output-Document has a different media from the
406   rest, or the second Output-Document is stapled and the rest are not, or the page-ranges of the first Input-
407   Document selects a few Input-Pages and the rest of the Input-Documents are printed in full, or one copy of
408   an Output-Document has a different media from the rest.

4.1 Numbering of Components

The Exception Extension defines a system for numbering of components.

- Each Input-Document has a number. The single Input-Document that a client sends with Print-Job or Print-URI and the first Input-Document that a client sends with Send-Document or Send-URI has a number of 1. Each subsequent Input-Document that a clients sends has a number that is one higher than the previous.

- Each Input-Page in an Input-Document is numbered sequentially, starting at 1 for the first Input-Page. If a Job has several Input-Documents, the first Input-Page of each Input-Document has the number of 1, which is relative to that Input-Document.

- Each Output-Document has a number. The first Output-Document has a number of '1', and each subsequent Output-Document has a number that is one higher than the previous Output-Document. The Output-Documents are numbered as if the value of "copies" were 1, i.e. if an Input-Document produces multiple copies, each copy of a particular Output-Document has the same number.

- Each Output-Page in an Output-Document is numbered sequentially, starting at 1 for the first Output-Page. If a Job has several Output-Documents, the first Output-Page of each has the number of 1, which is relative to that Output-Document

- Each copy of an Output-Document has a number. The first copy of each Output-Document has a number of '1', and each subsequent copy has a number that is one higher than the previous copy. If a job has multiple Output-Documents, the first copy of each has a number of '1'.

4.2 Relationship of Numbered Components

The previous section described how to number Input-Documents, Output-Documents, Input-Pages and Output-Pages. This section describes the relationship between the number on each of these four components. The relationship differs for each of the five cases defined in section 2.10. The following diagrams of tree structure show each of the five cases and the relationship of the numbers in those cases.

These diagrams assume that the number of copies of Output-Documents is 1. When the number of copies exceeds 1, some parts of these diagrams would have further replication, but the numeric relationships of the four displayed components would not change.

439 Degenerate Case:
440
441
```
                              Job &
442                      Input-Document 1 &
443                      Output-Document 1
444                              |
445                  ---------------------
446                  |         ...        |
447            Input-Page 1 &     Input-Page n &
448            Output-Page 1      Output-Page n
```
449
450
451 Conditions that define this case:
452
453   -   Job contains exactly 1 Input-Document
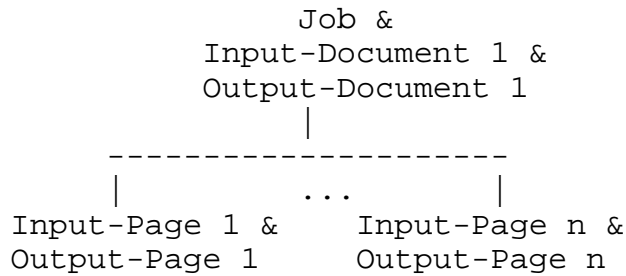
454   -   Either conditions for "Separate-Documents" or "Single-Documents" are met.

455 Observations about this case:
456
457   -   Job coincides with Output-Document 1 and Input-Document 1

458   -   Output-Page i coincides with Input-Page i

459   Separate-Documents Case:
460
461
```
                              Job
462                              |
463          --------------------------------------------------------
464          |                                   |                   |
465      Input-Document 1 &              Input-Document 2 &      ...
466      Output-Document 1               Output-Document 2
467          |                                   |
468    --------------------              ---------------------
469    |        ...        |             |         ...       |
470  Input-Page 1 &    Input-Page n &   Input-Page 1 &    Input-Page p
471  Output-Page 1     Output-Page n    Output-Page 1     Output-Page p
```
472
473 Conditions that define this case:
474
475   -   Job contains more than one or more Input-Documents, though one Input-Document is technically
476   the Degenerate Case.
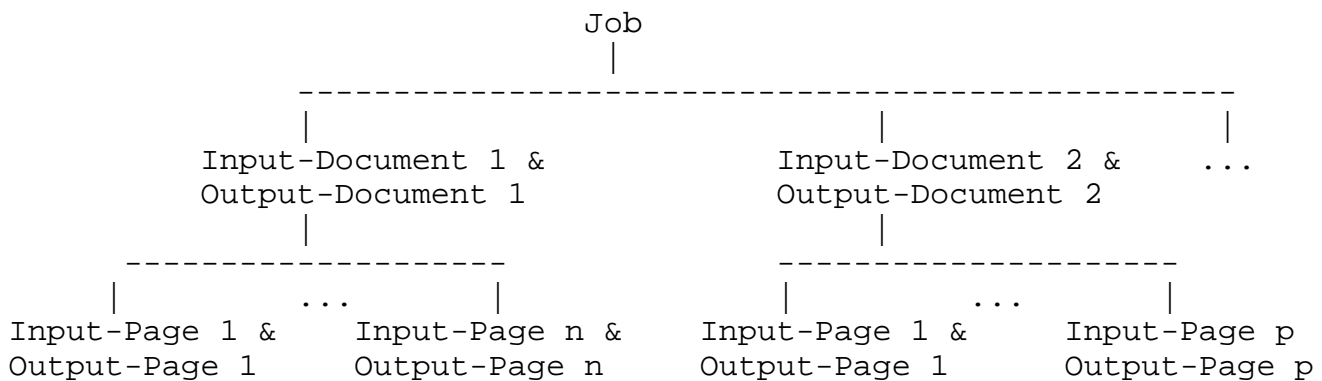
477   -   "multiple-document-handling" is 'separate-documents-collated-copies' or 'separate-documents-
478   uncollated-copies'

479   -   "pages-per-subset" is not present

480   -   "documents-per-subset" is not present

481   Observations about this case:

482
483   -   Output-Document i coincides with Input-Document i

484   -   Output-Page i coincides with Input-Page i

485
486   Single-Document Case:

487
```
488                        Job & Output Document 1
489                                   |
490            -------------------------------------------------
491            |                              |                 |
492        Input-Document 1             Input-Document 2    ...
493            |                              |
494        -------------------        --------------------
495        |         ...       |        |          ...       |
496   Input-Page 1 &    Input-Page n &   Input-Page 1 &    Input-Page p
497   Output-Page 1     Output-Page n    Output-Page n+1   Output-Page n+p
```
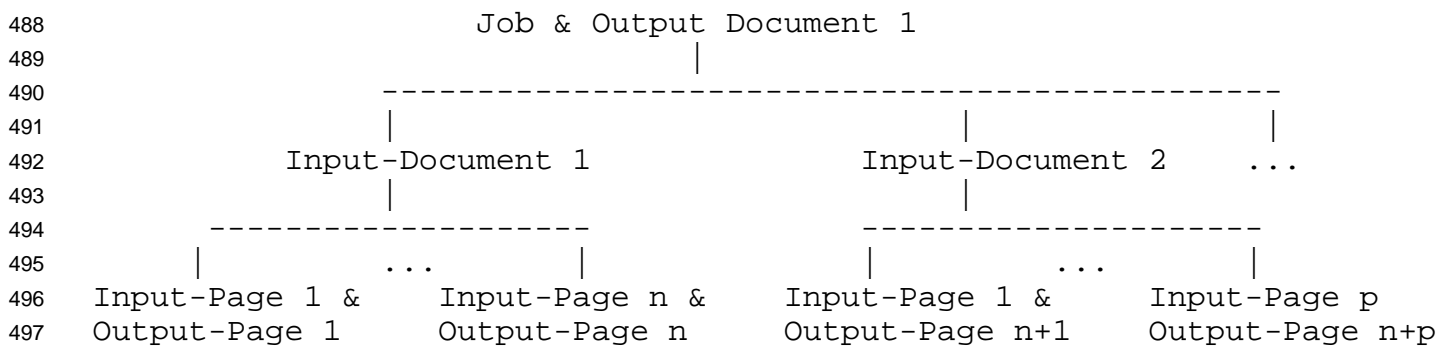
498
499   Conditions that define this case:

500
501   -   Job contains more than one or more Input-Documents, though one Input-Document is technically
502   the Degenerate Case.

503   -   "multiple-document-handling" is 'single-document' or 'single-document-new-sheet';

504   Observations about this case:

505
506   -   Output-Document 1 coincides with the Job

507   -   The numbering of Output-Pages is continuous through all Input-Documents, but the numbering of
508   Input-Pages starts at 1 in each Input-Document. That is, Input-Page i in Input-Document m
509   coincides with Output-Page i + k, where k is the number of Input-Pages in all previous Input-
510   Documents, i.e. Input-Documents 1 through m-1.

511   -   "pages-per-subset" is ignored if present

512   -   "documents-per-subset" is ignored if present

513
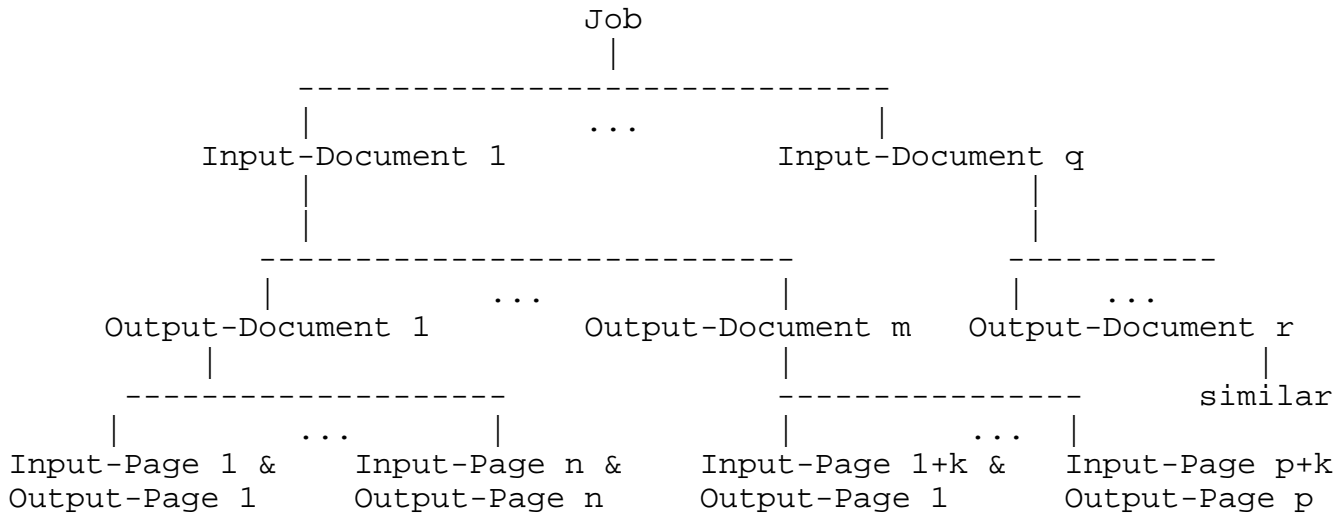
514   Page-Subset Document Case:
515
516   Job
517 |
518   ------------------------------
519 | ... |
520   Input-Document 1   Input-Document q
521 | |
522 | |
523   -----------------------------   -----------
524 | ... | | ...
525   Output-Document 1   Output-Document m   Output-Document r
526 | | |
527   -------------------   ----------------   similar
528 | ... | | ... |
529   Input-Page 1 &   Input-Page n &   Input-Page 1+k &   Input-Page p+k
530   Output-Page 1   Output-Page n   Output-Page 1   Output-Page p
531
532   Conditions that define this case:
533
534   -   Job contains one or more Input-Documents

535   -   "multiple-document-handling" is 'separate-documents-collated-copies' or 'separate-documents-
536   uncollated-copies'

537   -   "pages-per-subset" is present.

538   -   "documents-per-subset" is not present

539   Observations about this case:
540
541   -   The diagram shows that Output-Documents 1 through m are contained in Input-Document 1, and
542   Output-Documents m+1 through t are contained in Input-Document 2 and so on. However, this
543   diagram is not completely accurate. The Input-Pages from all Input-Documents are more accurately
544   viewed as a continuous stream of Input-Pages that are partitioned into Output-Documents as
545   specified by the attribute "pages-per-subset". For example, an Output-Document could come from
546   the last 3 Input-Pages of an Input-Document and the first 4 Input-Pages of the next Input-Document.

547   -   The Input-Pages in each Input-Document are numbered sequentially starting from 1 and the Output-
548   Pages in each Output-Document are numbered sequentially starting from 1. For the first Output-
549   Document, the numbers of the Input-Pages and Output-Pages coincide. For subsequent Output-
550   Documents, the numbers differ. For example, the first Output-Page of the second Output-Document
551   coincides with Input-Page w, where w is the number of Output-Pages in the first Output-Document.
552   To be specific, Output-Page i in Output-Document m coincides with Input-Page i + k of the Job,
553   where k is the number of Output-Pages in all previous Output-Documents of the job, e.g. Output-
554   Documents 1 through m-1.

555   -   "pages-per-subset" specifies the number of pages in each Output-Document.

556
557   Document-Subset Document Case:

558
559   NOTE: this case is here for completeness and is not supported by the Exceptions-Extension.

560
561   Job
562 |
563   --------------------------------
564 | ... |
565   Output-Document 1   Output-Document q
566 | |
567 | similar
568   --------------------------------
569 | |
570   Input-Document 1   Input-Document m
571 | |
572   --------------------   --------------------
573 | ... | | ... |
574 Input-Page 1 &   Input-Page n &   Input-Page 1 &   Input-Page p
575 Output-Page 1   Output-Page n   Output-Page 1+k   Output-Page p+k

576
577   Conditions that define this case:

578
579   -   Job contains one or more Input-Documents
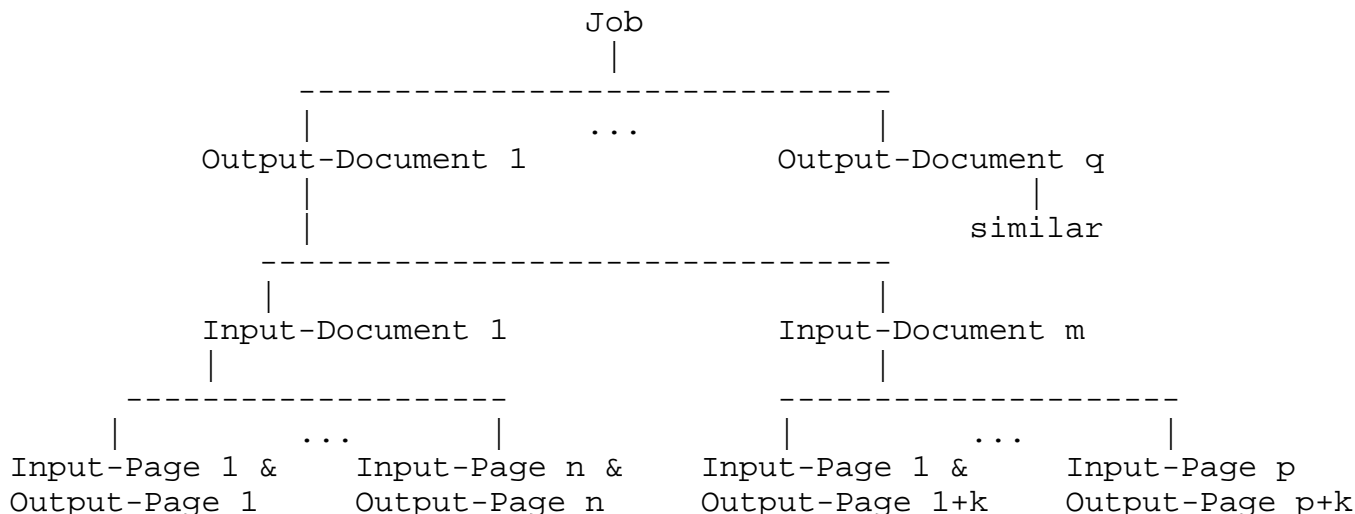
580   -   "multiple-document-handling" is 'separate-documents-collated-copies' or 'separate-documents-
581   uncollated-copies'

582   -   "pages-per-subset" is not present.

583   -   "documents-per-subset" is present

584   Observations about this case:

585
586   -   Input-Documents 1-m are contained in Output-Document 1, and Input-Documents m+1 through t
587   are contained in Output-Document 2 and so on.

588   -   Input-Page i in Input-Document m coincides with Output-Page i + k of Output-Document j, where k
589   is the number of Input-Pages in all previous Input-Documents of Output-Document j, e.g. Input-
590   Documents 1 through m-1.

591   -   "documents-per-subset" has the number of Input-Documents in each Output-Document.

592 **4.3 Association of Attributes**

593 The Exception Extension allows attribute associations with Input-Pages, Output-Pages, Input-Documents
594 and Output-Documents, and it continues to allow associations with Jobs. The Exception Extension specifies
595 rules for associations, and it categorizes attributes according to what they affect. The categories of attributes
596 and the members in the Exceptions-Extension are:
597

598 - Input Documents: "page-ranges", "document-format", "document-name", "compression" and
599 "document-natural-language".

600 - Output-Documents: "finishings"

601 - Sheets: "media" and "sides"

602 The table below shows what each of the three categories of attributes can be associated with:
603

	Category of attribute		
Associates with:	Input-Document	Output-Document	Sheets
Input-Document	yes	yes	yes
Output-Document	no	yes	yes
Input-Page	no	no	yes
Output-Page	no	no	yes

604
605 The meaning of these associations and their limitation is specified in section 16.
606

607 The Exception-Extension mechanism seems to be general enough to add new Document-Exceptions and
608 Page-Exceptions attributes without changing or extending the general mechanism. That is, an existing or
609 new Job attribute becomes a Document-Exceptions or Page-Exceptions attribute when a description of that
610 attributes says so, but no changes need be made to the ways exceptions work. If the new attribute belongs
611 to one of the three above categories, it follows the rules of that category. If it belongs to a new categories,
612 the rules of association must be defined.

613 **4.4 Effect of the "document-copies" attribute**

614 The "document-copies" attribute causes some copies of a document to be printed differently from others.
615 For example, 10 copies are duplex printed on letter paper with a staple. One copy is simplex printed on
616 transparencies without a staple. As another example, the first page of 100 copies of a 3 page document are
617 printed on letterhead paper and the first page of the 101st copy of the document is printed on regular letter
618 paper.
619

620 If an attribute can affect an Output-Document, it can affect particular Output-Document-Copies. If an
621 attribute can affect Sheets, it can affect Sheets of particular Output-Document-Copies.
622

623 Normally, when an attribute is associated with Input-Documents, Output-Documents, Input-Pages or
624 Output-Pages, that attribute is effectively associated with corresponding Input-Documents, Output-

625 Documents or Sheets. When an association includes the "document-copies" attribute, it has the following
626 meaning for each effective association. If the attribute effectively associates with:
627
628   - Input-Documents, the Printer ignores the "document-copies" attribute.

629   - Output-Documents, the attribute affects the specified copies of the Output-Documents.

630   - Sheets: the attribute affects the sheets of the specified copies of Output-Documents.

631 4.5 Subset Finishing

632 In IPP/1.1 a Printer applies the "finishings" attribute to all Output-Documents in a given job. This proposal
633 supports "Subset Finishing" which we define as the ability to partition the Input-Pages of an Input-
634 Document into one or more Output-Documents and to apply different types of finishing to each of the
635 individual Output-Documents contained within a single job.
636
637 This model supports subset finishing with the new attribute "pages-per-subset" which specifies the number
638 of Input-Pages per Output-Document. This model treats Subset-Finishing as a Job level sub-setting of the
639 Input-Documents into Output-Documents and as a Document Exception attribute rather than a Page
640 Exception attribute for two reasons.
641
642   - Page-Exceptions, as their name suggests, are exceptions for a few Input-Pages or Output-Pages that
643   differ from the rest of the Input-Pages or Output-Pages in the Job. With Subset-Finishing, all Input-
644   Pages belong to some subset. So, sub-setting is not an exception; it encompasses the entire Job.
645   Only the finishing part of Subset-Finishing can have exceptions and those exceptions apply to a
646   subset, much like they apply to Output-Documents. Because subsets behave like Output-
647   Documents, it is easiest to describe the sub-setting operation as creating Output-Documents.

648   - If the attributes "media", "sides" and "finishings" were all treated as Page-Exception attributes, then
649   there would have to one rule for splitting and merging groups when "finishings" is associated with
650   the group and another rule when it is not associated with the group. If a Page-Exception specifies
651   "sides" is duplex for pages 1-10 and "media" is added to pages 5 and 6, there can be three Page-
652   Exception groups, one for pages 1-4 with "sides", one for pages 5 and 6 with "sides" and "media"
653   and one for pages 7-10 with sides. If "media" is removed, the groups can be merged back to the
654   original single group. If "finishings = staple" had been present in the original group of pages 1-10,
655   such a split would change finishing from one staple in pages 1-10 to 3 staples, one in pages 1-6, one
656   in page 5-6 and one in pages 7-10.

657
658 The remainder of this document describes the changes necessary to support the Exceptions Extension.

5. New Job Template Attributes

The Exception Extension adds three new Job Template attributes: "document-exceptions", "page-exceptions" and "pages-per-subset". The first two attributes support exception attributes, and the third supports subset finishing.

```
+==================+====================+====================+
|  Job Attribute   |Printer: Default Value|  Printer: Supported |
|                  |      Attribute      |   Values Attribute  |
+==================+====================+====================+
| document-        |        none         |document-exceptions- |
|    exceptions     |                     |     supported       |
|(1setOf collection)|                     |(1setOf type1 keyword)|
+==================+====================+====================+
|  page-exceptions  |        none         |  page-exceptions-   |
|                  |                     |     supported       |
|(1setOf collection)|                     |(1setOf type1 keyword)|
+==================+====================+====================+
|  page-per-subset  |        none         |  pages-per-subset   |
|                  |                     |     supported       |
|(1setOf integer)  |                     |     (Boolean)       |
+==================+====================+====================+
```

5.1 document-exceptions (1setOf collection)

This OPTIONAL Job Template attribute contains attributes that are associated with Input-Documents and Output-Documents and that are treated as document exceptions. Such attributes are called "Document-Exceptions" attributes. The remainder of this section describes features that an implementation MUST support or MAY support if an implementation supports this attribute.

If this attribute is not present in a Job, there are no Document-Exceptions within the Job. If it is present, the value consists of one or more 'collection' values, where each 'collection' value identifies one or more Input-Documents or Output-Document and contains one or more Job Template attributes which act as exceptions to the corresponding Job Template attribute values for the specified Input-Documents or Output-Documents.

The first attribute of each 'collection' value MUST be either "input-documents" or "output-documents" and this attribute identifies Input-Documents or Output-Documents, respectively. The second attribute of each 'collection' MAY be "document-copies" and this attribute identifies the Output-Document-Copies. The remaining attributes in the 'collection' value are the one or more Job Template attributes that are exceptions for the specified Input-Documents or Output-Documents. The allowed attributes are listed in section 5.1.8

There may be more than one way for a client to arrange Document-Exceptions attributes in 'collection' values. For example, if a job contains 10 Output-Documents to be printed 1-sided on letter paper with no stapling and Output-Document 1 is to be two sided with stapling and Document 2 is to be two sided with no stapling, there are two possible ways to group the exceptions. The client could specify the two

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702 exceptions for Output-Document 1 in one 'collection' value and the single exception for Output-Document
703 2 in a second 'collection' value, or it could specify "two-sided" for Output-Documents 1 and 2 in one
704 'collection' value and "stapled" for Output-Document 1 in another 'collection' value.

705 If the "input-documents", "output-documents" or "document-copies" identify Input-Documents, Output-
706 Documents or Output-Document-Copies that don't exist, the Printer silently ignores them and associates
707 the Document-Exceptions with those Input-Documents, Output-Documents or Output-Document-Copies
708 that do exist. A client MUST NOT allow two 'collection' values to be associated with the same Input-
709 Document, Output-Document or Output-Document-Copy and to contain the same Document-Exceptions
710 attribute with different values. If the client violates the preceding rule, the Printer can use either value, and
711 it MUST issue a warning. It does so by adding 'job-warnings-detected' to the "job-state-reasons" and by
712 increasing the value of the "job-warnings-count" Job Description attribute by 1. If the Printer detects this
713 conflict while it is processing a Job-Submission operation, it MUST return the ignored values in the
714 Unsupported attributes.

715 When a Client receives this attribute in a Get-Jobs or Get-Job-Attributes, the value MUST contain the same
716 'collection' values received in Job-Submission operations, except for those 'collection' values the Printer
717 returned in the Unsupported Attributes.

718 Each 'collection' value of this attribute has either of the two forms as defined below. The 'collection'
719 values NEED NOT all be of the same form..

720 For the first form, the client MUST supply "input-documents" as the first attribute. If the client supplies the
721 "document-copies" attribute, it MUST be the second attribute. The client OPTIONALLY supplies the
722 remaining attributes in any order. If the Printer supports the Create-Job operation, then it MUST support the
723 attribute labeled with "CMUST" below; otherwise support is OPTIONAL.

Attribute name	syntax	In request	Printer Support
input-documents	rangeOfInteger(MAX)	MUST	MUST
document-copies	rangeOfInteger(MAX)	MAY	MAY
document-format	mimeMediaType	MAY	CMUST
document-name	name (MAX)	MAY	CMUST
compression	type3 keyword	MAY	CMUST
document-natural-language	naturalLanguage	MAY	MAY
page-ranges	1setOf rangeOfInteger (1:MAX)	MAY	MAY
finishings	1setOf type2 enum	MAY	MAY
sides	type2 keyword	MAY	MAY
media	type3 keyword	name(MAX	MAY	MAY

724 For the second form, the client MUST supply "output-documents" as the first attribute. If the client supplies
725 the "document-copies" attribute, it MUST be the second attribute. The client OPTIONALLY supplies the
726 remaining attributes in any order.

Attribute name	syntax	In request	Printer Support
output-documents	rangeOfInteger(MAX)	MUST	MUST

Attribute name	syntax	In request	Printer Support
document-copies	rangeOfInteger(MAX)	MAY	MAY
finishings	1setOf type2 enum	MAY	MAY
sides	type2 keyword	MAY	MAY
media	type3 keyword	name(MAX)	MAY	MAY

727 The following sections describe each attribute in the above table.

5.1.1 input-documents (rangeOfInteger (1:MAX))

729 This attribute identifies one or more Input-Documents by specifying a range of numbers (see section
730 4.1 for the rules on associating a number with each Input-Document). The Document-Exceptions
731 apply to the identified Input-Documents.
732
733 A Printer MUST support this attribute. A client MUST supply this attribute in each 'collection'
734 value and it MUST be the first attribute of each 'collection' value. If this attribute is present, then
735 the client MUST NOT supply "output-documents".
736
737 When a client supplies this attribute in a "document-exceptions" attribute of a Send-Document or
738 Send-URI request, this attribute MUST NOT identify Input-Documents which were sent in an
739 earlier operation. If a Printer receives such a value in a 'collection' value, it MUST treat all
740 attribute values in such a 'collection' value, but not other sibling 'collection' values, as unsupported
741 values and return the entire collection value in the Unsupported Attributes group.
742
743 See section 5 for details of usage of this attribute.
744

5.1.2 output-documents (rangeOfInteger (1:MAX))

746 This attribute identifies one or more Output-Documents by specifying a range of numbers (see
747 section 4.1 for the rules on associating a number with each Output-Document). The Document-
748 Exceptions apply to the identified Output-Documents.

749 A Printer MUST support this attribute. A client MUST supply this attribute in each 'collection'
750 value and it MUST be the first attribute of each 'collection' value. If this attribute is present, then
751 the client MUST NOT supply "input-documents".
752
753 When a client supplies this attribute in a "document-exceptions" attribute of a Send-Document or
754 Send-URI request, this attribute MUST NOT identify Output-Documents whose first Input-Page
755 was sent in an earlier operation. If a Printer receives such a value in a 'collection' value, it MUST
756 treat all attribute values in such a 'collection' value, but not other sibling 'collection' values, as
757 unsupported values and return the entire collection value in the Unsupported Attributes group.

5.1.3 document-copies (rangeOfInteger (1:MAX))

This attribute identifies one or more Output-Document-Copies by specifying a range of numbers. The Document-Exceptions apply to the identified Output-Document-Copies within Output-Documents specified either directly by "output-documents" or indirectly by "input-documents" (see section 16 for further details).

A Printer MAY support this attribute. A client MAY supply this attribute in each 'collection' value. If the client supplies this attribute, it MUST be the second attribute of each 'collection' value. If this attribute is present, then the client MUST also supply "input-documents" or "output-documents".

If the first member attribute is "input-documents", this attribute applies only to the other member attributes that affect Output-Documents and Sheets. The Printer MUST ignore this attribute for the other member attributes that affect Input-Documents.

5.1.4 document-format (mimeMediaType)

This attribute has the same meaning as in IPP/1.1. It indicates the document-format for one or more specified Input-Documents. The Printer MUST support this attribute. A client OPTIONALLY supplies it.

5.1.5 document-name (name (MAX))

This attribute has the same meaning as in IPP/1.1. It indicates the document-name for one or more specified Input-Documents. The Printer MUST support this attribute. A client OPTIONALLY supplies it.

5.1.6 compression (type3 keyword)

This attribute has the same meaning as in IPP/1.1. It indicates the compression for one or more specified Input-Documents. The Printer MUST support this attribute. A client OPTIONALLY supplies it.

5.1.7 document-natural-language (naturalLanguage)

This attribute has the same meaning as in IPP/1.1. It indicates the document-natural-language for one or more specified Input-Documents. The Printer MAY support this attribute. A client OPTIONALLY supplies it.

5.1.8 page-ranges (1setOf rangeOfInteger (1:MAX))

This attribute has the same meaning as in IPP/1.1. It redefines each Input-Document to contain only the specified Input-Pages. See section 5.2.3 for how this attribute interacts with "pages".. The "multiple-document-handling" attribute affects the algorithm for numbering Input-Pages when this attribute is a Job attribute but when it is a Document-Exception attribute. When this attribute is a Document-Exception attribute, the values of the "page-ranges" attribute specify the Input-Pages to select from each of the identified Input-Documents separately, For example, if this attribute has the value "3:5" and is associated with two Input-Documents A and B, Input-Document A redefined to

793   contain just two pages: 3 and 5, and Input-Document B also contains just pages 3 and 5. The Printer
794   MAY support this attribute. A client OPTIONALLY supplies it.

795

796   See section 5.2.4 for details of how this attribute affects number of pages with the "pages" attribute.

5.1.9 finishings (1setOf type2 enum)

798   This attribute has the same meaning as in IPP/1.1. It indicates the finishings for one or more
799   specified Output-Documents. As a Job Template attribute, it affects each Output-Document
800   produced by the Job. For example, all the sheets of each Output-Document are stapled together. As
801   a Document-Exceptions attributes, it affects only the specified Output-Documents. The Printer
802   MAY support this attribute. A client OPTIONALLY supplies it.

803   The next section gives further information about this attribute, but this information is the same for
804   all Output-Document attributes that might be added later.

805   5.1.9.1 Common Behavior for Output-Document Attributes

806   This attribute is directly associated with an Input-Document or Output-Document. This means that it
807   is effectively associated with one or more Output-Documents according to the rules of section 16,
808   and this attribute affects those Output-Documents.

809

810   If the "document-copies" attribute is present, the attribute affects only the specified copies of the
811   Output-Documents.

5.1.10 sides (type2 keyword)

813   This attribute has the same meaning as in IPP/1.1. It indicates the sides for one or more specified
814   Output-Pages. As a Job Template attribute, it affects each Sheet produced by the Job. As a
815   Document-Exceptions attributes, it affects only the specified Sheets. The Printer MAY support this
816   attribute. A client OPTIONALLY supplies it.

817   The next section gives further information about this attribute, but this information is the same for
818   all Sheet attributes, including "media" which is discussed in section 5.1.11

819   5.1.10.1 Common Behavior for Sheet Attributes

820   This attribute is directly associated with an Input-Document or Output-Document. This means that it
821   is effectively associated with one or more Output-Pages according to the rules of section 15, and this
822   attribute affects the Sheets containing the specified Output-Pages.

823   If the "document-copies" attribute is present, the attribute affects only the Output-Pages in the
824   specified copies of the Output-Documents.

825   Because this attribute affects a Sheet, but is effectively associated with an Output-Page, a Sheet that
826   contains two or more Output-Pages may have conflicting values of this attribute. This observation

827 leads to two rules, one for the first Output-Page that this attribute is effectively associated with and
828 one for the last Output-Page that this attribute is effectively associated with.

829 a) For the first Output-Page: if the value of this attribute is effectively associated with Output-
830 Page i, and if Output-Page i is not the first Output-Page contained on a Sheet and if the value
831 of this attribute differs from the value of this attribute for the preceding Output-Page i-1,
832 then Output-Page i MUST start a new Sheet and the Printer MUST issue a warning by
833 adding 'job-warnings-detected' to the "job-state-reasons" and by increasing the value of the
834 "job-warnings-count" Job Description attribute by 1.

835 b) For the last Output-Page: if the value of this attribute is effectively associated with Output-
836 Page i, and if Output-Page i is not the last Output-Page contained on a Sheet and if the value
837 of this attribute differs from the value of this attribute for the following Output-Page i+1,
838 then Output-Page i+1 MUST start a new Sheet and the Printer MUST issue a warning by
839 adding 'job-warnings-detected' to the "job-state-reasons" and by increasing the value of the
840 "job-warnings-count" Job Description attribute by 1.

5.1.11 media (type3 keyword | name(MAX))

842 This attribute has the same meaning as in IPP/1.1. It indicates the media for one or more specified
843 Output-Pages. As a Job Template attribute, it affects each Sheet produced by the Job. As a
844 Document-Exceptions attributes, it affects only the specified Sheets. The Printer MAY support this
845 attribute. A client OPTIONALLY supplies it.

846 See section 5.1.10.1 for additional information. The section describes the common behavior of all
847 Sheet attributes.

5.1.12 Handling of Error conditions

849 If a client omits a required member attribute or includes two member attributes that should never
850 both be present (e.g. "input-document" and "output-document"), a Printer MUST reject all attributes
851 in the 'collection' value and treat the 'collection' values, but not other sibling 'collection' values, as
852 unsupported.

853 If a client puts a member attribute in some position other than its required position (e.g. "input-
854 documents" MUST be first), a Printer MUST either:

855 a) use the specified value of the member attribute and ignore its wrong position or
856 b) reject all attributes in the 'collection' value and treat the 'collection' values, but not other
857 sibling 'collection' values, as unsupported.

5.1.13 Why not "document-exceptions-default"

859 There is no "document-exceptions-default" attribute because it adds complicated rules for a Printer
860 to implement. The problems are best illustrated with examples.

861   If there were a "document-exceptions-default" and it contained a "sides" and "media" exception for
862   the first Output-Page, and if a client submitted a Job with no "sides" attribute and with "media" as a
863   Job attribute with no exceptions, a possible meaning is that the Printer uses the client's requested
864   media for the entire Job and the sides specified by the "sides-default" and the "sides" value in
865   "document-exceptions-default". So in this example, the Printer ignores the "document-exceptions-
866   default" attribute for "media", but uses it for "sides" because the Printer uses it for an attribute
867   "xxx" only when it uses "xxx-default".

868   **5.1.14 document-exceptions-supported (1setOf type1 keyword)**

869   This attribute specifies the supported values of the "document-exceptions" attribute. A client can
870   use this attribute to determine what Document-Exceptions attributes the Printer supports.

871   This attribute contains the name of each attribute that the Printer supports in a 'collection' value of
872   the "document-exceptions" attribute. This attribute MUST contain the keywords "input-
873   documents" and "output-documents" because a Printer MUST support these attributes. This
874   attribute MUST also contain the name of each attribute that can be a document-exception. For
875   example, this attribute contains the keyword "sides" if and only if the Printer supports "sides" in a
876   'collection' value of the "document-exceptions" attribute.

877   Standard keyword values are:
878
879   -   'none': no attributes are supported in the "document-exceptions" attribute

880   -   'input-documents': the "input-document" attribute is supported

881   -   'output-documents': the "output-document" attribute is supported

882   -   'document-copies': the "document-copies" attribute is supported

883   -   'document-format': The "document-format" attribute is supported

884   -   'document-name': The "document-name" attribute is supported

885   -   'compression': The "compression" attribute is supported

886   -   'document-natural-language': The "document-natural-language" attribute is supported

887   -   'page-ranges': The "page-ranges" attribute is supported

888   -   'finishings': The "finishing" attribute is supported

889   -   'sides': The "sides" attribute is supported

890   -   'media': The "media" attribute is supported

5.2 page-exceptions (1setOf collection)

This OPTIONAL Job Template attribute contains attributes that are associated with Input-Pages and Output-Pages and that are treated as page exceptions. Such attributes are called "Page-Exceptions" attributes. The remainder of this section describes features that an implementation MUST support or MAY support if an implementation supports this attribute

If this attribute is not present in a Job, there are no Page-Exceptions attributes within the Job. If it is present, the value consists of one or more 'collection' values, where each 'collection' value identifies one or more Input-Pages or Output-Pages and contains one or more Job Template attributes which act as exceptions to the corresponding Job Template attributes for the specified Input-Pages or Output-Pages.

The first attribute of each 'collection' value MUST be either "input-documents" or "output-documents".

The second attribute MAY be "document-copies". If present, this attributes identifies the copies of the Output-Document. If this attribute is not present in a 'collection' value, then the 'collection' value applies to all Output-Document-Copies.

If "document-copies" is present, the "pages" attribute MUST be the third attribute; otherwise, it MUST be the second attribute. The "pages" attribute identifies either

- the Input-Pages relative to the Input-Document specified by "input-documents" or

- the Output-Pages relative to the Output-Document specified by "output-documents".

The Page-Exceptions attributes applies to the identified Input-Pages or Output-Pages, which need not be contiguous.

The remaining attributes in the 'collection' value are the Job Template attributes that are exceptions for the specified Input-Pages or Output-Pages.

There may be more than one way for a client to arrange Page-Exception attributes in 'collection' values. For example, if an Output-Document contains 10 Output-Pages to be printed 1-sided on white letter paper and Output-Page 1 is to be two sided with blue letter paper and Document 2 is to be two sided with white letter paper, there are two possible ways to group the exceptions. The client could specify the two exceptions for Output-Page 1 in one 'collection' value and the single exception for Output-Page 2 in second 'collection' values, or it could specify "two-sided" for Output-Pages 1 and 2 in one 'collection' value and "blue letter paper" for Output-Document 1 in another 'collection' value.

If the "pages", "document-copies" and the "input-documents" or "output-documents" identify Input-Pages, Output-Pages that either don't exist or are within nonexistent Output-Document-Copies, Input-Documents or Output-Documents, the Printer silently ignores them and associates the Page-Exceptions with those Input-Pages or Output-Pages that do exist. A client MUST not allow two 'collection's values to be associated with the same Input-Page or Output-Page and to contain the same Page-Exception attribute with different values. If there is such a conflict, the Printer can use either value, and it MUST issue a warning. It does so by adding 'job-warnings-detected' to the "job-state-reasons" and by increasing the value of the

932 "job-warnings-count" Job Description attribute by 1. If the Printer detects this conflict while it is
933 processing a Job-Submission operation, it MUST return the ignored value in the Unsupported attributes.

934 When a Client receives this attribute in a Get-Jobs or Get-Job-Attributes, the value MUST contain the same
935 'collection' values received in Job-Submission operations, except for those 'collection' values the Printer
936 returned in the Unsupported Attributes.

937 Each 'collection' value of this attribute has either of the two forms as defined below. The 'collection'
938 values NEED NOT all be of the same form.

939 For the first form, the client MUST supply "input-documents" as the first attribute. If the client supplies the
940 "document-copies" attribute, it MUST be the second attribute. The "pages" attribute MUST be the next
941 attribute. The client OPTIONALLY supplies the remaining attributes in any order.

Attribute name	syntax	In request	Printer Support
input-documents	rangeOfInteger(MAX)	MUST	MUST
document-copies	rangeOfInteger(MAX)	MAY	MAY
pages	rangeOfInteger(MAX)	MUST	MUST
sides	type2 keyword	MAY	MAY
media	type3 keyword	name(MAX	MAY	MAY

942 For the second form, the client MUST supply "output-documents" as the first attribute. If the client supplies
943 the "document-copies" attribute, it MUST be the second attribute. The the "pages" attribute MUST be the
944 next attribute. The client OPTIONALLY supplies the remaining attributes in any order.

Attribute name	syntax	In request	Printer Support
output-documents	rangeOfInteger(MAX)	MUST	MUST
document-copies	rangeOfInteger(MAX)	MAY	MAY
pages	rangeOfInteger(MAX)	MUST	MUST
sides	type2 keyword	MAY	MAY
media	type3 keyword	name(MAX)	MAY	MAY

945 The following sections describe each attribute in the above table.

5.2.1 input-documents (rangeOfInteger (1:MAX))

947   See section 5.1.1 for details of this attribute.

5.2.2 output-documents (rangeOfInteger (1:MAX))

949   See section 5.1.2 for details of this attribute.

5.2.3 document-copies (rangeOfInteger (1:MAX))

This attribute identifies one or more Output-Document-Copies by specifying a range of numbers. The Page-Exceptions apply to the Output-Pages within the identified Output-Documents-Copies within Output-Documents specified either directly by "output-documents" or indirectly by "input-documents" (see section 16 for further details).

A Printer MAY support this attribute. A client MAY supply this attribute in each 'collection' value. It MUST be the second attribute of each 'collection' value if the client supplies it. If this attribute is present, then the client MUST also supply the "input-documents" or "output-documents" attribute.

5.2.4 pages (1setOf rangeOfInteger(1:MAX))

This attribute identifies one or more Input-Pages or Output-Pages by specifying one or more ranges of numbers (see section 4.1 for the rules on associating a number with each Input-Page or Output-Page). The "1setOf" allows noncontiguous Input-Page or Output-Pages. The Page-Exceptions apply to the identified Input-Pages or Output-Pages within the Output-Documents specified directly by "output-documents" or indirectly by "input-documents". The "document-copies" specifies particular copies of Output-Documents.

If the "page-ranges" attribute (see section 5.1.8) is associated with an Input-Document, the Input-Pages identified by this attribute are the same as when "page-ranges" is not present. However, this attribute may identify pages that are deselected for printing by the "page-ranges" attribute. For example, if the value of "page-ranges" is "5:10" and this attribute identifies Input-Pages "3:6", this attribute identifies two Input-Pages (3 and 4) that are not printed and two that are (5 and 6)

If a Printer support the "page-exceptions" attribute, it MUST support this attribute. A client MUST supply this attribute in each 'collection' value of the "page-exceptions" attribute and it MUST be the second attribute of each 'collection' value.

When a client supplies this attribute in a Send-Document or Send-URI request, this attribute MUST NOT identify Output-Pages sent in an earlier operation. If a Printer receives such a value in a 'collection' value, it MUST treat all such values, but not other sibling 'collection' values, as unsupported values.

See section 5 for details of usage of this attribute.

5.2.5 sides (type2 keyword)

This attribute has the same meaning as in IPP/1.1. It indicates the sides for one or more specified Output-Pages. As a Job Template attribute, it affects each Sheet produced by the Job. As a Page-Exceptions attributes, it affects only the specified Sheets. The Printer MAY support this attribute. A client OPTIONALLY supplies it.

985   See section 5.1.10.1 for additional information. The section describes the common behavior of all
986   Sheet attributes.

5.2.6   media (type3 keyword | name(MAX))

988   This attribute has the same meaning as in IPP/1.1. It indicates the media for one or more specified
989   Output-Pages. As a Job Template attribute, it affects each Sheet produced by the Job. As a Page-
990   Exceptions attributes, it affects only the specified Sheets. The Printer MAY support this attribute. A
991   client OPTIONALLY supplies it.

992   See section 5.1.10.1 for additional information. The section describes the common behavior of all
993   Sheet attributes.

5.2.7   Handling of Error conditions

995   See section 5.1.12.

5.2.8   Why not "page-exceptions-default"

997   There is no "page-exceptions-default". See section 5.1.12 for the reasons.

5.2.9   page-exceptions-supported (1setOf type1 keyword)

999   This attribute specifies the supported values of the "page-exceptions" attribute. A client can use this
1000   attribute to determine what exception attributes the Printer supports.

1001   This attribute contains the name of each attribute that the Printer supports in a 'collection' value of
1002   the "page-exceptions" attribute. This attribute MUST contain the keywords "input-documents",
1003   "output-documents" and "pages" because a Printer MUST support these attributes. This attribute
1004   MUST also contain the name of each attribute that can be a page-exception. For example, this
1005   attribute contains the keyword "sides" if and only if the Printer supports "sides" in a 'collection'
1006   value of the "page-exceptions" attribute.

1007   Standard keyword values are:
1008
1009   -   'none': no attributes are supported in the "page-exceptions" attribute

1010   -   'input-documents': the "input-document" attribute is supported

1011   -   'output-documents': the "output-document" attribute is supported

1012   -   'document-copies': the "document-copies" attribute is supported

1013   -   'pages': The "pages " attribute is supported

1014   -   'sides': The "sides" attribute is supported

1015   -   'media': The "media" attribute is supported

5.3 pages-per-subset (1setOf integer)

1017   A client OPTIONALLY supplies this attribute, and a Printer OPTIONALLY supports this attribute.
1018   If a Printer supports the Page-Subset Document Case, it MUST support this attribute.
1019
1020   When this attribute is present, it effectively partitions one or more Input-Documents into
1021   contiguous subsets of Input-Pages. Each subset is defined to be an Output-Document
1022
1023   The value of the attribute is a set of one or more integers, where each integer specifies the number
1024   of Input-Pages in a subset, and the set is treated as a repeating sequence of integers. Thus, when the
1025   attribute contains a single integer, the integer specifies the number of Input-Pages in each subset, as
1026   a repeating sequence of the single integer. When the number of integers in this attribute exceeds 1,
1027   the first integer specifies the number of Input-Pages in the first subset, the second integer specifies
1028   the number of Input-Pages in the second subset and so on. If numbers in this attribute are exhausted
1029   before partitioning all of the Input-Pages, the Printer starts at the beginning of the sequence again
1030   and continues until all Input-Pages are partitioned.
1031
1032   If the job contains more than one Input-Document, the Input-Pages are treated as a single stream of
1033   Input-Pages which are partitioned into contiguous subsets with some subsets possibly belonging to
1034   more than one Input-Document.
1035
1036   If the number of Input-Pages available for the last subset is less than the number specified by this
1037   attribute, the Printer MUST treat the last subset as an Output-Document and MUST issue a warning
1038   by adding 'job-warnings-detected' to the "job-state-reasons" and by increasing the value of the
1039   "job-warnings-count" Job Description attribute by 1.

5.3.1 Why not "pages-per-subset-default"

1041   There is no "pages-per-subset-default" because there is no mechanism for a client to specify that
1042   there are no Input-Page subsets except to omit this attribute, which would cause the Printer to use
1043   the "pages-per-subset-default" attribute and create the default subsets. Without this attribute, a
1044   client can achieve subsets only by including the "pages-per-subset" attribute in the Job and the
1045   default is no subsetting. Also, if there were a defaulting mechanism, it isn't clear that customers
1046   would use the same partitioning over and over..

5.3.2 pages-per-subset-supported (Boolean)

1048   This attribute specifies whether the Printer supports the Page-Subset Document Case. If the
1049   attribute is present and has a value of "true", the Printer supports the Page-Subset Document Case.
1050   Otherwise, the Printer doesn't support the Page-Subset Document Case

1051 6. New Job Description attributes

1052 6.1.1 job-warnings-count (integer)

1053 This OPTIONAL attribute specifies the total number of warnings that a Printer has generated while
1054 processing and printing the Job. At the beginning of a Job, the value MUST be 0. It MUST increase
1055 by 1, each time the Printer generates a warning.

1056 7. New Job Description Values

1057 7.1.1 job-warnings-detected value for job-state-reasons (1setOf type2 keyword)

1058 If the Printer supports the value 'job-warnings-detected', the Printer MUST add it to "job-state-
1059 reasons" when it generates the first warning message. That is, a single occurrence of this value is
1060 present in the "job-state-reasons" if the Printer has generated one or more warnings.

1061 8. Extended Role of Some Operation Attributes

1062 In IPP/1.1, the following attributes are operation attributes in all Job-Submission operations except Create-
1063 Job, but the Printer doesn't put their values into the Job object.
1064
1065 - document-format

1066 - document-name

1067 - compression

1068 - document-natural-language

1069
1070 With the Exception Extension, these attributes also become:
1071
1072 - Operation attributes in the Create-Job and Validate-Job operation when all or most Input-
1073   Documents have the same attribute value.

1074 - Job Template attributes, so their values are accessible to a client via the Get-Job-Attributes and Get-
1075   Jobs operation.

1076 - Job Description attributes, for legacy reasons so their values are accessible to a client via the Get-
1077   Job-Attributes and Get-Jobs operation via the Job Description group name.

1078   - Document-Exceptions attributes, so the values are associated with one Input-Document (possible in
1079   IPP/1.1) and a client can query the attributes via Get-Job-Attributes and Get-Jobs operation (not
1080   possible in IPP/1.1).

1081 If a Printer supports the Exception Extension and if it supports an attribute in this section, it MUST support
1082 the attribute in the three contexts above. In IPP/1.1, a Printer MUST support all attributes in this section
1083 except the "document-natural-language" attribute. This effectively means that if a Printer supports this
1084 extension, it MUST support all of the attributes in this section except "document-natural-language" in the
1085 three contexts described above.
1086
1087 When one of the attributes in this section is an operation attribute in Print-Job, Print-URI or Create-Job, it
1088 becomes a Job Template attribute in the newly created Job object. If one of these attributes is a Document-
1089 Exceptions attribute, that attribute overrides the Job level attribute for the specified Input-Document.
1090
1091 When one of the attributes in this section is an operation attribute in Validate-Job, it is validated as if it
1092 were an operation attribute of Create-Job.
1093
1094 When one or more of the attributes in this section is an operation attribute in Send-Document or Send-URI
1095 request, they are put into a 'collection' value that is added to the "document-exceptions" attribute. See
1096 section 5.1 for a discussion of possible conflicts.

9.   Extensions to Printer Operations

1098 The sections below specify the extensions to the groups within IPP 1.1 operations. If an operation or a
1099 group within an operation is not mentioned, this extension does not change that operation or group,
1100 respectively.
1101

9.1 Create-Job and Validate-Job Operation Requests

1103   Attributes are added to the operation attributes group.
1104
1105   Group 1: Operation Attributes
1106
1107   Add the attributes specified in section 6: "document-format", "document-name",
1108   "compression" and "document-natural-language", so that a client can specify these
1109   attributes, at the job level.

9.2 Send-Document and Send-URI Operation Requests

1111   Attributes are added to the Operation Attributes group.
1112
1113   Group 1: Operation Attributes
1114

1115   "input-document-number" (integer):

1117   The client OPTIONALLY supplies this attribute in order to inform the printer about the
1118   order of documents when the printer is sending the Input-Documents asynchronously.
1119   The first Input-Document is 1, and subsequent Input-Documents are numbered
1120   sequentially. If the value of "last-document" is 'true', then the value of this attribute is
1121   also the total number of Input-Documents in the Job. If a client supplies this attribute in
1122   one Send-Document or Send-URI operation in a Job, it MUST send it in all such
1123   operations. A Printer deals with missing Input-Documents in the same way as without
1124   this attribute except that a time-out can occur with Input-Documents anywhere in the
1125   Job. For example, a Printer could receive Input-Documents 1 and 3 and not 2.

1127   "document-exceptions" (1setOf collection):

1129   The client OPTIONALLY supplies this attribute. See section 5.1 for details. The Printer
1130   MUST support this attribute if it supports the "document-exceptions" Job Template
1131   attribute. If the job doesn't contain a "document-exceptions" attribute, this attribute is
1132   added to the Job. Otherwise, the 'collection' values from this attribute are appended to
1133   the existing "document-exceptions" attribute. See section 5.1 for rules of resolving
1134   conflicts. Also the "input-documents" attribute is added to any 'collection' value that
1135   contains neither an "input-documents" nor "output-documents" attribute.

1137   "page-exceptions" (1setOf collection):

1139   The client OPTIONALLY supplies this attribute. See section 5.2 for details. The Printer
1140   MUST support this attribute if it supports the "page-exceptions" Job Template attribute.
1141   If the job doesn't contain a "page-exceptions" attribute, this attribute is added to the Job.
1142   Otherwise, the 'collection' values from this attribute are appended to the existing "page-
1143   exceptions" attribute. See section 5.2 for rules of resolving conflicts. Also the "input-
1144   documents" attribute is added to any 'collection' value that contains neither an "input-
1145   documents" nor "output-documents" attribute.

1146   10. Examples

1147   This section currently contains 3 examples for various relationships of Input-Documents and Output-
1148   Documents.. The first example is for the Degenerate Case only. The second and third cases are for the
1149   Separate-Document Case, the Single-Documents Case and the Page-Subset Documents Case.

1151   Brackets are used to delimit the beginning and end of each Collection value.

1152   10.1 First Page of Single Document is Letterhead

1153   In the first example, the Printer produces 1 copy of a single Output-Document. It is printed on letter-
1154   paper using Print-Job. The first Output-Page of the Output-Document is letterhead paper.

1155

10.1.1 Degenerate Case.

1156

1157   There is one Input-Document A which produces one Output-Document.

1158

```
1159   Print-Job
1160       job attributes group
1161           media: letter
1162           page-exceptions: {
1163               output-documents: 1:1          (I could have used input-documents: 1:1 as well)
1164               pages: 1:1
1165               media: letterhead }
1166       end-of-attributes
1167           Input-Document A
```

1168

10.2 First Page of Several Documents is Blue

1169

1170   In the second example, the Printer produces 3 copies of each Output-Document. Each is stapled and
1171   printed on letter-paper, two-sided using Create-Job. The first Output-Page of each Output-Document is
1172   blue-letter paper and one-sided. All Input-Documents are PostScript.

1173

1174   Attributes that differ between cases are in bold. The values for the attribute "input-documents" changes
1175   with each example, but could be "1:100" for all.

10.2.1 Separate-Documents Case.

1176

1177   There are two Input-Documents A and B which produce two Output-Documents.

1178

```
1179   Create-Job
1180       operations attributes group
1181           document-format: application/PostScript
1182       job attributes group
1183   *       multiple-document-handling: separate-documents-collated-copies
1184           sides: two-sided-long-edge
1185           media: letter
1186           copies: 3
1187           finishings: stapling
1188           page-exceptions: {
1189               output-documents: 1:2          (I could have used input-documents: 1:2 as well)
1190               pages: 1:1
1191               sides: one-sided
1192               media: blue-letter }
1193       end-of-attributes
1194   Send-Document
1195       end-of-attributes
1196           Input-Document A
1197   Send-Document
1198       end-of-attributes
1199           Input-Document B
```

1200

1201   **10.2.2 Single-Documents Case**

1202   There are two Input-Documents A and B and only one Output-Document.

1203

1204   Create-Job
1205   operations attributes group
1206   document-format: application/PostScript
1207   job attributes group
1208   **multiple-document-handling: single-document**
1209   sides: two-sided-long-edge
1210   media: letter
1211   copies: 3
1212   finishings: stapling
1213   page-exceptions: {
1214   output-documents: 1:1   (I could have used input-documents: 1:1)
1215   pages: 1:1
1216   sides: one-sided
1217   media: blue-letter }
1218   end-of-attributes
1219   Send-Document
1220   end-of-attributes
1221   Input-Document A
1222   Send-Document
1223   end-of-attributes
1224   Input-Document B

1225

1226   **10.2.3 Page-Subset Documents Case**

1227   There are two Input-Documents A and B. . The first Input-Document contains 10 Pages and the second
1228   one 15 pages. There are 7 Output-Documents with 3 pages, 5 pages, 4 pages, 2 pages, 3 pages, 5 pages
1229   and 3 pages. The " pages-per-subset" attributes wraps after the first four Output-Documents and starts
1230   with "3" again. After consuming 22 Input-Pages, the next number is "4", but only 3 pages remain. So
1231   the last Output-Document is short. These value show two boundary cases.

1232

1233   Create-Job
1234   operations attributes group
1235   document-format: application/PostScript
1236   job attributes group
1237   **multiple-document-handling: separate-documents-collated-copies**
1238   **pages-per-subset: 3, 5, 4, 2**
1239   sides: two-sided-long-edge
1240   media: letter
1241   copies: 3
1242   finishings: stapling
1243   page-exceptions: {
1244   output-documents: 1:7   (I could have used output-documents: 1:100 to be safe)
1245   pages: 1:1
1246   sides: one-sided
1247   media: blue-letter }
1248   end-of-attributes

```
1249        Send-Document
1250            end-of-attributes
1251                Input-Document A
1252        Send-Document
1253            end-of-attributes
1254                Input-Document B
```

1255 10.3 First Page is Blue and First Document is not stapled

1256 In the third example, the Printer produces 3 copies of each Output-Document. Each is stapled and
1257 printed on letter-paper, two-sided using Create-Job. The third and fourth Output-Pages of each Output-
1258 Document is blue-letter paper and one-sided. The second Output-Document is not stapled. All files are
1259 PostScript except the second which is html.
1260
1261 Attributes that differ between cases are in bold. The values for the attribute "input-documents" changes
1262 with each example, but could be "1:100" for all.

1263 10.3.1 Separate-Documents Case

1264 There are two Input-Documents A and B which produce two Output-Documents.
1265
1266 There are three version presented here in order to show three different places to put the attributes
1267 associated with an Input-Document. The differences are in ***bold-italic***.
1268
1269 First solution:
1270

```
1271   Create-Job
1272       operations attributes group
1273           document-format: application/PostScript
1274       job attributes group
1275           multiple-document-handling: separate-documents-collated-copies
1276           sides: two-sided-long-edge
1277           media: letter
1278           copies: 3
1279           finishings: stapling
1280           document-format: application/PostScript
1281           document-exceptions: {
1282               output-documents: 2:2          (I could have used input-documents: 2:2 & merged with next)
1283               finishings: none }
1284                          {
1285               input-documents: 2:2           next value of multi-value
1286               document-format:  text/html}
1287           page-exceptions: {
1288               output-documents: 1:2          (I could have used  input-documents: 1:2 as well)
1289               pages: 3:4
1290               sides: one-sided
1291               media: blue-letter }
1292       end-of-attributes
1293   Send-Document
1294       end-of-attributes
1295           Input-Document A
```

```
1296        Send-Document
1297            end-of-attributes
1298                Input-Document B
1299
1300    Second solution:
1301
1302    Create-Job
1303        operations attributes group
1304            document-format: application/PostScript
1305        job attributes group
1306            multiple-document-handling: separate-documents-collated-copies
1307            sides: two-sided-long-edge
1308            media: letter
1309            copies: 3
1310            finishings: stapling
1311            document-format: application/PostScript
1312            document-exceptions: {
1313                output-documents: 2:2
1314                finishings: none }
1315            page-exceptions: {
1316                output-documents: 1:2            (I could have used  input-documents: 1:2 as well)
1317                pages: 3:4
1318                sides: one-sided
1319                media: blue-letter }
1320        end-of-attributes
1321    Send-Document
1322        end-of-attributes
1323            Input-Document A
1324    Send-Document
1325        Operation attributes group
1326            document-format:  text/html
1327        end-of-attributes
1328            Input-Document B
1329
1330    Third solution:
1331
1332    Create-Job
1333        operations attributes group
1334            document-format: application/PostScript
1335        job attributes group
1336            multiple-document-handling: separate-documents-collated-copies
1337            sides: two-sided-long-edge
1338            media: letter
1339            copies: 3
1340            finishings: stapling
1341            document-format: application/PostScript
1342            page-exceptions: {
1343                output-documents: 1:2            (I could have used  input-documents: 1:2 as well)
1344                pages: 3:4
1345                sides: one-sided
1346                media: blue-letter }
1347        end-of-attributes
1348    Send-Document
```

```
1349            end-of-attributes
1350                Input-Document A
1351        Send-Document
1352            Operation attributes group
1353                document-exceptions: {
1354                    input-documents: 2:2
1355                    document-format:  text/html
1356                    finishings: none }
1357            end-of-attributes
1358                Input-Document B
1359
```

1360   10.3.2 Single-Documents Case

1361   There are two Input-Documents A and B and only one Output-Document.

1362

1363   There are three solutions. The Page-Exception attributes are in Create-Job in the first solution and in
1364   Send-Document in the last two solutions. The Document-Exception attribute is directly in the operation
1365   attributes of Send-Document in the first two solutions and in the document-exceptions attributes of
1366   Send-Document in the third solution. The differences are in **bold-italic**.

1367

1368   First solution:

1369

```
1370    Create-Job
1371        operations attributes group
1372            document-format: application/PostScript
1373        job attributes group
1374            multiple-document-handling: single-document
1375            sides: two-sided-long-edge
1376            media: letter
1377            copies: 3
1378            finishings: stapling
1379            document-exceptions: {
1380                output-documents: 2:2          (This is ignored because there is no 2ⁿᵈ document)
1381                finishings: none }
1382            page-exceptions: {
1383                input-documents: 1:1          (I could have used output-documents: 1:1)
1384                pages: 3:4
1385                sides: one-sided
1386                media: blue-letter }
1387        end-of-attributes
1388    Send-Document
1389        end-of-attributes
1390            Input-Document A
1391    Send-Document
1392        Operation attributes group
1393            document-format:  text/html
1394        end-of-attributes
1395            Input-Document B
1396
```

1397   Second solution:

1398

```
1399          Create-Job
1400              operations attributes group
1401                  document-format: application/PostScript
1402              job attributes group
1403                  multiple-document-handling: single-document
1404                  sides: two-sided-long-edge
1405                  media: letter
1406                  copies: 3
1407                  finishings: stapling
1408                  document-exceptions: {
1409                      output-documents: 2:2          (This is ignored because there is no 2nd document)
1410                      finishings: none }
1411              end-of-attributes
1412          Send-Document
1413              Operation attributes group
1414                  page-exceptions: {
1415                      input-documents: 1:1              (I could have used output-documents: 1:1)
1416                      pages: 3:4
1417                      sides: one-sided
1418                      media: blue-letter }
1419              end-of-attributes
1420                  Input-Document A
1421          Send-Document
1422              Operation attributes group
1423                  document-format:  text/html          (this can be here or in the document-exceptions)
1424              end-of-attributes
1425                  Input-Document B
1426
1427      Third solution:
1428
1429      Create-Job
1430          operations attributes group
1431              document-format: application/PostScript
1432          job attributes group
1433              multiple-document-handling: single-document
1434              sides: two-sided-long-edge
1435              media: letter
1436              copies: 3
1437              finishings: stapling
1438              document-exceptions: {
1439                  output-documents: 2:2          (This is ignored because there is no 2nd document)
1440                  finishings: none }
1441          end-of-attributes
1442      Send-Document
1443          Operation attributes group
1444              page-exceptions: {
1445                  input-documents: 1:1              (I could have used output-documents: 1:1)
1446                  pages: 3:4
1447                  sides: one-sided
1448                  media: blue-letter }
1449          end-of-attributes
1450              Input-Document A
1451      Send-Document
1452          Operation attributes group
```

1453   *document-exceptions: {*
1454   *input-documents: 2:2*
1455   *document-format: text/html }*
1456   end-of-attributes
1457   Input-Document B

1458 ### 10.3.3 Page-Subset Documents Case

1459 There are two Input-Documents A and B. . The first Input-Document contains 10 Pages and the second
1460 one 15 pages. There are 7 Output-Documents with 3 pages, 5 pages, 4 pages, 2 pages, 3 pages, 5 pages
1461 and 3 pages. The "pages-per-subset" attributes wraps after the first four Output-Documents and starts
1462 with "3" again. After consuming 22 Input-Pages, the next number is "4", but only 3 pages remain. So
1463 the last Output-Document is short.

1464
1465 Create-Job
1466   operations attributes group
1467   document-format: application/PostScript
1468   job attributes group
1469   **multiple-document-handling: separate-documents-collated-copies**
1470   **pages-per-subset: 3, 5, 4, 2**
1471   sides: two-sided-long-edge
1472   media: letter
1473   copies: 3
1474   finishings: stapling
1475   document-exceptions: {
1476   output-documents: 2:2
1477   finishings: none }
1478   page-exceptions: {
1479   output-documents: 1:7   (I could have used input-documents: 1:100 to be safe)
1480   pages: 3:4
1481   sides: one-sided
1482   media: blue-letter }
1483   end-of-attributes
1484 Send-Document
1485   end-of-attributes
1486   Input-Document A
1487 Send-Document
1488   Operation attributes group
1489   document-format: text/html   (this can be here or in the document-exceptions)
1490   end-of-attributes
1491   Input-Document B
1492

1493 ## 10.4 One document with 100 copies for distribution and one on transparencies.

1494 In the fourth example, the Printer produces 101 copies of the single Output-Document using Print-Job.
1495 The first 100 are stapled and printed on letter-paper, two-sided, except the first page is on blue paper,
1496 one-sided. The eleventh copy is printed on transparencies, one-sided and not stapled. The file is
1497 PostScript.
1498
1499 Print-Job
1500   operations attributes group

```
1501                    document-format: application/PostScript
1502              job attributes group
1503                    sides: two-sided-long-edge
1504                    media: letter
1505                    copies: 101
1506                    finishings: stapling
1507                    document-format: application/PostScript
1508                    document-exceptions: {
1509                        output-documents: 1:1              (I could have used  input-documents: 1:1 as well)
1510                        document-copies: 101:101
1511                        sides: one-sided
1512                        media: transparency }
1513                        finishings: none }
1514                    page-exceptions: {
1515                        output-documents: 1:1              (I could have used  input-documents: 1:1 as well)
1516                        document-copies: 1:100
1517                        pages: 1:1
1518                        sides: one-sided
1519                        media: blue-letter }
1520              end-of-attributes
1521                    Input-Document A
1522
```

1523   11. IANA Considerations

1524

1525   IANA will be called on to register the Job Template attributes defined in this document, using the
1526   procedures outlined in [ipp-mod].

1527   12. Internationalization Considerations

1528   The IPP extensions defined in this document require the same internationalization considerations as any of
1529   the Job Template attributes defined in IPP/1.1 [ipp-mod].

1530   13. Security Considerations

1531   The IPP extensions defined in this document require the same security considerations as any of the Job
1532   Template attributes defined in IPP/1.1 [ipp-mod].

1533   14. References

1534   [ipp-mod]
1535   R. deBry, T. Hastings, R. Herriot, S. Isaacson, P. Powell, "Internet Printing Protocol/1.0: Model and
1536   Semantics", <draft-ietf-ipp-model-v11-04.txt>, June 23, 1999.

1537 [RFC2566]
1538   R. deBry, T. Hastings, R. Herriot, S. Isaacson, P. Powell, "Internet Printing Protocol/1.0: Model and
1539   Semantics", RFC 2566, April 1999.

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16. Appendix A: Rules for Attribute Association

1558 For each category of attribute, there is a rule:
1559   1. Input-Documents: such an attribute
1560   a) cannot be directly associated with Input-Pages, Output-Pages, Output-Documents
1561   b) can be directly associated with an Input-Document, and it affects the Input-Document it is
1562   associated with.
1563   c) can be associated with a Job and it affects all Input-Documents that don't have the attribute
1564   associated with it.
1565   2. Output-Documents: such an attribute
1566   a) can never be directly associated with an Input-Page or Output-Page.
1567   b) can be directly associated with an Output-Document, and it affects the Output-Document it is
1568   associated with.
1569   c) can be directly associated with an Input-Document. If that Input-Document produces a first
1570   Output-Page for one or more Output-Documents, the attribute is effectively associated with each
1571   such Output-Document that doesn't have the attribute directly associated with it. Now use rule
1572   2b). If that Input-Document doesn't produce any first Output-Pages of an Output-Document, it is
1573   ignored and the Printer produces a warning message.

1574   d) can be associated with a Job and it affects all Output-Documents that don't have the attribute
1575   associated with it.
1576   3. Sheets: such attributes
1577   a) can be directly associated with an Output-Page, and it affects the associated Output-Page .
1578   b) can be directly associated with an Input-Page, and it is effectively associated with the Output-
1579   Page determined by the relationship described for the four cases in section 4.2 if that Output-
1580   Page doesn't have the attribute directly associated with it. Now use rule 3a)
1581   c) can be directly associated with an Output-Document, and it affects all Output-Pages in the
1582   specified Output-Document that don't have the attribute associated directly with it or the
1583   corresponding Input-Page.
1584   d) can be directly associated with an Input-Document, and it is effectively associated with all Input-
1585   Pages in the specified Input-Document that don't have the attribute associated directly with it.
1586   By transitivity, the attribute is effectively associated with all corresponding Output-Pages (see
1587   section 4.2) that don't have the attribute associated directly with the them or the containing
1588   Output-Document. Now use rule 3a)
1589   e) can be associated with a Job and it affects all Output-Pages that don't have the attribute
1590   associated with it.
1591
1592 When an association includes the "document-copies" attribute, it modifies the meaning of the above rules
1593 slightly for each effective association. If the attribute effectively associates with:
1594
1595   -   Input-Documents, the Printer ignores the "document-copies" attribute.
1596   -   Output-Documents, the attribute affects the specified copies of the Output-Documents (See Item
1597   2b))
1598   -   Sheets: the attribute affects the sheets of the specified copies of Output-Documents (See Items 3a)
1599   and 3c)).

1600   17. Appendix B: Change History

1601 This section summarizes the changes to the document. Each sub-section is in reverse chronological order.
1602 Adding or removing ISSUES that don't change the document are not listed here.

1603   17.1 Changes to the January 3, 2000 version to make the January 31, 2000 version

1604 The following changes to the January 3, 2000 version to make the January 31, 2000 version:

1605 1. Changed the format to be a PWG-DRAFT. No technical content changed.

18. Appendix C: Description of the IEEE-ISTO PWG

The Printer Working Group (or PWG) is a Program of the IEEE Industry Standards and Technology Organization (ISTO) with member organizations including printer manufacturers, print server developers, operating system providers, network operating systems providers, network connectivity vendors, and print management application developers. The group is chartered to make printers and the applications and operating systems supporting them work together better. All references to the PWG in this document implicitly mean "The Printer Working Group, a Program of the IEEE ISTO." In order to meet this objective, the PWG will document the results of their work as open standards that define print related protocols, interfaces, procedures and conventions. Printer manufacturers and vendors of printer related software will benefit from the interoperability provided by voluntary conformance to these standards.

In general, a PWG standard is a specification that is stable, well understood, and is technically competent, has multiple, independent and interoperable implementations with substantial operational experience, and enjoys significant public support.

For additional information regarding the Printer Working Group visit:

<div align="center">

http://www.pwg.org

</div>

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Title: Internet Printing Protocol (IPP): Exception Attributes for Documents and Pages

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Document Number 4

1   IEEE-ISTO Printer Working Group (PWG)   Kirk Ocke
2   PWG-DRAFT   Tom Hastings
3   Xerox Corporation
4   June 5, 2000
5
6   Internet Printing Protocol (IPP): Production Printing Attributes - Set1
7   <pwg-ipp-prod-print-set1-000605.rtf, .pdf>
8
9   Status of this Memo
10

16
17
18   Abstract
19

20   This document specifies an extension to the Internet Printing Protocol/1.0 (IPP) [RFC2565, RFC2566] and
21   IPP/1.1 [ipp-mod, ipp-pro]. This extension consists primarily of Job Template attributes defined for
22   submitting print jobs to production printers. These attributes permit a user to control and/or override
23   instructions in the document content to perform the following functions: print on document covers, insert
24   sheets into the document, provide an accounting id, request accounting sheets, provide job sheet messages,
25   request error sheets, provide a message to the operator, provide a job recipient name in cases that is
26   intended to be different from the job submitter's name, control the media used for job sheets, request media
27   by characteristic (size, weight, etc.), control collation, and shift the image.
28
29   This extension also defines the "current-page-order" Job Description attribute, the "user-defined-names-
30   supported" Printer Description attribute, and the 'resources-are-not-supported' value for the "job-state-
31   reasons" Job Description attribute.
32
33   Some additional "media" keyword values are defined for use with the "media" Job Template attribute.

34   The full set of IPP documents includes:

35

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 (this document)
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

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 included
45   in a printing protocol for the Internet. It identifies requirements for three types of users: end users,
46   operators, and administrators. It calls out a subset of end user requirements that are satisfied in IPP/1.0. A
47   few OPTIONAL operator operations have been added to IPP/1.1.

48

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

53

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
56   encoding rules for a new Internet MIME media type called "application/ipp". This document also defines
57   the rules for transporting over HTTP a message body whose Content-Type is "application/ipp". This
58   document defines a new scheme named 'ipp' for identifying IPP printers and jobs.

59

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

65

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

68

Table of Contents

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Table of Tables

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197

1   Introduction

199
200   This document specifies an extension to the Internet Printing Protocol/1.0 (IPP) [RFC2565, RFC2566] and
201   IPP/1.1 [ipp-mod, ipp-pro]. This extension consists primarily of Job Template attributes defined for
202   submitting print jobs to production printers. These attributes permit a user to control and/or override
203   instructions in the document content to perform the following functions: print on document covers, insert
204   sheets into the document, provide an accounting id, request accounting sheets, provide job sheet messages,
205   request error sheets, provide a message to the operator, provide a job recipient name in cases that is
206   intended to be different from the job submitter's name, control the media used for job sheets, request media
207   by characteristic (size, weight, etc.), control collation, and shift the image.

208
209   This extension also defines the "current-page-order" Job Description attribute, the "user-defined-names-
210   supported" Printer Description attribute, and the 'resources-are-not-supported' value for the "job-state-
211   reasons" Job Description attribute.

212
213   Some additional "media" keyword values are defined for use with the "media" Job Template attribute.

214
215   Many of these functions MAY be specified in a document format (PDL). In such cases, the user MAY
216   request that the application include these instructions as part of the document data when the document is
217   generated, rather than in the IPP protocol at print time. However, some applications are unable to support
218   some of the functions. Also some of these functions are not supported in some PDLs. Finally, in a
219   production environment, the document may be generated separately from being printed, in which case the
220   end user or the production printer operator supplies the instructions at print time, long after the document
221   had been created.

222
223

2   Terminology

225
226   This section defines the following additional terms that are used throughout this document.

227
2.1   Conformance Terminology

229
230   Capitalized terms, such as **MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, MAY,**
231   **NEED NOT,** and **OPTIONAL**, have special meaning relating to conformance to this specification. These
232   terms are defined in [ipp-mod section 13.1 on conformance terminology, most of which is taken from RFC
233   2119 [RFC2119]. Since support of this entire IPP extension specification is OPTIONAL for conformance
234   to IPP/1.0 or IPP/1.1 ([ipp-mod], [ipp-pro]), the terms MUST, MUST NOT, REQUIRED, SHOULD,
235   SHOULD NOT, MAY, NEED NOT, and OPTIONAL apply *if and only if the extension specification in*
236   *this document is implemented.* Thus a feature labeled as REQUIRED in this document is not REQUIRED
237   if implementing the basic IPP/1.1 protocol defined by [ipp-mod] and [ipp-pro].

238 **2.2 Other terminology**

239

document data	The data that represent an "original document" supplied with a Job Creation request. Typically Document Data is in the form of a PDL.
set	The sheets of either (1) one copy of an output document copy with collated sheets or (2) all the copies of a single sheet for uncollated sheets. See description in section 3.13.1.
original document	The document composed by a user that is eventually submitted in the for of Document Data as part of a create request.
original document order	The orders of the pages, typically reading order, as defined in the Original Document.
print-stream pages	The sequence of pages according to the definition of pages in the language used to express the document data defined relative to the Input Document.
Input-Document	The sequence of input pages that the client sends as document data to the IPP Printer (see [ipp-except]).
Output-Document	The sequence of output pages that the Printer renders onto output media (see [ipp-except]).
rendered output	Media sheets that are delivered as part of the output of a print request, typically containing impressions.
collection	An attribute syntax consisting of a set of attributes. Such a collection attribute has a value that is a set of attributes, similar to a Java Map or a PostScript dictionary. See [ipp-coll].

240
241

242 **2.3 Coordinate System**

243

244 Some of the attribute extensions proposed in this document refer to specific edges of a sheet of printed
245 media. Specifying that a staple be placed in the upper left corner of a printed document is an example. To
246 resolve ambiguity the following coordinate system is used throughout this document:

247

248 The specified edge is always with respect to the document as if the document were a portrait document. If
249 the document is actually a landscape or a reverse-landscape document, the client (which may include a user)
250 supplies the appropriate transformed value. For example, to position a staple in the upper left hand corner
251 of a landscape document when held for reading, the client supplies the 'staple-bottom-left' value (since
252 landscape is defined as a +90 degree rotation from portrait, i.e., anti-clockwise). On the other hand, to
253 position a staple in the upper left hand corner of a reverse-landscape document when held for reading, the
254 client supplies the 'staple-top-right' value (since reverse-landscape is defined as a –90 degree rotation from
255 portrait, i.e., clockwise).

256

257 The x-axis is defined to be along the bottom edge, with positive values extending in the direction of the
258 right edge.

259

260 The y-axis is defined to be along the left edge, with positive values extending toward the top edge.

261
262   The origin (0,0) is the bottom-left corner.

263
264

265   ## 2.4   Enumeration and Ordering of print-stream pages

266
267   A *print-stream page* is a page according to the definition of pages in the language used to express the
268   document data" (see section of 13.2.4 of the IPP Model and Semantics Document). The *document data*
269   included in an IPP request is typically a PDL representation of a document composed by a user. For the
270   remainder of this description we will use the term document data to mean the typical PDL representation
271   sent with an IPP request (e.g., a PostScript File), and the term *original document* to mean the document
272   composed by the user (e.g., a Word97 document). The print-stream page numbering is with respect to the
273   Input-Document, not the Output-Document (see [ipp-except]). Furthermore, the page numbers are ordinal
274   numbers starting at 1 and are independent of the page numbers that may be printed on the pages.

275
276   The order of the print-stream pages in the document data is either the same as the order of the original
277   document, known as 1-N (read "one to N"), or the reverse of that order, known as N-1. There are no
278   assumptions on the order of the original document, other than it is ordered.

279
280   The enumeration of print-stream pages begins with 1 and increments by 1 for each additional print-stream
281   page. The enumeration is based on the order of the original document, not the document data supplied with
282   the IPP request. In other words, if the document data is supplied in N-1 order (reverse of the original
283   document order), then print-stream page number '1' in the enumeration is actually the N th print-stream
284   page defined in the document data (see the "page-order-received" attribute in section 3.12). Similarly,
285   print-stream page number '2' is defined by the (N-1) th print-stream page defined in the document data.
286   Suppose the document data is supplied in the 1-N order (same as the original document order), then print-
287   stream page number '1' in the enumeration is the 1 st print-stream page defined in the document data.
288   Similarly, print-stream page number '2' is defined by the 2 nd print-stream page defined in the document
289   data. The enumeration of print-stream pages is only relevant when applying attributes or operations that act
290   on a page, or range of page basis (e.g., the "insert-sheet" attribute in section 3.2).

291
292   The enumeration of print-stream pages is affected by the "multiple-document-handling" attribute. When
293   the "multiple-document-handling" attribute is 'single-document' or 'single-document-new-sheet,' the
294   enumeration is based on the concatenation of all the print-stream pages in the job. In the case of 'separate-
295   documents-collated-copies' and 'separate-documents-uncollated-copies,' the enumeration of print-stream
296   pages applies to each document. For example, for a job with eight documents, referring to print-stream
297   page number '1' actually refers to print-stream page number '1' in each of the eight documents included with
298   the job.

299
300   The enumeration of print-stream pages is NOT affected by the "page-ranges" Job Template attribute, if
301   supplied. The "page-ranges" attribute merely affects which Input-Document pages are actually printed. For
302   example, if an insert sheet is to be inserted after print-stream page number is 5 of a 10-page document, the
303   insert page will be inserted after page 5 with respect to the Input-Document as long as page 5 is included in
304   the "page-ranges" attribute. If the "page-ranges" attribute does not include Input-Document page 5, then the
305   insert sheet will not be inserted. Thus a user can supply the "page-ranges" attribute without having to

306   change any other attributes in order to print a part of a document.
307
308

2.5   Collection Attributes

309
310

311   An attribute of type 'collection' has a value that is a set of attributes, called *member* attributes. The
312   definition for each member attribute is specified as a sub-section of the collection attribute definition. Each
313   member attribute MAY in turn be single-valued or multi-valued. The Printer validates and processes each
314   member attribute of a Job Template collection attribute in the same way that it validates and processes Job
315   Template attributes. The collection merely serves as a container for the member attributes. In other words,
316   the 'collection' attribute type serves the same purpose as the 'map' data type in the Java programming
317   language and the dictionary mechanism in PostScript. See [ipp-coll] for a complete definition and encoding
318   of the 'collection' attribute syntax with examples.
319

2.6   Definition of 'none' values

320
321

322   For most Job Template attributes, the client needs a way to indicate that the Printer MUST NOT perform
323   the feature associated with the attribute, including not performing the default action indicated by the
324   Printer's "xxx-default" attribute. If the client omits the "xxx" Job Template attribute, a corresponding value
325   is used from the PDL data, if present. Otherwise, the Printer's "xxx-default" attribute value is used.
326
327   For each attribute definition, the representation of none is specified or is explicitly disallowed. For string
328   attribute syntax types, such as 'text', 'name', 'uri', 'uriScheme', 'charset', 'naturalLanguage', 'mimeMediaType',
329   and 'octetString', the client supplies a zero-length value to indicate an explicit none. For 'enum', 'keyword',
330   or 'keyword | name' a specific 'none' enum or keyword value is defined. For 'integer' or 'rangeOfInteger'
331   values, a particular distinguished value, such as 0 or -1' is defined to mean none. The client can supply the
332   defined none value in order to override a Printer's "xxx-default" value. The Printer MUST return the 'no-
333   value' out-of-band value for Printer Description attributes that have 'dateTime' or 'integer' time values that
334   do not yet have a value (see [ipp-mod] sections 4.3.14 and 4.4.30).
335
336   Similarly, for the corresponding Printer's "xxx-default", the Printer MUST use the same none value to
337   indicate that there is no default value that will be applied. Thus the defined values for the "xxx-default"
338   attribute are the same as those that a client can supply, including the none case. Consequently, no special
339   mention is made of the none case in each "xxx-default" attribute definition. However, a Printer
340   implementation MUST support the defined none value for each Job Template attribute in job submission,
341   as a value of the "xxx-default" Printer attribute, and as one of the values of the "xxx-supported" Printer
342   attribute, if the Printer supports the "xxx" Job Template attribute. Also the administrator SHOULD be able
343   to remove the 'none' value from the list of supported values if the site policy is to disallow the none case.
344   See [ipp-set-ops] for means to set the values of the "xxx-supported" and "xxx-default" Printer attributes
345   using the Set-Printer-Attributes operation.
346
347   There are a few Job Template attributes for which there is no none value defined, because of the inherent
348   nature of the semantics associated with the attribute the Printer always supplies some value. Examples of
349   such attributes (see [ipp-mod]) are: "media" (type3 keyword | name) and "sides" (keyword). There is no

350 'none' keyword value defined for use with the media and a zero-length string will not match any supported
351 values. Similarly, there is no 'none' keyword value defined for the "sides" attribute. All jobs that print use
352 some media instance and either print on one side or on both sides. Thus this kind of attribute does not have
353 a defined none value. Because some attributes do not have none values defined, while most do, the
354 definition document MUST specify the distinguished none value in each attribute definition or explicitly
355 state that there is no distinguished none value.
356

357 3   Job Template Attributes

358

359 This section defines Job Template Attribute extensions for production printing. Table 1 summarizes the
360 Job and Printer Job Template attributes.

361   **Table 1 - Summary of Job Template Attributes**

Job Attribute	Printer: Default Value Attribute	Printer: Supported Values Attribute
cover-back (collection)	cover-back-default (collection)	cover-back-supported (1setOf type2 keyword)
cover-front (collection)	cover-front-default (collection)	cover-front-supported (1setOf type2 keyword)
insert-sheet (collection)	insert-sheet-default (collection)	insert-sheet-supported (1setOf type2 keyword)
job-account-id(name(MAX))	job-account-id-default (name(MAX))	job-account-id-supported (integer(0:255))
job-accounting-sheets (collection)	job-accounting-sheets-default (collection)	job-accounting-sheets-supported (1setOf type2 keyword)
job-error-sheet (collection)	job-error-sheet-default (collection)	job-error-sheet-supported (1setOf type2 keyword)
job-message-to-operator (text(MAX))	job-message-to-operator-default (text(MAX))	job-message-to-operator-supported (integer(0:1023))
job-recipient-name (name(MAX))	job-recipient-name-default (name(MAX))	job-recipient-name-supported (integer(0:255))
job-sheets-col (collection)	job-sheets-col-default (collection)	job-sheets-col-supported (1setOf type2 keyword)
job-sheet-message (text(MAX))	job-sheet-message-default (text(MAX))	job-sheet-message-supported (integer(0:1023))
media-col (collection)	media-col-default (collection)	media-col-supported (1setOf type2 keyword) media-col-ready (1setOf collection)
page-delivery (type2 keyword)	page-delivery-default (type2 keyword)	page-delivery-supported (1setOf type2 keyword)
page-order-received (type2 keyword)	page-order-received-default (type2 keyword)	page-order-received-supported (1setOf type2 keyword)
separator-sheets (collection)	separator-sheets-default (collection)	separator-sheets-supported (1setOf type2 keyword)

x-image-auto-center (boolean)	x-image-auto-center-default (boolean)	x-image-auto-center-supported (boolean)
x-image-shift (integer (MIN:MAX))	x-image-shift-default (integer (MIN:MAX))	x-image-shift-supported (rangeOfInteger (MIN:MAX))
x-side1-image-shift (integer (MIN:MAX))	x-side1-image-shift-default (integer (MIN:MAX))	x-side1-image-shift-supported (rangeOfInteger (MIN:MAX))
x-side2-image-shift (integer (MIN:MAX))	x-side2-image-shift-default (integer (MIN:MAX))	x-side2-image-shift-supported (rangeOfInteger (MIN:MAX))
y-image-auto-center (boolean)	y-image-auto-center-default (boolean)	y-image-auto-center-supported (boolean)
y-image-shift (integer (MIN:MAX))	y-image-shift-default (integer (MIN:MAX))	y-image-shift-supported (rangeOfInteger (MIN:MAX))
y-side1-image-shift (integer (MIN:MAX))	y-side1-image-shift-default (integer (MIN:MAX))	y-side1-image-shift-supported (rangeOfInteger (MIN:MAX))
y-side2-image-shift (integer (MIN:MAX))	y-side2-image-shift-default (integer (MIN:MAX))	y-side2-image-shift-supported (rangeOfInteger (MIN:MAX))

362
363
3.1   cover-front (collection) and cover-back (collection)
364
365
366 These two attributes specify how covers are to be applied to each copy of each printed document within a
367 job. Presence of the "cover-front" attribute indicates that a front cover is requested, and similarly, the
368 presence of the "cover-back" attribute indicates that a back cover is requested. Each of the "cover-front"
369 and "cover-back" attributes includes where printing should be applied on the cover (if any), and what media
370 should be used for the cover.
371
372 Both the "cover-front" and "cover-back" attributes are affected by the "multiple-document-handling"
373 attribute. In the case of the 'single-document' and 'single-document-new-sheet' values, the covers MUST be
374 applied to each copy of the composite (single) document. When the value is either 'separate-documents-
375 collated-copies' or 'separate-documents-uncollated-copies', then the covers MUST be applied to each
376 document copy individually.
377
378 The sheets in the rendered output that represent the covers are treated like any other sheet in the document
379 copy. For example, if the "finishings" attribute has a value of 'staple,' then the staple would bind the covers,
380 along with all of the other sheets in the output.
381
382 Both the "cover-front" and "cover-back" attributes are defined by the following collection:
383
384   **Table 2 - "cover-front" and "cover-back" member attributes**

Attribute name	attribute syntax	request	Printer Support
media	type3 keyword	name(MAX)	MAY be neither or one of, but NOT both	MUST

media-col	collection		MAY
cover-type	type2 keyword	MUST	MUST

385

386   **3.1.1   media (type3 keyword | name(MAX)) or media-col (collection)**

387

388   Either the "media" (defined in [ipp-mod] section 4.2.11) or the "media-col" member attribute is used
389   to indicate what media that the Printer MUST use for the specified cover. The member attributes
390   are the same as those for the "media-col" attribute shown in Table 7.

391

392   If the client omits both the "media" and the "media-col" member attributes, then the media currently
393   being used by the Printer object for the document copy SHOULD also be used for the cover. The
394   client MUST NOT supply both the "media" and the "media-col" member attributes. If the client
395   supplies such a mal-formed request by supplying both, the Printer MUST either (1) reject the
396   request and return the 'client-error-bad-request' status code (see [ipp-mod] section 13.1.4.1) or (2)
397   use either the "media" or the "media-col" member attribute, independent of the value of the "ipp-
398   attribute-fidelity" attribute supplied by the client.

399

400   Since this "media" member attribute has the same name as the "media" Job Template attribute
401   defined in [ipp-mod] section 4.2.11), the "media-supported" (1setOf (type3 keyword | name(MAX)))
402   Printer attribute (also defined in [ipp-mod] section 4.2.11) identifies the values of this "media"
403   member attribute (as well as the values of the "media" Job Template attribute) that the Printer
404   supports, i.e., the names of the supported media.

405

406   Since this "media-col" member attribute has the same name as the "media-col" Job Template
407   attribute defined in section 3.10), the "media-col-supported" Printer attribute (defined in section
408   3.10.16) identifies the keyword names of the member attributes supported in this "media-col"
409   member attribute (as well as the keyword names of the "media-col" Job Template attribute), i.e., the
410   names of the member attributes in Table 7 that the Printer supports.

411

412   **3.1.2   cover-type (type2 keyword)**

413

414   The "cover-type" member attribute indicates whether covers are wanted and which sides of the
415   cover MUST contain print-stream pages. The print-stream pages used for printing on a cover come
416   from the document data.

417

418   Standard keyword values for "cover-type" are:

419

'no-cover'	No covers are to be produced.
'print-none'	No printing on either side of the cover.

'print-front'	The front side (side one) of the cover MUST contain a print-stream page.
	For a front cover ("cover-front") the first print-stream page MUST be placed on side one of the front cover sheet (this is the outside of the front cover). The Printer MUST place the second print stream page on side one of the first sheet of the output document.
	For back cover ("cover-back") the last print-stream page MUST be placed on side one of the back cover sheet (this is the inside of the back cover). The Printer MUST place the second to last print stream page on the front or back side of the last sheet of the output document depending on whether there are an odd or an even number of print stream pages.
'print-back'	The back side (side two) of the cover MUST contain a print-stream page.
	For a front cover ("cover-front") the first print-stream page MUST be placed on side two of the front cover sheet (this is the inside of the front cover). The Printer MUST place the second print stream page on side one of the first sheet of the output document.
	For a back cover ("cover-back") the last print-stream page MUST be placed on side two of the back cover sheet (this is the outside of the back cover). The Printer MUST place the second to last print stream page on the front or back side of the last sheet of the output document depending on whether there are an odd or an even number of print stream pages.
'print-both'	Both the front and back sides of the cover MUST contain a print-stream page.
	The front cover MUST contain the first and second print-stream pages on the front and back sides of the front cover sheet, respectively. The Printer MUST place the third print stream page on side one of the first sheet of the output document.
	The back cover MUST contain the second to last and last print-stream pages on the front and back sides of the back cover sheet, respectively. The Printer MUST place the third to last print stream page on the front or back side of the last sheet of the output document depending on whether there are an odd or an even number of print stream pages.

420
421   When printing on the back side (side two) of a cover, the value of the "sides" attribute SHOULD be
422   used to determine which edge is the reference edge (i.e., long or short edge). In the case where the
423   "sides" attribute is 'one-sided,' then the reference edge SHOULD be the long edge.
424
425   NOTE: If referencing the "sides" attribute is insufficient for determining the reference edge printing
426   on the back side of a cover, then an additional member attribute could be defined that indicates
427   which edge to reference. However, the predominate use cases are covered without this additional

428   member attribute.
429
430   In cases where the document data does not contain enough print-stream pages to satisfy the "cover-
431   front" or "cover-back" request, the behavior is implementation dependent.
432
433   The "cover-type-supported" (1setOf type2 keyword) Printer attribute identifies the values that the
434   Printer supports, i.e., the keyword cover types supported.
435
436   ### 3.1.3   cover-front-default (collection) and cover-back-default (collection)
437
438   The "cover-front-default" and "cover-back-default" specify the cover that the Printer will provide, if
439   any, if the client omits the "cover-front" or "cover-back" Job Template attribute, respectively. The
440   member attributes are defined in Table 2. A Printer MUST support the same member attributes and
441   values for these default attributes as it supports for the corresponding "cover-front" and "cover-
442   back" Job Template attributes.
443
444   ### 3.1.4   cover-front-supported (1setOf type2 keyword), cover-back-supported (1setOf type2
445   keyword)
446
447   The "cover-front-supported" and "cover-back-supported" attributes identify the keyword names of
448   the member attributes supported in the "cover-front" and "cover-back" collection Job Template
449   attributes, respectively, i.e., the keyword names of the member attributes in Table 2 that the Printer
450   supports.
451

452   ## 3.2   insert-sheet (1setOf collection)
453

454   This attribute specifies how sheets that are not to be imaged, are to be inserted into the sequence of media
455   sheets that are produced for each copy of each printed document in the job. How the sheet is inserted is
456   implementation dependent, and could be as sophisticated as insertion hardware, or as simple as using media
457   from an existing input-tray.
458

459   The order of the values of the "insert-sheet" attribute is important. In the case where more than one value
460   refers to the same page (i.e., multiple values contain the same value for the "after-page-number" member
461   attribute), the values of "insert-sheet" are to be applied in the order that they occur.
462

463   This attribute is affected by the "multiple-document-handling" attribute. For values of 'single-document'
464   and 'single-document-new-sheet,' the sheet is inserted in the composite (single) document created by the
465   concatenation of all the print-stream pages in all of the documents. In the case of 'separate-documents-
466   collated-copies' and 'separate-documents-uncollated-copies,' the inserted sheets are applied to the print-
467   stream in each document separately. The collection consists of:
468

469   **Table 3 - "insert-sheet" member attributes**

Attribute name	attribute syntax	request	Printer Support

insert-after-page-number	integer (0:MAX)	MUST	MUST
insert-count	integer (0:MAX)	MAY	MUST
media	type3 keyword | name(MAX)	MUST be one or the other, but NOT both	MUST
media-col	collection		MAY

470
471
472   **3.2.1   insert-after-page-number (integer(0:MAX))**
473
474   The "insert-after-page-number" member attribute specifies the page in the Input-Document (see
475   sections 2.2 and 2.4) print-stream after which the sheet is to be placed. The inserted sheet(s) does
476   not affect the number of print-stream pages. For-example, to insert a single sheet after both pages 2
477   and 3 of a given document, the value of "input-after-page-number" would be 2 and 3 respectively
478   (not 2 and 4, as it would be if the inserted sheet affected the Input-Document print-stream page
479   count). For a complete description of the enumeration of print-stream pages see section 2.4.
480
481   If the value of the "insert-after-page-number" member attribute is 0, then the sheet is inserted before
482   the first page. If the value is MAX, then the sheet is inserted after the last sheet in the document.
483
484   If the "insert-after-page-number" member attribute is not a valid input document page reference in
485   the print-stream, then the IPP Printer SHOULD ignore the request. For example, (1) the page
486   number is beyond the last page of the document AND is not MAX or (2) the "page-ranges" Job
487   Template attribute does not include the specified page number (see section 2.4). There is no way to
488   validate the "after-page-number" attribute with the Validate-Job operation, since the validation
489   cannot occur until the pages of the documents have arrived at the printer.
490
491   Since the "insert-after-page-number" member attribute refers to a specific input-document print-
492   stream page, it is possible to specify an insertion between sides one and two, of a two sided
493   document, or between print-stream pages that are part of a single impression if the "number-up"
494   attribute has a value other than '1.' In this case, the Printer MUST force a new Sheet after the
495   specified page, insert the specified sheet, place the following pages on the first side of the next
496   Sheet, and issue a warning by adding 'job-warnings-detected' to the "job-state-reasons" and by
497   increasing the value of the "job-warnings-count" Job Description attribute by 1. See [ipp-except]
498   for this error handling specification under "Common Behavior for Sheet Attributes".
499
500   The "insert-after-page-number-supported" (rangeOfInteger(0:MAX)) Printer attribute indicates the
501   range of page numbers supported in the "insert-after-page-number" member attribute, i.e., the
502   minimum (SHOULD be 0) and the maximum (SHOULD be MAX) page numbers supported.
503
504   **3.2.2   insert-count (integer(0:MAX))**
505
506   The "insert-count" attribute indicates how many sheets to insert. If the "insert-count" attribute is
507   omitted, then the printer assumes a value of 1. The value 0 indicates that no inserts sheets are to be
508   inserted.
509

510   The "insert-count-supported (rangeOfInteger(0:MAX)) Printer attribute specifies the range of values
511   that the Printer supports, i.e., the minimum number (MUST be 0) and the maximum number of
512   pages.
513
514   **3.2.3   media (type3 keyword | name(MAX)) or media-col (collection)**
515
516   Either the "media" (defined in [ipp-mod] section 4.2.11) or the "media-col" member attribute is used
517   to indicate the media that the Printer MUST use for the insert sheet.   The member attributes are the
518   same as those for the "media-col" attribute shown in Table 7.
519
520   The client MUST supply either the "media" or the "media-col" member attribute, but NOT both. If
521   the client supplies such a mal-formed request by supplying neither or both, the Printer MUST
522   (depending on implementation) either (1) reject the request and return the 'client-error-bad-request'
523   status code (see [ipp-mod] section 13.1.4.1) or (2) use either the "media" or the "media-col" member
524   attribute, independent of the value of the "ipp-attribute-fidelity" attribute supplied by the client.
525
526   Since this "media" member attribute has the same name as the "media" Job Template attribute
527   defined in [ipp-mod] section 4.2.11), the "media-supported" (1setOf (type3 keyword | name(MAX)))
528   Printer attribute (also defined in [ipp-mod] section 4.2.11) identifies the values of this "media"
529   member attribute (as well as the values of the "media" Job Template attribute) that the Printer
530   supports, i.e., the names of the supported media.
531
532   Since this "media-col" member attribute has the same name as the "media-col" Job Template
533   attribute defined in section 3.10), the "media-col-supported" Printer attribute (defined in section
534   3.10.16) identifies the keyword names of the member attributes supported in this "media-col"
535   member attribute (as well as the keyword names of the "media-col" Job Template attribute), i.e., the
536   names of the member attributes in Table 7 that the Printer supports.
537
538   **3.2.4   insert-sheet-default (1setOf collection)**
539
540   The "insert-sheet-default" Printer attributes specify the insert sheet(s) that the Printer MUST
541   provide, if any, if the client omits the "insert-sheet" Job Template attribute. The member attributes
542   are defined in Table 3. A Printer MUST support the same member attributes for this default
543   collection attribute as it supports for the corresponding "insert-sheet" Job Template attribute.
544
545
546   **3.2.5   insert-sheet-supported (1setOf type2 keyword)**
547
548   The "insert-sheet-supported" attribute identifies the keyword names of the member attributes
549   supported in the "insert-sheet" collection Job Template attribute, i.e., the keyword names of the
550   member attributes in Table 3 that the Printer supports.
551
552
553   **3.3   job-account-id (name (MAX))**
554

555 The "job-account-id" attribute is a character string representing the account associated with the job. The
556 "job-account-id" attribute could be a customer name, a sequence of digits referencing an internal billing
557 number, or even a credit card number. How the printer uses the "job-account-id" is implementation
558 dependent. A zero-length value indicates that there is no account name.
559
560
561   **3.3.1   job-account-id-supported (integer(1:255))**
562
563   The "job-account-id-supported" attribute indicates the maximum length that the Printer will accept
564   for the "job-account-id" Job Template attribute without truncation. A conforming Printer MUST be
565   able to accept 255 octets without truncation. However, an IPP Printer MAY be implemented as a
566   gateway to another print system that cannot accept the full 255-octet range, in which case the value
567   will be truncated to the maximum length specified by the "job-account-id-supported" attribute.
568
569
570   3.4   job-accounting-sheets (collection)
571
572 This attribute specifies which job accounting sheets MUST be printed with the job. Job accounting sheets
573 typically contain information such as the value of the "job-account-id" attribute, and the number and type of
574 media sheets used while printing the job. The exact information contained on a job accounting sheet is
575 implementation dependent, but should always be a reflection of the account information associated with the
576 job.
577
578 The 'collection' syntax allows a client to specify media for job accounting sheets that is different than the
579 current media being used for the print-stream page impressions. The collection consists of:
580

581   **Table 4 - "job-accounting-sheets" member attributes**

Attribute name	attribute syntax	request	Printer Support
job-accounting-sheets-type	type3 keyword | name(MAX)	MUST	MUST
media	type3 keyword | name(MAX)	MAY be	MUST
media-col	collection	neither or one of, but NOT both	MAY

582
583
584   **3.4.1   job-accounting-sheets-type (type3 keyword | name(MAX))**
585
586   The "job-accounting-sheets-type" member attribute specifies which job accounting sheets format the
587   Printer MUST use to print on the specified media. Standard keyword values are:
588

'none'	No accounting sheets are to be printed (i.e. printing of job accounting sheets is totally suppressed).
'standard'	The standard site accounting sheet MUST be printed with the job.

589
590   The "job-accounting-sheets-type-supported" (1setOf (type3 keyword | name(MAX))) Printer
591   attribute identifies the values of this "job-accounting-sheets-type" member attribute that the Printer
592   supports, i.e., the names of the job accounting sheets supported.
593
594   **3.4.2   media (type3 keyword | name(MAX)) or media-col (collection)**
595
596   Either the "media" (defined in [ipp-mod] section 4.2.11) or the "media-col" member attribute is used
597   to indicate the media that the Printer SHOULD use for the job accounting sheet. The member
598   attributes are the same as those for the "media-col" attribute shown in Table 7.
599
600   If both the "media" and the "media-col" member attributes are omitted, then the media currently
601   being used by the Printer object for the document copy SHOULD also be used for the accounting
602   sheet. The client MUST NOT supply both the "media" and the "media-col" member attribute. If the
603   client supplies such a mal-formed request by supplying both, the Printer MUST (depending on
604   implementation) either (1) reject the request and return the 'client-error-bad-request' status code (see
605   [ipp-mod] section 13.1.4.1) or (2) use either the "media" or the "media-col" member attribute,
606   independent of the value of the "ipp-attribute-fidelity" attribute supplied by the client.
607
608   Since this "media" member attribute has the same name as the "media" Job Template attribute
609   defined in [ipp-mod] section 4.2.11), the "media-supported" (1setOf (type3 keyword | name(MAX)))
610   Printer attribute (also defined in [ipp-mod] section 4.2.11) identifies the values of this "media"
611   member attribute (as well as the values of the "media" Job Template attribute) that the Printer
612   supports, i.e., the names of the media supported.
613
614   Since this "media-col" member attribute has the same name as the "media-col" Job Template
615   attribute defined in section 3.10), the "media-col-supported" Printer attribute (defined in section
616   3.10.16) identifies the keyword names of the member attributes supported in this "media-col"
617   member attribute (as well as the keyword names of the "media-col" Job Template attribute), i.e., the
618   names of the member attributes in Table 7 that the Printer supports.
619
620   **3.4.3   job-accounting-sheets-default (collection)**
621
622   The "job-accounting-default" Printer attributes specify the job accounting that the Printer MUST
623   provide, if any, if the client omits the "job-accounting" Job Template attribute. The member
624   attributes are defined in Table 4. A Printer MUST support the same member attributes and value
625   for this default collection attribute as it supports for the corresponding "job-accounting-sheets" Job
626   Template attribute.
627
628   **3.4.4   job-accounting-sheets-supported (1setOf type2 keyword)**
629
630   The "job-accounting-supported" attribute identifies the keyword names of the member attributes
631   supported in the "job-accounting-sheets" Job Template collection attribute, i.e., the keyword names
632   of the member attributes in Table 4 that the Printer supports.
633

634 ## 3.5 job-error-sheet (collection)

635

636 This attribute specifies which job error sheet MUST be printed with the job. This is a printer specific sheet
637 enumerating any known errors or warnings that occurred during processing. For example: a printer could
638 put the text 'warning: image off page 2," on the error sheet to indicate a possible image processing defect.
639 The printer vendor defines the content of the error sheet. If necessary the error sheet can consist of more
640 than one page of output.

641

642 If the Printer is producing a job sheet for this job (see section 3.8 and [ipp-mod] section 4.2.3), then the
643 Printer object MAY print any error and warning information on that same job sheet, i.e., merge the error
644 sheet with the job sheet. This use of the job sheet for errors only applies if the "job-error-sheet" attribute is
645 supplied without either a "media" or "media-col" member attribute. If the "media" or "media-col" member
646 attribute is supplied, a separate error sheet MUST always be used to print errors and warnings.

647

648 The 'collection' syntax allows a client to specify media for job error sheets that is different than the current
649 media being used for the print-stream page impressions. The collection consists of:

650

651 **Table 5 - "job-error-sheet" member attributes**

Attribute name	attribute syntax	request	Printer Support
job-error-sheet-type	type3 keyword | name(MAX)	MUST	MUST
job-error-sheet-when	type2 keyword	MAY	MAY
media	type3 keyword | name(MAX)	MAY be neither or one of, but NOT both	MUST
media-col	collection		MAY

652

653 ### 3.5.1 job-error-sheet-type (type3 keyword | name(MAX))

654

655 The "job-error-sheet-type" member attribute specifies which job error sheets format that the Printer
656 SHOULD to print error information. Standard keyword values are:

657

'none'	No error sheet information is to be printed. (i.e., printing of error sheets is totally suppressed – even if errors or warnings occurred during job processing).
'standard'	The standard site or vendor defined error sheet information MUST be printed with the job depending on the conditions specified by the "job-error-sheet-when" attribute.

658

659 The "job-error-sheet-type-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute
660 identifies the values of this "job-error-sheet-type" member attribute that the Printer supports, i.e., the
661 names of the job error sheets.

662

663 ### 3.5.2 job-error-sheet-when (type2 keyword)

664

665 The "job-error-sheet-when" member attribute specifies the conditions under which the error sheet

666   information is to be produced. The standard keyword values are:
667

| 'on-error' | Print the error sheet information if and only if errors or warnings occurred during the life of the job. |
| 'always' | Always print the error sheet information, i.e., error sheets are printed even if no errors or warnings occurred during job processing – when no errors or warnings occurred a suitable message will be printed on the sheet to indicate this. The 'always' value gives an explicit indication of whether or not there were errors or warnings detected during the processing of the job. |

668
669   The "job-error-sheet-when-supported" (1setOf type2 keyword) Printer attribute identifies the values
670   of this "job-error-sheet-when" member attribute that the Printer supports, i.e., the possible
671   conditions under which the job error sheet will be printer.
672
673   **3.5.3   media (type3 keyword | name(MAX)) or media-col (collection)**
674
675   Either the "media" (defined in [ipp-mod] section 4.2.11) or the "media-col" member attribute is used
676   to indicate the media that the Printer SHOULD be use for the job error sheets. The member
677   attributes are the same as those for the "media-col" attribute shown in Table 7.
678
679   If the client omits both of the "media" or the "media-col" member attributes, the Printer prints any
680   job sheet error information on either the job sheet, if it is being produced, or a separate sheet using
681   the media of the document, depending on implementation.
682
683   The client MUST NOT supply both the "media" and the "media-col" member attribute. If the client
684   supplies such a mal-formed request by supplying both, the Printer MUST (depending on
685   implementation) either (1) reject the request and return the 'client-error-bad-request' status code (see
686   [ipp-mod] section 13.1.4.1) or (2) use either the "media" or the "media-col" member attribute,
687   independent of the value of the "ipp-attribute-fidelity" attribute supplied by the client.
688
689   Since this "media" member attribute has the same name as the "media" Job Template attribute
690   defined in [ipp-mod] section 4.2.11), the "media-supported" (1setOf (type3 keyword | name(MAX)))
691   Printer attribute (also defined in [ipp-mod] section 4.2.11) identifies the values of this "media"
692   member attribute (as well as the values of the "media" Job Template attribute) that the Printer
693   supports, i.e., the names of the supported media.
694
695   Since this "media-col" member attribute has the same name as the "media-col" Job Template
696   attribute defined in section 3.10), the "media-col-supported" Printer attribute (defined in section
697   3.10.16) identifies the keyword names of the member attributes supported in this "media-col"
698   member attribute (as well as the keyword names of the "media-col" Job Template attribute), i.e., the
699   names of the member attributes in Table 7 that the Printer supports.
700
701   **3.5.4   job-error-sheet-default (collection)**
702
703   The "job-error-sheet-default" Printer attributes specify the job error sheets that the Printer MUST

704   provide, if any, if the client omits the "job-error-sheet" Job Template attribute. The member
705   attributes are defined in Table 5. A Printer MUST support the same member attributes and values
706   for this default attribute as it supports for the corresponding "job-error-sheet" Job Template
707   attribute.
708
709   An implementation SHOULD be configured out-of-the-box so that the "job-error-sheet-default"
710   Printer Attribute has the collection value consisting of the "job-error-sheet-type" with a value of:
711   'standard' rather than 'none'. Then the Administrator and End Users have to explicitly turn off error
712   information.
713
714   ### 3.5.5   job-error-sheet-supported (1setOf type2 keyword)
715
716   The "job-error-sheet-supported" attribute identifies the names of the member attributes supported in
717   the "job-error-sheet" Job Template collection attribute, i.e., the keyword names of the member
718   attributes in Table 5 that the Printer supports.
719
720

721 ## 3.6   job-message-to-operator (text(MAX))

722

723 This attribute carries a message from the user to the operator to indicate something about the processing of
724 the print job. A zero length text value indicates no message.

725

726 Note: this attribute may be used in conjunction with the IPP 1.0 "job-hold-until" Job Template attribute
727 (see [ipp-mod] section 4.2.2); specifically with the 'indefinite' value. This combination allows a client to
728 specify instructions to the operator, while simultaneously preventing the job from being processed until
729 some operator intervention occurs. This combination is particularly useful in production printing
730 environments, where printer configuration may be required to properly print the job.

731

732   ### 3.6.1   job-message-to-operator-supported (integer(0:1023))

733

734   The "job-message-to-operator-supported" Printer attribute indicates the maximum length that the
735   Printer will accept for the "job-message-to-operator" Job Template attribute without truncation. A
736   conforming Printer MUST be able to accept 1023 octets without truncation. However, an IPP
737   Printer MAY be implemented as a gateway to another print system that cannot accept the full 1023
738   octet range, in which case the value will be truncated to the maximum length specified by the "job-
739   message-to-operator-supported" attribute.

740

741

742 ## 3.7   job-recipient-name (name(MAX))

743

744 This attribute contains the name of the person that is to receive the output of the job. The value of the "job-
745 recipient-name" attribute is commonly printed on job sheets printed with the job. An example of another
746 use of the "job-recipient-name" attribute is if the printer accesses a database to get job delivery instructions
747 for the recipient of a job. A zero-length value indicates that there is no job recipient name.

748
749 If the client omits this attribute in a create request, the printer MAY use the "job-recipient-name-default"
750 attribute value, unless it has not been configured by the administrator, or MAY use the "authenticated user"
751 name (see [IPP-MOD] section 8.3), depending on implementation.
752
753   **3.7.1   job-recipient-name-supported (integer(0:255))**
754
755   The "job-recipient-name-supported" Printer attribute indicates the maximum length that the Printer
756   will accept for the "job-recipient-name" Job Template attribute without truncation. A conforming
757   Printer MUST be able to accept 255 octets without truncation. However, an IPP Printer MAY be
758   implemented as a gateway to another print system that cannot accept the full 255 octet range, in
759   which case the value will be truncated to the maximum length specified by the "job-recipient-name-
760   supported" attribute.
761
762
763 ## 3.8   job-sheets-col (collection) - augments IPP/1.1 "job-sheets"
764
765 This attribute augments the IPP/1.1 "job-sheets" attribute (define in [ipp-mod] section 4.2.3). The
766 'collection' attribute syntax allows a client to specify media for job sheets that is different than the current
767 media being used for the print stream images. An example of where this is useful is for separator sheets,
768 which may allow easier distinction of document copies.
769
770 Table 6 lists the member attributes of the "job-sheets-col" collection attribute:
771

772   **Table 6 - "job-sheets-col" member attributes**

Attribute name	attribute syntax	request	Printer Support
job-sheets	type3 keyword | name(MAX)	MUST	MUST
media	type3 keyword | name(MAX)	MUST be one or the other, but NOT both	MUST
media-col	collection		MAY

773
774   **3.8.1   job-sheets (type3 keyword | name(MAX))**
775
776   The "job-sheets" member attribute specifies which job sheets to print on the specified media. The
777   values for this member attribute are identical to the keyword and name values for the "job-sheets"
778   Job Template attribute itself, including the 'none' value, and convey the same semantics.
779
780   Since this "job-sheets" member attribute has the same name as the "job-sheets" Job Template
781   attribute defined in [ipp-mod] section 4.2.3), the "job-sheets-supported" (1setOf (type3 keyword |
782   name(MAX))) Printer attribute specifies which are the values of this "job-sheets" member attribute
783   (as well as the values of the IPP/1.1 "job-sheets" Job Template attribute) that the Printer supports.
784

785   **3.8.2   media (type3 keyword | name(MAX)) or media-col (collection)**
786
787   Either the "media" (defined in [ipp-mod] section 4.2.11) or the "media-col" member attribute is used
788   to indicate the media that the Printer SHOULD use for the job sheet. The member attributes are the
789   same as those for the "media-col" attribute shown in Table 7.
790
791   The client MUST supply either the "media" or the "media-col" member attribute, but NOT both. If
792   the client supplies such a mal-formed request by supplying neither or both, the Printer MUST
793   (depending on implementation) either (1) reject the request and return the 'client-error-bad-request'
794   status code (see [ipp-mod] section 13.1.4.1) or (2) use either the "media" or the "media-col" member
795   attribute, independent of the value of the "ipp-attribute-fidelity" attribute supplied by the client.
796
797   Since this "media" member attribute has the same name as the "media" Job Template attribute
798   defined in [ipp-mod] section 4.2.11), the "media-supported" (1setOf (type3 keyword | name(MAX)))
799   Printer attribute (also defined in [ipp-mod] section 4.2.11) identifies the values of this "media"
800   member attribute (as well as the values of the "media" Job Template attribute) that the Printer
801   supports, i.e., the names of the supported media.
802
803   Since this "media-col" member attribute has the same name as the "media-col" Job Template
804   attribute defined in section 3.10), the "media-col-supported" Printer attribute (defined in section
805   3.10.16) identifies the keyword names of the member attributes supported in this "media-col"
806   member attribute (as well as the keyword names of the "media-col" Job Template attribute), i.e., the
807   names of the member attributes in Table 7 that the Printer supports.
808
809   **3.8.3   job-sheets-col-default (collection)**
810
811   The "job-sheets-default (see [ipp-mod] section 4.2.3) attribute and the "job-sheets-col-default"
812   Printer attribute specify the job sheets that the Printer MUST provide, if the client omits both the
813   "job-sheets" and the "job-sheets-col" Job Template attribute in the Job Creation operation (and the
814   PDL doesn't include a job sheets specification). The member attributes are defined in Table 6. A
815   Printer MUST support the same member attributes for this default collection attribute as it supports
816   for the corresponding "job-sheets-col" Job Template attribute.
817
818   The "job-sheets-default" and "job-sheets-col-default" Printer attributes MUST both be configured to
819   specify the same job sheet instance. If the administrator sets one of them to a value (either locally or
820   with the Set-Printer-Attributes operation - see [ipp-set]), the Printer MUST set the other attribute's
821   value to specify the same job sheet instance or to the 'unknown' out-of-band value, if there isn't a
822   corresponding value to be set for the other attribute. If a client attempts to set both attributes, but
823   their values specify different job sheet instances, the Printer MUST reject the Set-Printer-Attributes
824   operation and return the 'client-error-conflicting-attributes' status code. The reason to have both
825   default attributes configured, is so that clients that only know about the "job-sheets" attribute will
826   see the "job-sheets-default" attribute, while clients that know about the "job-sheets-col" attribute
827   will be able to determine the characteristics of the job sheet default.
828

829   **3.8.4   job-sheets-col-supported (1setOf type2 keyword)**
830
831   The "job-sheets-col-supported" attribute identifies the keyword names of the member attributes
832   supported in the "job-sheets-col" collection Job Template attribute, i.e., the keyword names of the
833   member attributes in Table 6 that the Printer supports.
834
835

836 ## 3.9   job-sheet-message (text(MAX))
837
838 This attribute is used to convey a message that is delivered with the job, and may be printer on a job sheet
839 (e.g., the 'standard' job sheet). The message may contain any type of information, but typically includes
840 either instructions for offline processing (e.g., finishing), or a message for the job recipient.
841
842   **3.9.1   job-sheet-message-supported (integer(0:1023))**
843
844   The "job-sheet-message-supported" Printer attribute indicates the maximum length that the Printer
845   is able to accept for the "job-sheet-message" Job Template attribute without truncation. A
846   conforming Printer MUST be able to accept 1023 octets without truncation. However, an IPP
847   Printer MAY be implemented as a gateway to another print system that cannot accept the full 1023
848   octet range, in which case the value will be truncated to the maximum length specified by the "job-
849   sheet-message-supported" attribute.
850
851

852 ## 3.10 media-col (collection) - augments IPP/1.1 "media"
853
854 This attribute augments the "media" Job Template attribute (defined in [ipp-mod] section 4.2.11). This
855 collection attribute enables a client end user to submit a list of media characteristics to the Printer as a way
856 to more completely specify the media for the Printer to be used. Each member attribute of the collection
857 identifies a media characteristic. A Printer MAY support the "media" attribute without supporting the
858 "media-col" attribute. However, if a Printer supports the "media-col" attribute, it MUST also support the
859 "media" attribute.
860
861 Each value of the "media" (type3 keyword | name) attribute uniquely identifies an instance of media. Each
862 combination of values of the "media-col" collection attribute also uniquely identify an instance of media.
863 Depending on implementation and site policy, not all media instances need have media names. Such media
864 instances that do not have media names associated with them are accessible using the "media-col" attribute
865 only. In other words, when a media data base is created by an implementation and/or an administrator, each
866 media name is associated with a media instance, but each media instance NEED NOT have a media name
867 associated with it. Thus the standard name 'iso-a4-white' is associated with a particular instance of media,
868 say, a 20 pound, 210 mm x 297 mm size, and white color media instance. If there are other media instances
869 of the same size and color, but differ in some other characteristic, such as weight, then they MUST each
870 have different names or not have a name at all. A Printer MUST NOT have two instances of media that
871 have all of the same characteristics. The "media-description" member attribute (see section 3.10.1) MUST
872 be used to distinguish two or more media instances that would otherwise have the same characteristics.

873
874 When associating standard media keywords with media instances to be used with the "media" attribute, the
875 implementation and/or the administrator SHOULD associate them with media instances whose
876 characteristics are what users would normally expect. For example, the 'iso-a4-white' keyword SHOULD
877 be associated with a media instance that is A4 in size, 20 pound or 24 pound in weight, white in color, with
878 an opaque opacity, no holes, no tabs, etc.
879
880 The standard media keywords that identify media sizes, such as 'iso-a4' and 'na-letter', are associated with
881 any media in an input tray that is configured for that media size. Thus specifying media size keywords with
882 the "media" attribute does not guarantee reproducible results from one job submission to another, since
883 different media of the same size may be present from one time to the next. If none of the input trays are
884 configured for that size, the association with a media instance is implementation dependent.
885
886 The client MUST NOT supply both the "media" and the "media-col" Job Template attributes in a Job
887 Creation request. If the client supplies such a mal-formed request by supplying both, the Printer MUST
888 (depending on implementation) either (1) reject the request and return the 'client-error-bad-request' status
889 code (see [ipp-mod] section 13.1.4.1) or (2) use either the "media" or the "media-col" attribute, independent
890 of the value of the "ipp-attribute-fidelity" attribute supplied by the client.
891
892 A number of collection Job Template attributes defined in this document have both the "media" and
893 "media-col" member attributes. The same rule against supplying both in a request holds for these collection
894 attributes. Those Job Template attributes whose sole purpose is to specify the media are defined so that the
895 Printer MUST use the requested media, while those that have additional purposes as well are defined so
896 that the Printer SHOULD use the requested media.
897
898 Table 7 lists the member attributes of the "media-col" collection attribute:
899
900   **Table 7 - "media-col" member attributes**

Attribute name	attribute syntax	request	Printer Support
media-description	type3 keyword | name(MAX)	MAY	MAY
media-color	type3 keyword | name(MAX)	MAY	MAY
media-opacity	type3 keyword	MAY	MAY
media-pre-printed	type3 keyword | name	MAY	MAY
media-tabs	type3 keyword	MAY	MAY
media-hole-count	integer(0:MAX)	MAY	MAY
media-order-count	integer(1:MAX)	MAY	MAY
media-label-type	type3 keyword | name(MAX)	MAY	MAY
media-size	collection	MAY	MUST
media-weight-metric	integer(0:MAX)	MAY	MAY
media-weight-english	integer(0:MAX)	MAY	MAY
media-back-coating	type3 keyword | name(MAX)	MAY	MAY
media-front-coating	type3 keyword | name(MAX)	MAY	MAY

| media-recycled | type3 keyword \| name(MAX) | MAY | MAY |

901
902 When media is specified by characteristic using the 'collection' attribute syntax, the printer object MUST
903 match the requested media exactly. The "media-col" collection member attributes definitions are:
904
905

906 **3.10.1 media-description (type3 keyword | name(MAX))**
907
908 The "media-description" member attribute is used to specify a media description. The "media-
909 description" member attribute is treated as just another characteristic of the media that the printer
910 must match to select the correct media. Furthermore, more than one medium instance can have the
911 same 'keyword' or 'name' value. As with any 'keyword | name' value, the client SHOULD localize
912 the 'keyword' value, but not the 'name' value.
913
914 The value of the "media-description" member attribute can be any of the keyword or name values
915 defined for the "media" Job Template attribute (see [ipp-mod] section 4.2.11 and section 6.3 in this
916 document) or any other name value defined by the implementation or administrator that is a
917 description. But, unlike the "media" attribute 'keyword' values, the 'keyword' value of the "media-
918 description" member attribute MUST have no specific semantic meaning to the Printer. For
919 example, if the keyword value is one of the input tray keywords, the Printer MUST NOT use that
920 value to pull the media from that tray. If the client wants to select the media in a particular tray, no
921 matter what it is, then the client MUST supply that tray keyword name, say, 'top', in the "media" Job
922 Template attribute, instead of using the "media-description" member attribute. Similarly, if the text
923 string happens to be the same as one of the media size names, the Printer MUST NOT use that value
924 to select a media of that size. When supplying the "media-col" attribute, the client MUST use the
925 "media-size" member attribute to specify the size. If the client wants to select the media of a
926 particular size, no matter what it is, then the client MUST supply that size keyword name, say 'iso-
927 a4', in the "media" Job Template attribute, instead of using the "media-description" member
928 attribute.
929
930 For example, suppose that a Printer supports two A4 media that are identical, except that one has
931 three punched holes and the other does not. If the "media-hole-count" member attribute (see section
932 3.10.6) is supported, then one will have the value, say, '3' and the other '0'. In such a case, the
933 "media-description" attribute is not needed to distinguish between the two media instances.
934 However, if the "media-hole-count" member attribute is not supported, the "media-description"
935 MUST have different values for the two media, say, 'punched' and 'un-punched' (or a zero length
936 'name' string), respectively. The "media-description" member attribute could contain any additional
937 information, such as the size, weight, color, etc. However, the client cannot localize any 'name'
938 values (only pre-defined standard 'keyword' values) to the locale of the user. In order to allow the
939 users to access these two media instances most simply using the "media" attribute, they SHOULD
940 each have names associated with them, such as the 'iso-a4-punched' name (defined by the
941 administrator) and the 'iso-a4-white' keyword (defined in IPP/1.1 - see [ipp-mod] Appendix C).
942
943 As another example of the use of the "media-description" member attribute to distinguish two media
944 instances that otherwise would have identical characteristics, there are a number of IPP/1.1 media

945   keywords that a user would expect to have the same characteristics. For example, 'na-letter' and 'a'
946   are both 8.5 by 11 inches. If they would be associated with media instances that have the same
947   characteristics, the administrator MUST put two different values in their "media-description"
948   member attributes, say, 'na-letter' and 'a'.
949
950   The "media-description-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute
951   identifies the values of this "media-description" member attribute that the Printer supports, i.e., the
952   descriptions supported.
953
954   **3.10.2 media-color (type3 keyword | name(MAX))**
955
956   The "media-color" attribute indicates the desired color of the media being specified.
957
958   Standard keyword values for "media-color" are:
959

'clear'	The specified media should have no color.
'white'	The specified media should be white.
'pink'	The specified media should be pink.
'yellow'	The specified media should be yellow.
'blue'	The specified media should be blue.
'green'	The specified media should be green.
'buff'	The specified media should be buff.
'goldenrod'	The specified media should be goldenrod.
'red'	The specified media should be red.
'gray'	The specified media should be gray.
'ivory'	The specified media should be ivory.
'orange'	The specified media should be orange.

960
961   Note: The standard keyword values for the "media-color" attribute are derived primarily from the
962   Printer MIB [RFC1759] prtInputMediaColor standard values with the addition of 'blue', 'red', 'gray',
963   'ivory', 'orange', and 'clear' (instead of 'transparent' - see section 3.10.3).
964
965   Custom paper colors can be specified using the 'name' (MAX) attribute syntax of the color attribute.
966
967   The "media-color-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute identifies the
968   values of this "media-color" member attribute that the Printer supports, i.e., the colors supported.
969
970   **3.10.3 media-opacity (type3 keyword)**
971
972   The "media-opacity" attribute indicates the desired opaqueness of the media being specified.
973
974   Standard keyword values for "opacity" are:
975

| 'opaque' | The specified media should be opaque. |

'transparent'	The specified media should be transparent.

976

977   The "media-opacity-supported" (1setOf type3 keyword) Printer attribute identifies the values of this
978   "media-opacity" member attribute that the Printer supports, i.e., the opacities supported.

979

980   **3.10.4 media-pre-printed (type3 keyword | name(MAX))**

981

982   The "media-pre-printed" attribute indicates that the pre-printed characteristics of the desired media.
983   Examples of pre-printed media include forms and company letterhead. If the value is 'blank', the
984   Printer MAY use an electronic representation of a form, if the medium has some imaged
985   information already associated with it. The standard keyword values for "media-pre-printed" are:

986

'blank'	The desired medium is not pre-printed.
'pre-printed'	The desired medium is pre-printed; the other attributes identify which medium instance and so what is actually pre-printed.
letter-head'	The site-defined letter head pre-printed is desired.

987

988   The "media-pre-printed-supported" (1setOf (type3 keyword | name(MAX)) Printer attribute
989   identifies the values of this "media-pre-printed" member attribute that the Printer supports.

990

991   **3.10.5 media-tabs (type3 keyword)**

992

993   The "media-tabs" member attribute indicates that the desired media should have tabs.

994

995   Standard keyword values for "media-tabs" are:

996

'none'	There are no tabs on the desired media
'pre-cut'	The desired media has tabs, each of which extends only partially along a given edge.
'full-cut'	The desired media has tabs which extend along the entire length of a given edge.

997

998   The "media-tabs" member attribute does not imply that media is ordered in any way. Ordered media
999   is specified only using the "media-order-count" member attribute (see section 3.10.7). If the tabbed
1000   media is ordered, then the order MUST be indicated using the "media-order-count" member
1001   attribute.

1002

1003   The "media-tabs-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute identifies the
1004   values of this "media-tabs" member attribute that the Printer supports, i.e., the tabs supported.

1005

1006   **3.10.6 media-hole-count (integer(0:MAX))**

1007

1008   The "media-hole-count" attribute indicates the number of pre-drilled holes in the desired media. A
1009   value of 0 (zero) indicates that no holes should be present in the media.

1010
1011   The "media-hole-count-supported" (1setOf rangeOfInteger(0:MAX)) Printer attribute identifies the
1012   ranges of values of this "media-hold-count" member attribute that the Printer supports.
1013
1014   **3.10.7 media-order-count (integer(1:MAX))**
1015
1016   The "media-order-count" attribute indicates the number of sheets, within an ordered sequence of
1017   sheets; after which the sequence begins to repeat. For example, third cut tab stock has an order
1018   count of 3 (this is also sometimes called the modulus of the ordered media).
1019
1020   If the "media-order-count" is 1, then the media is not ordered.
1021
1022   The "media-order-count-supported" (rangeOfInteger(1:MAX)) Printer attribute identifies the range
1023   of values of this "media-order-count" member attribute that the Printer supports.
1024
1025   **3.10.8 media-label-type (type3 keyword | name(MAX))**
1026
1027   The "media-label-type" member attribute identifies the label characteristics of the media. The
1028   standard keyword values are:
1029

'none'	The media MUST NOT be labeled stock.
'standard'	The media MUST be the site-defined standard labeled stock.

1030
1031   If this member attribute is supported, the Printer MUST support at least the 'none' and 'standard'
1032   values.
1033
1034   The "media-label-type-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute
1035   identifies the values of this "media-label-type" member attribute that the Printer supports, i.e., the
1036   label characteristics supported, which MUST include the 'none' keyword value so that validation
1037   follows the normal rules.
1038
1039   **3.10.9 media-size (collection)**
1040
1041   The "media-size" member attribute is a collection that explicitly specifies the numerical media
1042   width and height dimensions.
1043
1044   It is RECOMMENDED that a client localize the collection values to the size names that users are
1045   familiar with, such as 'letter' and 'A4', possibly also including the exact dimensions as well (and in
1046   the units appropriate for the user's locale). If a client does not recognize a pair of numbers as a
1047   named size, it can simply display the two numbers instead. Thus the pair of size dimensions serve
1048   the same function as keyword values, except that the client has an obvious fallback display for an
1049   unrecognized pair, namely, the actual dimension numbers.
1050   The "media-size" collection member attributes are:
1051

1052   **Table 8 - "media-size" member attributes**

Attribute name	attribute syntax	request	Printer Support
x-dimension	integer (0:MAX)	MUST	MUST
y-dimension	integer (0:MAX)	MUST	MUST

1053
1054

1055   3.10.9.1 x-dimension (integer(0:MAX))

1056

1057   Indicates the size of the media in hundredths of a millimeter along the bottom edge of the
1058   media. See section 2.3 regarding the coordinate system. This unit is equivalent to 1/2540 th
1059   of an inch resolution.

1060

1061   3.10.9.2 y-dimension (integer(0:MAX))

1062

1063   Indicates the size of the media in hundredths of a millimeter along the left edge of the media.
1064   See section 2.3 regarding the coordinate system. This is equivalent to 1/2540 th of an inch
1065   resolution.

1066

1067   3.10.9.3 media-size-supported (1setOf collection)

1068

1069   Indicates the sizes supported by the Printer. A requested media size dimension matches a
1070   supported media dimension if it is within an implementation-defined tolerance. For
1071   example, PostScript [redbook] specifies a tolerance of 5 points (5/72 of an inch = 1.7 mm) of
1072   a supported dimension, i.e., within 176 units of the value of the dimension.

1073

1074   The "media-size-supported " collection member attributes are:

1075

1076   **Table 9 - "media-size-supported" member attributes**

Attribute name	attribute syntax	request	Printer Support
x-dimension	integer (0:MAX) | rangeOfInteger (0:MAX)	MUST	MUST
y-dimension	integer (0:MAX) | rangeOfInteger (0:MAX)	MUST	MUST

1077
1078
1079   **3.10.9.3.1 x-dimension (integer(0:MAX) | rangeOfInteger(0:MAX))**

1080

1081   Indicates the size of the media in hundredths of a millimeter along the bottom edge
1082   of the media. The rangeOfInteger attribute syntax accommodated variable size
1083   implementations, including web printers. See section 2.3 regarding the coordinate
1084   system. This is equivalent to 1/2540 th of an inch resolution.

1085

1086   **3.10.9.3.2 y-dimension (integer(0:MAX) | rangeOfInteger(0:MAX))**
1087
1088   Indicates the size of the media in hundredths of a millimeter along the left edge of the
1089   media. The rangeOfInteger attribute syntax accommodated variable size
1090   implementations, including web printers. See section 2.3 regarding the coordinate
1091   system. This is equivalent to 1/2540 th of an inch resolution.
1092
1093
1094   **3.10.10   media-weight-metric (integer(0:MAX))**
1095
1096   The "media-weight" member attribute indicates the weight of the desired media rounded to the
1097   nearest whole number of grams per square meter. The "media-weight-supported" (1setOf
1098   integer(MAX)) Printer attribute identifies the values of this "media-weight" member attribute that
1099   the Printer supports, i.e., the weights supported in metric units.
1100
1101   **3.10.11   media-weight-english (integer(0:MAX))**
1102
1103   The "media-weight-english" member attribute indicates the weight of the desired media rounded to
1104   the nearest whole number of pounds.
1105
1106   If a Printer supports the "media-weight-english" member attribute, it MUST also support the
1107   "media-weight-metric" member attribute (but vice-versa is OPTIONAL). If the Printer supports
1108   both weight member attributes, the values SHOULD be available in both units for each medium.
1109   Then users can request media with either units.
1110
1111   Note: The use of pounds is actually pounds per ream. However, the size of a ream depends on the
1112   type of media. For example:

Bond paper	20 lb = 75 g/m**2	1 lb = 3.750 g/m**2
Index Bristol	90 lb = 163 g/m**2	1 lb = 1.811 g/m**2
tab stock		
Cover stock	65 lb = 176 g/m**2	1 lb = 2.708 g/m**2
Rank paper	55 lb = 80 g/m**2	1 lb = 1.455 g/m**2
Newsprint		1 lb = 1.627 g/m**2

1113   .
1114
1115   Note: Even for bond paper, the conversion between the two units of measure is approximate in
1116   order to give integer values in both system of units.
1117
1118   The "media-weight-english-supported" (1setOf integer(0:MAX)) Printer attribute identifies the
1119   values of this "media-weight-english" member attribute that the Printer supports, i.e., the weights
1120   supported in English units.
1121
1122   **3.10.12   media-front-coating (type3 keyword | name(MAX)) and media-back-coating**
1123   **(type3 keyword | name(MAX))**
1124

1125   The "media-front-coating" and "media-back-coating" member attributes indicate what pre-process
1126   coating has been applied to the front and back of the desired media, respectively.
1127
1128   Standard keyword values for "media-front-coating" and "media-back-coating" are:
1129

'none'	Indicated that the media MUST not have any coating.
'any'	Indicates that the media MUST be coated, but the specific coating type is not important.
'glossy'	Indicates that the media MUST have a "glossy" coating.
'high-gloss'	Indicates that the media MUST have a "high-gloss" coating.
'semi-gloss'	Indicates that the media MUST have a "semi-gloss" coating.
'satin'	Indicates that the media MUST have a "satin" coating.
'matte'	Indicates that the media MUST have a "matte" coating.

1130
1131   The "media-front-coating-supported" (1setOf (type3 keyword | name(MAX))) and "media-back-
1132   coating-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute identifies the values of
1133   these "media-front-coating" and "media-back-coating" member attributes that the Printer supports.
1134
1135   **3.10.13   media-recycled (type3 keyword | name(MAX))**
1136
1137   The "media-recycled" member attribute indicates the recycled characteristics of the media. The
1138   standard keyword values are:
1139

'none'	The media MUST NOT be recycled.
'standard'	The media MUST be the site-defined standard recycled stock.

1140
1141   If this member attribute is supported, the Printer MUST support at least the 'none' and 'standard'
1142   values.
1143
1144   The "media-recycled-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute identifies
1145   the values of this "media-recycled" member attribute that the Printer supports, i.e., the recycled
1146   characteristics supported, which MUST include the 'none' keyword value so that validation follows
1147   the normal rules.
1148
1149   **3.10.14   media-default (type3 keyword | name(MAX)) or media-col-default (collection)**
1150
1151   The "media-default" (see [ipp-mod] section 4.2.11) or the "media-col-default" Printer attribute
1152   specifies the media that the Printer uses, if the client omits both the "media" and the "media-col" Job
1153   Template attributes in the Job Creation operation (and the PDL doesn't include a media
1154   specification). The member attributes are defined in Table 7. A Printer MUST support the same
1155   member attributes for this default collection attribute as it supports for the corresponding "media-
1156   col" Job Template attribute.
1157
1158   The "media-default" and "media-col-default" Printer attributes MUST both be configured to specify

1159   the same media instance. If the administrator sets one of them to a value (either locally or with the
1160   Set-Printer-Attributes operation - see [ipp-set]), the Printer MUST set the other attribute's value to
1161   specify the same media instance or to the 'unknown' out-of-band value, if there isn't a corresponding
1162   value to be set for the other attribute. If a client attempts to set both attributes, but their values
1163   specify different media instances, the Printer MUST reject the Set-Printer-Attributes operation and
1164   return the 'client-error-conflicting-attributes' status code. The reason to have both default attributes
1165   configured, is so that clients that only know about the "media" attribute will see the "media-default"
1166   attribute, while clients that know about the "media-col" attribute will be able to determine the
1167   characteristics of the media default.

1168
1169   **3.10.15   media-ready (1setOf (type3 keyword | name(MAX))) and media-col-ready**
1170   **(1setOf collection)**
1171
1172   The "media-ready" (see [ipp-mod] section 4.2.11) and "media-col-ready" Printer attribute identifies
1173   the media that are available for use without human intervention, i.e., the media that are ready to be
1174   used without human intervention. The collection value MUST have all of the member attributes
1175   that are supported in Table 7. If this attribute is supported, the Printer MUST support the IPP/1.1
1176   "media-ready" (1setOf (type3 keyword | name(MAX))) Printer attribute also. The i th value of the
1177   "media-ready" corresponds to the i th value of the "media-col-ready" attribute, so that the client can
1178   correlate the media name or keywords with the collection values, i.e., determine the characteristics
1179   of each ready media instance.

1180
1181   **3.10.16   media-col-supported (1setOf type2 keyword)**
1182
1183   The "media-col-supported" Printer attribute identifies the keyword names of the member attributes
1184   supported in the "media-col" collection Job Template attribute, i.e., the keyword names of the
1185   member attributes in Table 7 that the Printer supports.

1186
1187
1188   # 3.11 page-delivery (type2 keyword)
1189
1190   This attribute indicates whether print-stream pages of the job are to be delivered to the output bin or finisher
1191   in the same page order as the original document, or, in reverse of that order, and, whether the print-stream
1192   pages are delivered face up or face down. The "page-delivery" attribute specifies the intent based on the
1193   "original document" page order. See section 2.4 for a complete discussion on the ordering of print-stream
1194   pages.

1195
1196   Standard keyword values for page delivery are:
1197

'same-order-face-up'	The media sheets that represent the printed document MUST be delivered to the output bin or finishing device in the same order as defined by the "page-order-received" attribute. Further, side one of each sheet MUST be delivered face up to the output bin or finishing device.

'same-order-face-down'	The media sheets that represent the printed document MUST be delivered to the output bin or finishing device in the same order as defined by the "page-order-received" attribute. Further, side one of each sheet MUST be delivered face down to the output bin or finishing device.
'reverse-order-face-up'	The media sheets that represent the printed document MUST be delivered to the output bin or finishing device in the reverse order by the "page-order-received" attribute. Further, side one of each sheet MUST be delivered face up to the output bin or finishing device.
'reverse-order-face-down'	The media sheets that represent the printed document MUST be delivered to the output bin or finishing device in the reverse order by the "page-order-received" attribute. Further, side one of each sheet MUST be delivered face down to the output bin or finishing device.
'system-specified'	The Printer selects the most efficient delivery order based on other Job Template attributes supplied by the client, such as "finishings" and "page-order-received".

1198
1199 The "page-delivery" attribute is often used in conjunction with on-line and off-line finishing devices. The
1200 intent is to be able to deliver the media sheets in either the order of the page-stream pages as defined in the
1201 "original document" or in the reverse of that order.
1202
1203   **3.11.1 Interaction with the "page-order-received" attribute**
1204
1205   The "page-order-delivery" attribute is dependent on the value of the "page-order-received" attribute
1206   (defined in section 3.12 below):
1207

"page-order-received"	"page-delivery"	Description of behavior
'1-to-n-order'	'same-order-face-up'	The first print-stream page in the "document data" MUST be the first print-stream page delivered, followed by the second "print-stream" page, and so on. Further, each media sheet MUST be delivered with side one of the sheet facing up.
'1-to-n-order'	'same-face-order-down'	The first print-stream page in the "document data" MUST be the first print-stream page delivered, followed by the second "print-stream" page, and so on. Further, each media sheet MUST be delivered with side one of the sheet facing down.
'1-to-n-order'	'reverse-order-face-up'	The last print-stream page in the "document data" MUST be the first print-stream page delivered, followed by the second to last "print-stream" page, and so on. Further, each media sheet MUST be delivered with side one of the sheet facing up.

'1-to-n-order'	'reverse-order-face-down'	The last print-stream page in the "document data" MUST be the first print-stream page delivered, followed by the second to last "print-stream" page, and so on. Further, each media sheet MUST be delivered with side one of the sheet facing down.
'n-to-1-order'	'same-order-face-up'	The first print-stream page in the "document data" MUST be the first print-stream page delivered, followed by the second "print-stream" page, and so on. Further, each media sheet MUST be delivered with side one of the sheet facing up.
'n-to-1-order'	'same-order-face-down'	The first print-stream page in the "document data" MUST be the first print-stream page delivered, followed by the second "print-stream" page, and so on. Further, each media sheet MUST be delivered with side one of the sheet facing down.
'n-to-1-order'	'reverse-order-face-up'	The last print-stream page in the "document data" MUST be the first print-stream page delivered, followed by the second to last "print-stream" page, and so on. Further, each media sheet MUST be delivered with side one of the sheet facing up.
'n-to-1-order'	'reverse-order-face-down'	The last print-stream page in the "document data" MUST be the first print-stream page delivered, followed by the second to last "print-stream" page, and so on. Further, each media sheet MUST be delivered with side one of the sheet facing down.

1208
1209

3.12 page-order-received (type2 keyword)

1211

This attribute specifies the page order of the print-stream pages defined in the document data. The "page-order-received" attribute does not provide any direct processing instructions, it only provides information about the page order so that the client can specify ordinal page numbers with respect to the original source document, rather than having to take into account whether the print stream pages are being sent "one to N" or "N to one". For example, consider such Job Template attributes as "insert-sheet" (section 3.2) and "page-exceptions" (see [ipp-except]). See section 2.4 for a complete discussion of print-stream page order.

1218

Standard keyword values for "page-order-received" are:

1220

'1-to-n-order'	The print-stream pages defined in the document data are in the same order as the original document.
'n-to-1-order'	The print-stream pages defined in the document data are in the reverse order of the original document.

1221

The "page-order-received" attribute applies to all documents in a Job Creation or Document Creation request. If a job consists of multiple documents, and all of the documents are not in the same page order, either '1-to-n-order' or 'reverse,' then inconsistent processing of other Job Template attributes that depend on "page-order-received" may occur.

1226
1227   If the "page-order-received" attribute is not present in a Job Creation or Document Creation request, then
1228   the printer SHOULD assume a value of '1-to-n-order.'

1229
1230

1231   **3.13 separator-sheets (collection)**

1232

1233   This attribute specifies which separator sheets MUST be printed with the job. Separator sheets are used to
1234   separate individual copies of a multiple copy job (i.e., when the "copies" attribute is greater than 1). The
1235   "separator-sheets" attribute is dependent both on the value of "multiple-document-handling" and on the
1236   value of "sheet-collate" (see [ipp-prog]). See sections 2.2 and 3.13.1 for a detailed description and
1237   examples of what constitutes a "set."

1238
1239   Separator sheets may either be non-imaged sheets, or may contain Printer generated information.

1240
1241   The 'collection' attribute syntax allows a client to specify media for job separator sheets that is different than
1242   the current media being used for the print-stream page impressions. The collection consists of:

1243

1244   **Table 10 - "separator-sheets" member attributes**

Attribute name	attribute syntax	request	Printer Support
separator-sheets-type	type3 keyword | name(MAX)	MUST	MUST
media	type3 keyword | name(MAX)	MAY be neither or one of, but NOT both	MUST
media-col	collection		MAY

1245
1246

1247   **3.13.1 separator-sheet-type (type3 keyword | name(MAX))**

1248

1249   The "separator-sheets-type" member attribute specifies which separator sheets type the Printer
1250   MUST use for the separator sheets. Standard keyword values are:

1251

'none'	No separator sheets are to be delivered with the printed output.
'slip-sheets'	A separator sheet MUST be printed between "sets" of the job.
'start-sheet'	A separator sheet MUST be printed to indicate the start of each "set" of the job.
'end-sheet'	A separator sheet MUST be printed to indicate the end of each "set" of the job.
'wrap-sheets'	Separator sheets MUST be printed to indicate both the start and end of each "set" of the job.

1252

1253   Example: A job is created consisting of a single document, with the job template attribute "copies"
1254   equal to '10' and "separator-sheets-type" equal to 'slip-sheets'. If each of the 10 "sets" is denoted by
1255   (J1), (J2) ... (J10), and a separator sheet is denoted by S, then the delivered output would be: (J1) S
1256   (J2) S ... S (J9) S (J10).

1257
1258   The "separator-sheets-type-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute
1259   identifies the values of this "separator-sheet-type" member attribute that the Printer supports, i.e.,
1260   the type names of the separator sheets.
1261
1262   **3.13.2 media (type3 keyword | name(MAX)) or media-col (collection)**
1263
1264   Either the "media" (defined in [ipp-mod] section 4.2.11) or the "media-col" member attribute is used
1265   to indicate the media that the Printer MUST use for the job separator sheet. The member attributes
1266   are the same as those for the "media-col" attribute shown in Table 7.
1267
1268   If the client omits both the "media" and the "media-col" member attributes, then the implementation
1269   selects a media instance (by means outside the scope of this document) that is appropriate for
1270   separator sheets. The client MUST NOT supply both the "media" and the "media-col" member
1271   attribute. If client supplies such a mal-formed request by supplying both, the Printer MUST
1272   (depending on implementation) either (1) reject the request and return the 'client-error-bad-request'
1273   status code (see [ipp-mod] section 13.1.4.1) or (2) use either the "media" or the "media-col" member
1274   attribute, independent of the value of the "ipp-attribute-fidelity" attribute supplied by the client.
1275
1276   Since this "media" member attribute has the same name as the "media" Job Template attribute
1277   defined in [ipp-mod] section 4.2.11), the "media-supported" (1setOf (type3 keyword | name(MAX)))
1278   Printer attribute (also defined in [ipp-mod] section 4.2.11) identifies the values of this "media"
1279   member attribute (as well as the values of the "media" Job Template attribute) that the Printer
1280   supports, i.e., the names of the supported media.
1281
1282   Since this "media-col" member attribute has the same name as the "media-col" Job Template
1283   attribute defined in section 3.10), the "media-col-supported" Printer attribute (defined in section
1284   3.10.16) identifies the keyword names of the member attributes supported in this "media-col"
1285   member attribute (as well as the keyword names of the "media-col" Job Template attribute), i.e., the
1286   names of the member attributes in Table 7 that the Printer supports.
1287
1288
1289   **3.13.3 separator-sheets-default (collection)**
1290
1291   The "separator-sheets-default" Printer attributes specify the separator sheets that the Printer MUST
1292   provide, if any, if the client omits the "separator-sheets" Job Template attribute. The member
1293   attributes are defined in Table 10. A Printer MUST support the same member attributes for this
1294   default collection attribute as it supports for the corresponding "separator-sheets" Job Template
1295   attribute.
1296
1297   **3.13.4 separator-sheets-supported (1setOf type2 keyword)**
1298
1299   The "separator-sheets-supported" attribute identifies the keyword names of the member attributes
1300   supported in the "separator-sheets" collection Job Template attribute, i.e., the names of the member
1301   attributes in Table 10 that the Printer supports.

1302
1303 3.14 Impression Image Shifting Attributes
1304
1305 The attributes defined in this sub-section shift the impression images as specified in the attribute definition.
1306 The Printer MUST apply this shifting to the resulting impression after creating a single impression from a
1307 number of page images as specified by either (1) the "number-up" attribute (see [ipp-mod] sections 4.2.9
1308 and 15.3) or any other attribute that specifies imposition. In other words, these attributes affect the
1309 impression, not individual page images.
1310
1311 3.14.1 x-image-auto-center (boolean)
1312
1313 This attribute causes the impression to be centered along the x-axis on the media to which it is applied.
1314
1315 If the "x-image-shift," "x-side1-image-shift" or "x-side2-image-shift" attributes are specified, then the
1316 printer MUST apply the "x-image-auto-center" attribute first, followed by the "x-image-shift" attribute, and
1317 finally the "x-side1-image-shift" and "x-side2-image-shift" attributes.
1318
1319 For example, if the print-stream image normally is placed on the media sheet as follows:
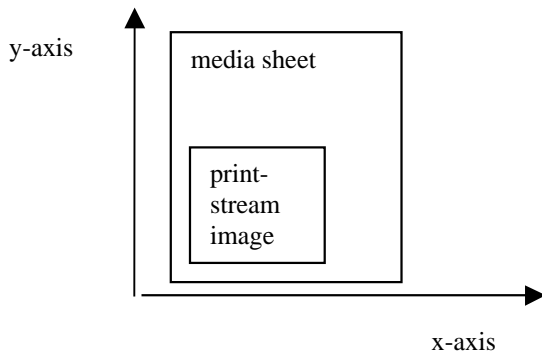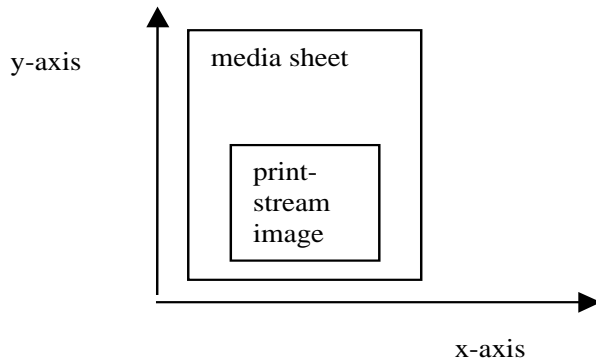

1320
1321
1322 with "x-image-auto-center" = 'true' (1), the result would be:
1323

1324
1325
1326 3.14.2 x-image-shift (integer(MIN:MAX))
1327

1328   This attribute causes the impression on both sides of each sheet, to be shifted in position with respect to the
1329   media on which the impression is to be rendered. The direction of shift MUST be along the x-axis of the
1330   Coordinate System (see section 2.3) with respect to the medium. The sign of the value indicates the
1331   direction of the shift.
1332
1333   If the client supplies the "x-image-auto-center," "x-side1-image-shift" or "x-side2-image-shift" attributes,
1334   then the Printer MUST apply the "x-image-auto-center" attribute first, followed by the "x-image-shift"
1335   attribute, and finally the "x-side1-image-shift" and "x-side2-image-shift" attributes.
1336
1337   The unit of measure for this attribute is hundredths of a millimeter. This is equivalent to $1/2540^{th}$ of an inch
1338   resolution.
1339
1340
1341   **3.14.3 x-side1-image-shift (integer(MIN:MAX))**
1342
1343   This attribute causes the impression, on the front of each sheet, to be shifted in position with respect to the
1344   media on which the impression is to be rendered. The direction MUST be along the x-axis of the
1345   Coordinate System (see section 2.3) with respect to the medium. The sign of the value indicates the
1346   direction of the shift.
1347
1348   If the bind edge is along the y-axis, then a bind edge image shift can be accomplished by applying
1349   impression shifts of equal magnitude, and opposite sign, to the "x-side1-image-shift" and "x-side2-image-
1350   shift" attributes, respectively (assuming that the "sides" attribute is 'two-sided-long-edge').
1351
1352   If the client supplies the "x-image-auto-center" or "x-image-shift" attributes, then the Printer MUST apply
1353   the "x-image-auto-center" attribute first, followed by the "x-image-shift" attribute, and finally the "x-side1-
1354   image-shift" and "x-side2-image-shift" attributes.
1355
1356   The unit of measure for this attribute is hundredths of a millimeter. This is equivalent to $1/2540^{th}$ of an inch
1357   resolution.
1358
1359   **3.14.4 x-side2-image-shift (integer(MIN:MAX))**
1360
1361   This attribute causes the impression, on the back of each sheet, to be shifted in position with respect to the
1362   media on which the impression is to be rendered. The direction of shift MUST be along the x-axis of the
1363   Coordinate System (see section 2.3) with respect to the medium. The sign of the value indicates the
1364   direction of the shift.
1365
1366   If the bind edge is along the y-axis, then a bind edge image shift can be accomplished by applying
1367   impression shifts of equal magnitude, and opposite sign, to the "x-side1-image-shift" and "x-side2-image-
1368   shift" attributes, respectively (assuming that the "sides" attribute is 'two-sided-long-edge').
1369
1370   If the client supplies the "x-image-auto-center" or "x-image-shift" attributes, then the Printer MUST apply
1371   the "x-image-auto-center" attribute first, followed by the "x-image-shift" attribute, and finally the "x-side1-
1372   image-shift" and "x-side2-image-shift" attributes.

1373
1374 The unit of measure for this attribute is hundredths of a millimeter. This is equivalent to 1/2540th of an inch
1375 resolution.
1376
1377
1378 **3.14.5 y-image-auto-center (boolean)**
1379
1380 This attribute causes the impression to be centered along the y-axis on the media to which it is applied.
1381
1382 If the client supplies the "y-image-image," "y-side1-image-shift" or "y-side2-image-shift" attributes, then
1383 the Printer MUST apply the "y-image-auto-center" attribute first, followed by the "y-image-shift" attribute,
1384 and finally the "y-side1-image-shift" and "y-side2-image-shift" attributes.
1385
1386
1387 **3.14.6 y-image-shift (integer(MIN:MAX))**
1388
1389 This attribute causes the impression on both sides of each sheet, to be shifted in position with respect to the
1390 media on which the impression is to be rendered. The direction of shift MUST be along the y-axis of the
1391 Coordinate System (see section 2.3) with respect to the medium. The sign of the value indicates the
1392 direction of the shift.
1393
1394 If the client supplies the "y-image-auto-center," "y-side1-image-shift" or "y-side2-image-shift" attributes,
1395 then the Printer MUST apply the "y-image-auto-center" attribute first, followed by the "y-image-shift"
1396 attribute, and finally the "y-side1-image-shift" and "y-side2-image-shift" attributes.
1397
1398 The unit of measure for this attribute is hundredths of a millimeter. This is equivalent to 1/2540th of an inch
1399 resolution.
1400
1401
1402 **3.14.7 y-side1-image-shift (integer(MIN:MAX))**
1403
1404 This attribute causes the impression, on the front of each sheet, to be shifted in position with respect to the
1405 media on which the impression is to be rendered. The direction of shift MUST be along the y-axis of the
1406 Coordinate System (see section 2.3) with respect to the medium. The sign of the value indicates the
1407 direction of the shift.
1408
1409 If the bind edge is along the x-axis, then a bind edge image shift can be accomplished by applying
1410 impression shifts of equal magnitude, and opposite sign, to the "y-side1-image-shift" and "y-side2-image-
1411 shift" attributes, respectively (assuming that the "sides" attribute is 'two-sided-short-edge').
1412
1413 If the client supplies the "y-image-auto-center" or "y-image-shift" attributes, then the Printer MUST apply
1414 the "y-image-auto-center" attribute first, followed by the "y-image-shift" attribute, and finally the "y-side1-
1415 image-shift" and "y-side2-image-shift" attributes.
1416
1417 The unit of measure for this attribute is hundredths of a millimeter. This is equivalent to 1/2540th of an inch

1418   resolution.
1419
1420
1421   **3.14.8 y-side2-image-shift (integer(MIN:MAX))**
1422
1423   This attribute causes the impression, on the back of each sheet, to be shifted in position with respect to the
1424   media on which the impression is to be rendered. The direction of shift MUST be along the y-axis of the
1425   reference coordinate system with respect to the medium. The sign of the value indicates the direction of the
1426   shift.
1427
1428   If the bind edge is along the x-axis, then bind edge image shift can be accomplished by applying impression
1429   shifts of equal magnitude, and opposite sign, to the "y-side1-image-shift" and "y-side2-image-shift"
1430   attributes, respectively (assuming that the "sides" attribute is 'two-sided-short-edge').
1431
1432   If the client supplies the "y-image-auto-center" or "y-image-shift" attributes, then the Printer MUST apply
1433   the "y-image-auto-center" attribute first, followed by the "y-image-shift" attribute, and finally the "y-side1-
1434   image-shift" and "y-side2-image-shift" attributes.
1435
1436   The unit of measure for this attribute is hundredths of a millimeter. This is equivalent to $1/2540^{th}$ of an inch
1437   resolution.
1438
1439   ## 3.15 Usage in Document-Exceptions and Page-Exceptions
1440
1441   Most of the Job Template attributes defined in this document are defined for use in the "document-
1442   exceptions" (collection) and/or "page-exceptions" (collection) Job Template attributes (see [ipp-except]).
1443   According to that document, any Job Template attribute document MUST indicate the syntax and semantics
1444   for applying each Job Template attribute in any Document and/or Page exceptions.
1445
1446   Table 12 augments the definitions of each Job Template attribute defined in this document by indicating
1447   with which parts of a job, the attribute "associates with" and "affects" (see [ipp-except]). All Job Template
1448   attributes associate with the Job, so that is not indicated in Table 12. A subset of the Job Template
1449   attributes are defined to be used in Document-Exceptions to affect Input-Document and are associated with
1450   Input-Documents only via the "document-exceptions" attribute. Another subset affect Output-Documents
1451   and are associated with either Input-Documents or Output-Document via the "document-exceptions"
1452   attribute. A final subset of Job Template attributes affects Sheets, Pages, or Impressions and are associated
1453   with Pages of an Input-Document or an Output-Document by the "pages-exceptions" attribute or associated
1454   with Input-Document or Output-Document via a "document-exceptions" attribute. See [ipp-except] for the
1455   syntax of the "document-exceptions" (1setOf collection), "page-exceptions" (1setOf collection) and "page-
1456   per-subset" (1setOf integer(1:MAX)) and semantics of association with Document-Exceptions, Page-
1457   Exceptions, Sheets, and Pages. The "pages-per-subset" attribute defines Output-Document to be subsets of
1458   pages within Input-Documents.
1459
1460   Table 11 lists the possible attribute exception semantics for Job Template attributes and shows what clients
1461   can supply in Job Creation operations.

1462   **Table 11 - Job Template Attribute Exception Semantics**

Affects	Associates With	Exception attribute	member attributes
Job	Job	none	
Input-Document	Input-Document	"document-exceptions"	"input-documents"
Output-Document	Output-Document	"document-exceptions"	"output-documents"
		"pages-per-subset"	N/A
	Input-Document	"document-exceptions"	"input-documents"
sheet, impression	Output-Page	"page-exceptions"	"output-documents", "pages"
	Input-Page	"page-exceptions"	"input-documents", "pages"
	Output-Document	"document-exceptions"	"output-documents"
		"pages-per-subset"	N/A
	Input-Document	"document-exceptions"	"input-documents"

1463

1464   A client MUST NOT submit and a Printer MUST NOT support a Job Creation request with "document-
1465   exceptions" (collection), "page-exceptions" (collection), or "pages-per-subset" containing member attributes
1466   not indicated in Table 11 depending on what the Job Template attribute is defined to affect as indicated in
1467   Table 12. If a client submits a Job Creation request with such a member attribute and "ipp-attribute-
1468   fidelity" = 'true', the Printer MUST reject the request and return the 'client-error-bad-request' status code. If
1469   a client submits a Job Creation request with such a member attribute and "ipp-attribute-fidelity" = 'false' or
1470   omitted, the Printer MUST accept the request and return the 'successful-ok-ignored-or-substituted-
1471   attributes' status code, along with the collection and only those member attributes.

1472

1473   **Table 12 - Document and Page Exception Semantics by Attribute**

Section or Attribute	Affects:
3.1 cover-front (collection) and cover-back (collection)	Output-Documents
3.2 insert-sheet (1setOf collection)	Output-Documents
3.3 job-account-id (name (MAX))	Job
3.4 job-accounting-sheets (collection)	Job
3.5 job-error-sheet (collection)	Job
3.6 job-message-to-operator (text(MAX))	Job
3.7 job-recipient-name (name(MAX))	Job
3.8 job-sheets-col (collection) - augments IPP/1.1 "job-sheets"	Job
3.9 job-sheet-message (text(MAX))	Job
3.10 media-col (collection) - augments IPP/1.1 "media"	Sheets
3.11 page-delivery (type2 keyword)	Output-Documents
3.12 page-order-received (type2 keyword)	Input-Documents
3.13 separator-sheets (collection)	Job
3.14.1 x-image-auto-center (boolean) through 3.14.8 y-side2-image-shift (integer(MIN:MAX))	Impressions

1474

4   Job Description Attributes

This section defines Job Description attributes for use with IPP/1.0 [RFC 2566] and IPP/1.1 [ipp-mod].

4.1   current-page-order (type2 keyword)

This attribute represents the current page order of the document data supplied with the job. Initially "current-page-order" is set to the value of the Job Template attribute "page-order-received." The value of "current-page-order" may change based on processing and the value of the "page-order-delivery" attribute. If the Printer changes the value of a Job's "current-page-order" Job Description attribute, then it is assumed that the associated document data has been transformed in some way to reflect this change. It should be noted that the document data that "current-page-order" refers to is not always the document data sent with the create request, but may also refer to the processed images that are to be delivered to the printer. The standard values for this attribute are the same as for of the "page-order-received" attribute (see section 3.12), namely '1-to-n-order' and 'n-to-1-order'.

5   Printer Description Attributes

This section defines Printer Description attributes for use with IPP/1.0 [RFC 2566] and IPP/1.1 [ipp-mod].

5.1   user-defined-names-supported (1setOf type2 keyword)

This Printer attribute identifies the "xxx" Job Template attributes that the Printer will accept user-defined name in a Job Creation request, i.e., a name that a client supplies that is not in the corresponding "xxx-supported" Printer attribute. In effect, the presence of the 'xxx' keyword value in this attribute suspends validation of the "xxx" attribute for any 'name' values supplied by the client. Thus a user can supply a custom name for this "xxx" attribute. If there are no Job Template attributes that will accept any name value, the value of this attribute MUST be the keyword 'none'.

For any "xxx" Job Template attributes identified by this attribute, the Printer suspends validation for values of type 'name' and the job is created containing the user-defined value, even when the client supplied the "ipp-attribute-fidelity" with a 'true' value (which would otherwise, have caused the Printer to reject the request, if the "xxx" value had not been among those of the Printer's "xxx-supported" attribute).

For example, the system administrator could add the 'media' keyword attribute name value to the "user-defined-names-supported" Printer attribute in order to allow the user to supply any media name value for the "media" attribute even if that name wasn't one of the media names in the Printer's "media-supported" attribute.

When the client supplies a 'yyy' value for the "xxx" attribute that is not in the "xxx-supported" Printer attribute , the Printer does not return the "xxx" value in the Unsupported Attributes group in the response. Instead, the Printer stores the requested attribute and value unmodified on the Job object for subsequent queries as with any supported value. Subsequently, a user or operator can query the Job using the Get-Job-

1519 Attributes or Get-Jobs operations to see what user-defined value was requested. Depending on
1520 implementation and/or site policy, the Printer schedules the job following one of the following options:
1521
1522   1. Add the 'resources-are-not-supported' value (see section 6.1) to the Job's "job-state-reasons"
1523   attribute and move the job to the 'pending-held' state until either the operator adds the requested
1524   value to the Printer's "xxx-supported" attribute or the user or operator modifies the job to contain
1525   a value that is in the Printer's "xxx-supported" attribute; then releases the job using the Release-
1526   Job operation (see [ipp-mod] section 3.3.6).
1527
1528   2. Add the 'resources-are-not-supported' value to the Job's "job-state-reasons" attribute but keep the
1529   job in the 'pending' state and start to process the job as if the requested media were ready, but
1530   stop the job ("job-state" = 'processing-stopped') and the Printer ("printer-state" = 'stopped') and
1531   request immediate operator intervention. The operator loads the requested media and continues
1532   the Printer, using the Resume-Printer operation (see [ipp-mod] section 3.2.8).
1533
1534

6   Additional Values for Existing Attributes

1536
1537 This section defines additional values for existing attributes.
1538

6.1   Additional values for the "job-state-reasons" Job attribute

1540
1541 This section defines additional values for the "job-state-reasons" (1setOf type2 keyword) Job Description
1542 attribute (see [ipp-mod] section 4.3.8):
1543
1544 'resources-are-not-supported': At least one of the resources needed by the job, such as media, fonts,
1545   resource objects, etc., is not supported on any of the physical printer's for which the job is a
1546   candidate. This condition MAY be detected when the job is accepted, or subsequently while
1547   the job is pending or processing, depending on implementation. The job may (1) remain in its
1548   current state, (2) be moved to the 'pending-held' state, depending on implementation and/or job
1549   scheduling policy, or (3) scheduled normally, but the Printer is put into the 'stopped' state when
1550   the job is attempted to be processed on the Printer. This value is intended for use with an
1551   implementation that supports the "user-defined-names-supported" Printer attribute (see section
1552   5.1) which allows a job to be accepted with an unsupported 'name' value.

1553

6.2   Additional values for the IPP/1.1 "job-sheets" Job Template Attribute

1555
1556 The following additional values are defined for the IPP/1.1 "job-sheets" Job Template attribute:
1557

job-start-sheet	A job sheet MUST be printed to indicate the start of the job.
job-end-sheet	A job sheet MUST be printed to indicate the end of the job.
job-wrap-sheets	Job sheets MUST be printed to indicate the start and end of all the output associated with the job.

first-print-stream-page	Some users have customized the banner sheets in their environment (Microsoft, Novell, etc.) and prefer them instead of the printer's standard ones. The custom banner sheet is the first page of the PDL. When the client supplies the 'first-print-stream-page' value, the first page in the document data is printed as the job sheet and the printer's standard job sheet is suppressed.

1558
1559

6.3   Additional values for the IPP/1.1 "media" and "media-description" attributes

1561

1562 This section defines additional values for the "media" (type3 keyword | name(MAX)) Job Template
1563 attribute (see [ipp-mod] section 4.2.11), the "media" member attribute defined in this document in a number
1564 of the collection attributes, and the "media-description" member attribute defined in section 3.10.1:

1565

1566 If the Printer implementation supports the use of tray name keywords to identify media, there SHOULD be
1567 one and only one keyword assigned for each input tray on the printer. If multiple keywords for the same
1568 tray exist in "media-supported", the client UI could potentially become very confusing to the user because
1569 the Printer would appear to have more input trays than it actually has. However, see the discussion in the
1570 Printer MIB [RFC1759] about a manual input tray that uses the same input slot as a regular input tray.
1571 Also, if using tray names, it is RECOMMENDED that the printer implementation use the most descriptive
1572 keyword for a logical tray in order to assist the user or operator to recognize the matching physical tray at
1573 the printer. There are three methods to choose the keyword: 1) If the printer trays aren't physically labeled,
1574 the keyword SHOULD best match the physical location of the tray (e.g. 'top', 'bottom'). 2) If the printer
1575 trays are physically labeled, the keyword SHOULD best match the label of the tray (e.g. 'tray-1', tray-2'),   3)
1576 If more than one keyword matches the label of the tray, the keyword SHOULD be used that best
1577 distinguishes the tray from the Printer's other trays.

1578

1579 If a Printer allows the media to be specified by tray name keyword, the Printer implementation MUST NOT
1580 use the 'name(MAX)' attribute syntax to create custom tray names, but rather MUST use the most
1581 appropriate tray name keyword value. This ensures interoperability among clients that submit jobs to
1582 multiple types of printers.

1583

1584 These are additional standard keyword values defined for input-trays.

1585

'bypass-tray'	The specified tray is used for handling odd or special paper. This paper tray usually has a small capacity and is physically located such that the paper travels through a shorter paper path. In some printer implementations, the 'bypass-tray' may also be used to bypass any marking device and be used for insert sheets. See the "insert-sheet" definition in section 3.2.

| 'tray-*N*' | The input tray that is best specified as a tray with values 'tray-1', 'tray-2'…. The correspondence between the 'tray-*N*' keyword and the actual input-tray is implementation dependent, as is the number of input trays. If this group of 'tray-*N*' values is supported, at least the 'tray-1' value MUST be supported. |

1586
1587
1588
1589 These are additional standard keyword values which are used by the implementation for specifying a pre-
1590 defined media size:
1591

'iso-a4-wide'	Specifies the iso A4 cover size: 223 mm x 297 mm
'na-letter-cover'	Specifies the letter cover size: 9 in x 11 in
'jp-reply-postcard'	Specifies the Ofuku-Hagaki postcard size: 148 mm x 200 mm
'na-postcard'	Specifies the North American postcard size: 4.5 in x 6 in
'na-8x10'	Specifies the 8x10 size.
'na-5x7'	Specifies the 5x7 size.
'taiwan-815'	Specifies the 815 Taiwan size: 267 mm x 388 mm
'iso-220x330'	Specifies the 220 mm x 330 mm size

1592
1593

1594 7   Conformance Requirements

1595
1596 This section summarizes the Conformance Requirements detailed in the definitions in this document for
1597 clients and Printer objects (servers or devices).
1598

1599 7.1   Conformance Requirements for Printer objects

1600
1601 In general each of the attributes defined in this document are OPTIONAL for a Printer to support, so that
1602 Printer implementers MAY implement any combination of attributes. Only the following conditional
1603 conformance requirements are defined:
1604

If the Printer supports:	then the Printer MUST also support (but vice-versa is OPTIONAL):
"cover-back"	"cover-front"
"job-sheets-col"	"job-sheets" (see [ipp-mod] section 4.2.3)
"media-col"	"media" (see [ipp-mod] section 4.2.11)
"media-col-ready"	"media-ready (see [ipp-mod] section 4.2.11)
"x-side2-image-shift"	"x-side1-image-shift"
"y-side2-image-shift"	"y-side1-image-shift"
"x-side1-image-shift"	"x-image-shift"

"y-side1-image-shift"	"y-image-shift"

1605
1606   Each of the collection attribute definitions indicate which member attributes are REQUIRED and which are
1607   OPTIONAL for a Printer to support and is not repeated here.
1608
1609   If a Printer supports the 'collection' attribute syntax of a Job Template attribute , then it MUST support the
1610   distinguished none value defined for that collection. See section 2.6.
1611
1612   Support of the 'name' attribute syntax for Job Template attributes and collection member attributes is
1613   OPTIONAL, as in IPP/1.1.
1614
1615
1616   ## 7.2   Conformance Requirements for clients
1617
1618   Clients that support two Job Template attributes that control the same aspect, such as "media" and "media-
1619   col", MUST NOT supply both in a Job Creation request as indicated in the definitions of these attributes.
1620
1621   Clients that support a "xxx" collection Job Template attribute SHOULD use the Get-Printer-Attributes
1622   request to obtain the "xxx-default" collection and display that to the user, so that the user can make any
1623   changes before submitting the Job. Then the client submits values for all member attributes, rather than
1624   depending on the Printer's defaulting for omitted member attributes, since such defaulting is
1625   implementation dependent and will vary from Printer to Printer.
1626
1627   # 8   IANA Considerations
1628
1629   IANA will be called on to register the attributes defined in this document, using the procedures outlined in
1630   [ipp-mod] section 6.
1631
1632
1633   # 9   Internationalization Considerations
1634
1635   The IPP extensions defined in this document require the same internationalization considerations as any of
1636   the Job Template attributes defined in IPP/1.1 [ipp-mod].
1637
1638
1639   # 10 Security Considerations
1640
1641   The IPP extensions defined in this document require the same security considerations as any of the Job
1642   Template attributes defined in IPP/1.1 [ipp-mod].
1643
1644

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13 Appendix A: Change History

This section summarizes the changes to the document. Each sub-section is in reverse chronological order. Adding or removing ISSUES that don't change the document are not listed here.

13.1 Changes to the May 9, 2000 to create the June 5, 2000 version

The following changes were made to the May 9, 2000 version to create the June 5, 2000 version:

1. Added the "cover-type-supported" Printer attribute.

2. REQUIRED (rather than RECOMMENDED) the Printer to make the "job-sheets-default" and "job-sheets-col-default" Printer attributes identify the same job sheet instance or have one of them set to the 'unknown' out-of-band value.

3. REQUIRED (rather than RECOMMENDED) the Printer to make the "media-default" and "media-col-default" Printer attributes identify the same media instance or have one of them set to the 'unknown' out-of-band value.

4. Added the 'system-specified' keyword value to the "page-delivery" Job Template attribute.

13.2 Changes to the April 26, 2000 to create the May 9, 2000 version

The following changes were made to the April 26, 2000 version to create the May 9, 2000 version:

1. Clarified that both the "job-sheets-default" and "job-sheets-col-default" Printer attributes SHOULD both be configured to specify the same job-sheet instance.
2. Changed the "media-description" member attribute back to 'type3 keyword | name(MAX)' from 'text' so that clients can localize the value and the "media-description-supported" back to '1setOf (type3 keyword

1725 | name(MAX) from 'integer(0:255)'.
1726   3. Deleted the "media-weight-type" attribute - don't have two ways to specify the same thing until there is
1727   a way to indicate which one the Printer supports.
1728   4. Replaced the "media-weight" and "media-weight-units" with "media-weight-metric" and "media-
1729   weight-english", so that implementations can support "media-weight-metric" only or both and clients
1730   can request either.
1731   5. Clarified that the "media-size" tolerance is implementation-defined. The 5 points tolerance for
1732   PostScript is given as an example.
1733   6. Removed "-supported" from the "x-dimension" and "y-dimension" member attributes to agree with the
1734   collection specification.
1735   7. Clarified that both the "media-default" and "media-col-default" Printer attributes SHOULD both be
1736   configured to specify the same media instance.
1737   8. Changed "job-separator-sheets" collection attribute so that if the client supplies neither the "media" or
1738   the "media-col" member attributes, the implementation picks some appropriate separator sheet medium,
1739   rather that using the document's media.
1740   9. Added the 'first-print-stream-page' keyword value to the "job-sheets" Job Template attribute.
1741

13.3 Changes to the April 11, 2000 to create the April 26, 2000 version

1743
1744   The following changes were made to the April 11, 2000 version to create the April 26, 2000 version:
1745
1746   1. Added discussion about distinguished none values for all but a few Job Template attributes.
1747   2. Clarified the table and language for collections that have both "media" and "media-col" around the
1748   client sending neither (error for some collection attributes, not for others), one or the other, or both
1749   (error).
1750   3. Removed the use of the 'none' out-of-band value and defined distinguished values for keywords (usually
1751   'none', or 'no-xxx'), strings (zero-length), and integers (usually 0) instead. Existing clients and Printers
1752   might get confused with the (new) 'none' out-of-band value.
1753   4. Broke "job-error-sheet-type" into two member attributes: "job-error-sheet-type" and "job-error-sheet-
1754   when".
1755   5. Removed the "s" from "job-error-sheet".
1756   6. Banned "media-default" and "media-col-default" from both having a value, even if one is the name of
1757   the other. Required the Printer to set the other to 'no-value' out-of-band value.
1758   7. Added "media-label-type" (type3 keyword | name(MAX)), and "media-recycled" (type3 keyword |
1759   name(MAX)) member attributes to "media-col".
1760   8. Changed the "xxx-supported" (boolean) to "xxx-supported" (integer(0:X) so that the maximum length
1761   of the string could be queried by the client.
1762   9. Added 'gray', 'ivory', and 'orange' colors
1763   10. Changed media-pre-printed (boolean) to media-pre-printed (type3 keyword | name(MAX)) and defined
1764   'blank', 'pre-printed', and 'letter-head'.
1765   11. Removed -supported from the member attributes of the "media-col-supported" (1setOf collection).
1766   12. Added 'none' keyword value to media-front-coating (type3 keyword | name(MAX)) and media-back-
1767   coating (type3 keyword | name(MAX))
1768   13. Replaced the 'user-define' and 'user-define-supported' out-of-band values with the "user-defined-names-
1769   supported" Printer attribute. This will help existing clients that query the Printer.

1770   14. Added some "media" keyword values.
1771   15. Enhanced the Conformance Section with client requirements.
1772

13.4 Changes to the February 7, 2000 to create the April 11, 2000 version

1774
1775   The following changes were made to the February 7, 2000 version to create the April 11, 2000 version:
1776
1777   1.   Clarified that the "page-ranges" Job Template attribute does not affect the print-stream page
1778   numbering.
1779   2.   Aligned the collection attribute definitions to agree with the updated Collection [ipp-coll] document:
1780   a) Changed "xxx-supported"(boolean) to "xxx-supported" (1setOf type2 keyword) to return the
1781   keyword names of the member attributes.
1782   b) Removed the 'type3 keyword | name' attribute syntaxes from "xxx" (type3 keyword | name |
1783   collection) attributes and moved those values into a new "xxx-type" member attribute in the
1784   collection for new attributes. For the existing IPP/1.1 "job-sheets" (type3 keyword | name) and
1785   "media" (type3 keyword | name) attributes created new "xxx-col" (collection) companion
1786   attributes.
1787   c) For each collection attribute that had a "media" (type3 keyword | name(MAX) | collection)
1788   member attribute, removed the 'collection' and added a new OPTIONAL "media-col" (collection)
1789   member attribute to carry the media characteristics.
1790   d) Clarified that a client MUST NOT supply both "media" and a "media-col" Job Template attributes
1791   or member attributes. If a Printer receives such a bad request, it MUST either reject it or use one
1792   or the other attributes depending on implementation.
1793   e) Add prefix names to member attributes when they are intended to be unique, such as "cover-" to
1794   "cover-printed-sided" so that the "xxx-supported" would not be ambiguous. Same for "insert-" to
1795   insert-after-page-number" and "insert-count".
1796   f) Added "xxx-default" (collection) for all collection attributes for consistency as required by [ipp-
1797   coll].
1798   g) Added "xxx-supported" Printer attributes for all member attributes for consistency as required by
1799   [ipp-coll].
1800   3.   Removed the prefix from the "media" and the "media-col" member attributes, so that they are the
1801   same as the IPP/1.1 Job Template attributes.
1802   4.   Added the insert-after-page-number-supported" (1setOf type2 keyword) Printer attribute for
1803   consistency.
1804   5.   Added that a value of MAX for "insert-after-page-number" inserts a page after the last page in the
1805   document no matter how many pages are in the document.
1806   6.   Changed "insert-sheet" to agree with the Exceptions document [ipp-except], so that if a page number
1807   is not the first on a sheet, the insert happens after that sheet, and the page is forced to the next sheet
1808   and a warning given using the "job-warnings-count" Job Description attribute and the Job's 'job-
1809   warnings-detected' job-state-reasons.
1810   7.   Add the "insert-count-supported (integer(1:MAX)) Printer attribute for consistency.
1811   8.   Clarified that the "media" attribute maps a name or keyword to a media instance, but that not all
1812   media instances need have an associated media name or keyword. Also that no two media instances
1813   can have the same "media" attribute name or keyword.
1814   9.   Clarified that that the "media-col" collection attribute maps a set of characteristics to a media instance

1815   and that all media instances must have a distinct set of characteristics, not counting their names. The
1816   "media-description" member attribute can be used as a characteristics to distinguish two otherwise
1817   identical media instances.
1818 10.   Changed the name of the "media-name" member attribute to "media-description" and its attribute
1819   syntax from 'type3 keyword | name(MAX)' to 'text(255)' to make sure that the value is just an
1820   arbitrary string with no semantic content, such as a tray name or size.
1821 11.   Clarified that several media instances can have the same "media-description" member attribute value.
1822 12.   Specified the tolerance for media size matching of 5 points, same as PostScript.
1823 13.   Removed the type3 keyword from the "media-size" (collection) member attribute, so as to have only
1824   one way to specify size, namely a pair of integers. The client can use these integers to map to a media
1825   size name in the locale of the user, similar to keywords.
1826 14.   Added a rangeOfInteger to the "media-size-supported" (1setOf collection) member attributes and so
1827   added a "-supported" suffix to "x-dimension" and "y-dimension" member attributes since they now
1828   have different attribute syntaxes to the member attributes of the "media-size" member attribute.
1829 15.   Added "media-col-ready" (1setOf collection) Job Template Printer attribute to show the
1830   characteristics of the ready media.
1831 16.   Clarified that the IPP/1.1 "media-ready" (1setOf (type3 keyword | name(MAX))) Printer attribute
1832   MUST also be supported, and that the values correspond, so that the client can determine the
1833   mapping of the media names/keywords to the media characteristics for the ready media at least.
1834 17.   Deleted "sheet-collate", since it is already defined in the "Job Progress Attributes" document [ipp-
1835   prog].
1836 18.   Added the section on Document and Page Exceptions to indicate the semantics of each Job Template
1837   attribute as required by [ipp-except].
1838 19.   Deleted the definition of the 'none' out-of-band attribute value, since it is defined in the [ipp-coll]
1839   document.
1840 20.   Added the 'user-define' out-of-band attribute value for use as one of the values of the Printer's "xxx-
1841   supported" attributes to indicate that a client can supply a name that is not in the Printer's supported
1842   list, i.e., can supply custom names.
1843 21.   Added the 'user-define-supported' out-of-band value so that an implementation can indicate in the
1844   "xxx-supported" returned by the Get-Printer-Supported-Values operation whether or not it will allow
1845   the administrator to set the 'user-define' out-of-band value in the corresponding Printer's "xxx-
1846   supported" attribute.
1847 22.   Added the 'resources-are-not-supported' value for use with the "job-state-reasons" Job Description
1848   attribute to indicate that a user has supplied a custom name.
1849 23.   Clarified that if a Printer supports "job-sheets-col", it MUST also support the IPP/1.1 "job-sheets" Job
1850   Template attribute.
1851 24.   Clarified that if a Printer supports "media-col", it MUST also support the IPP/1.1 "media" Job
1852   Template attribute.
1853 25.   Clarified that if a Printer supports "media-col-ready", it MUST also support the IPP/1.1 "media-
1854   ready" Printer attribute.
1855 26.   Changed the attribute syntax for "job-account-id-supported", "job-message-to-operator-supported",
1856   "job-recipient-name-supported", and "job-sheet-message-supported" from 'boolean' to 'integer(1:255)'
1857   to indicate the maximum string length supported, since IPP is often a gateway to another system that
1858   can't store the string length required for conforming IPP Printers.
1859 27.   Added notes about the conversion between English and metric for different types of media.

13.5 Changes to the January 30, 2000 to create the February 7, 2000 version

The following changes were made to the January 30, 2000 version to create the February 7, 2000 version:

1. Changed the attribute syntax of "cover-front-supported" and "cover-back-supported" from 'collection' to 'boolean', since a Printer MUST support all (both) member attributes and any combinations of values.
2. Changed the 'sheet' member attribute in each of the following collections to give them distinct names so that the "xxx-supported" Printer attribute can indicate their respective (potentially different) values: "job-accounting-sheets", "job-error-sheets", "job-sheets", and "separator-sheets".
3. Added "media-" to the beginning of each member attribute of the "media" collection, so that ordinary "media-xxx-supported" could be used to represent their individual supported values.
4. Removed the 'name(MAX)" choice from the "media-size" member attribute. If the properties of a medium are being given, either the keyword name or the exact numerical dimensions known to the implementation, not a name made up by the administrator.
5. Added "media-size-supported (1setOf collection) which contains the combinations of numerical sizes supported (x-dimension and y-dimension) by the Printer. This "xxx-supported" attribute is the only one that has a value of '1setOf collection' in order to list the pairs of x and y dimensions supported. The attribute syntax of the "x-dimension" and "y-dimension" is a choice of 'integer(0:MAX)' or 'rangeOfInteger(0:MAX)' to cover the case of continuous media and cut sheet printers that can cut the medium to any size within the specified range.
6. Changed the "media-supported" from containing a collection whose member attributes listed the supported values that the client could supply as member attributes to just containing a new out-of-band 'any-collection' value that indicates that the implementation allows any combination of member attributes that are indicated by the corresponding "xxx-supported" Printer attributes.

13.6 Changes to the January 28, 2000 to create the January 30, 2000 version

The following changes were made to the January 28, 2000 version to create the January 30, 2000 version:

1. Ordered the Job Template attributes alphabetically.
2. Add 'name(MAX)' to Job Template attributes that had (type3 keyword | collection) to be consistent with IPP/1.1 that has (type3 keyword | name(MAX)).

13.7 Changes to create the January 28, 2000 version

Initial version.

14 Appendix B: Possible future additions

This appendix lists possible future additions.

14.1 Possible future keyword additions for "media" and "media-col" attributes

1904
1905
1906   These are additional standard keyword values which are used by the implementation as a
1907   simple method for media selection. When combinations of these values are needed for
1908   media selection, it is RECOMMENDED that the attribute "media-col" collection be used to
1909   prevent proliferation of complex keywords and names.
1910

'plain'	The plain media as specified by the output device.
'pre-punched'	The pre-punched media as specified by the output device.
'transparency'	The transparent media as specified by the output device.
'letterhead'	The pre-printed letterhead media as specified by the output device.
'heavyweight'	The heavyweight media as specified by the output device.
'recycled'	The recycled media as specified by the output device.
'bond'	The bonded media as specified by the output device.
'labels'	The labels media as specified by the output device.
'pre-printed'	The pre-printed media as specified by the output device.
'custom1'	Custom value 1 defined for the site
'custom2'	Custom value 2 defined for the site
'custom3'	Custom value 3 defined for the site
'custom4'	Custom value 4 defined for the site
'custom5'	Custom value 5 defined for the site
'custom6'	Custom value 6 defined for the site
'custom7'	Custom value 7 defined for the site

1911
1912

14.2 Possible future additions to the "media-col" Job Template attribute

1914
1915 Since there would be some redundancy between the above proposed keywords for "media" and "media-col"
1916 and other "media-col" member attributes, provide some way to indicate which member attributes subsume
1917 which keyword values, depending on which member attributes are supported. Then a Printer can indicate
1918 which keyword values map to which member attributes. The following table shows what these
1919 redundancies would be:
1920

"media-description" keyword values	redundant member attributes

'plain', 'bond', 'transparency'	"media-opacity" - 'opaque', 'transparent' values
'pre-punched'	"media-hole-count" - non-zero value
'plain'	"media-pre-printer" - 'blank' value
'letterhead'	"media-pre-printed" - 'letterhead' value
'pre-printed'	"media-pre-printed" - 'pre-printed' value
'heavyweight'	"media-weight-metric", "media-weight-english"
'recycled'	"media-recycled" - 'standard' value
'labels'	"media-label-type" - 'standard' value

1921
1922   Should we add a new member attribute, called "media-kind" (type3 keyword | name) with value like:
1923   labels, envelope, envelope-plain, envelope-window, continuous-long, continuous-short, multi-layer, and
1924   multi-part-form from the Printer MIB?
1925
1926   Should the values: 'bond', 'Index-Bristol-tab-stock', 'cover-stock', 'rank-paper' and 'newsprint' (see "media-
1927   weight" member attribute description) be added to this new "media-kind" member attribute?
1928
1929
1930

15 Appendix C: Description of the IEEE Industry Standards and Technology (ISTO)

1933
1934   The IEEE-ISTO is a not-for-profit corporation offering industry groups an innovative and flexible
1935   operational forum and support services. The IEEE-ISTO provides a forum not only to develop standards,
1936   but also to facilitate activities that support the implementation and acceptance of standards in the
1937   marketplace. The organization is affiliated with the IEEE (http://www.ieee.org/) and the IEEE Standards
1938   Association (http://standards.ieee.org/).
1939
1940   For additional information regarding the IEEE-ISTO and its industry programs visit:
1941
1942   http://www.ieee-isto.org.
1943

16 Appendix D: Description of the IEEE-ISTO PWG

1945
1946   The Printer Working Group (or PWG) is a Program of the IEEE Industry Standards and Technology
1947   Organization (ISTO) with member organizations including printer manufacturers, print server developers,
1948   operating system providers, network operating systems providers, network connectivity vendors, and print
1949   management application developers. The group is chartered to make printers and the applications and
1950   operating systems supporting them work together better. All references to the PWG in this document
1951   implicitly mean "The Printer Working Group, a Program of the IEEE ISTO." In order to meet this
1952   objective, the PWG will document the results of their work as open standards that define print related
1953   protocols, interfaces, procedures and conventions. Printer manufacturers and vendors of printer related
1954   software will benefit from the interoperability provided by voluntary conformance to these standards.
1955

1956 In general, a PWG standard is a specification that is stable, well understood, and is technically competent,
1957 has multiple, independent and interoperable implementations with substantial operational experience, and
1958 enjoys significant public support.
1959
1960 For additional information regarding the Printer Working Group visit:
1961
1962   http://www.pwg.org
1963
1964
1965

17 Appendix E: IEEE Industry Standards and Technology Organization Copyright Statement

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1967
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1977
1978 Title: Internet Printing Protocol: Production Printing Attributes - Set1
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2005
2006   Use of this document is wholly voluntary. The existence of this document does not imply that there are no
2007   other ways to produce, test, measure, purchase, market, or provide other goods and services related to its
2008   scope.
2009

Document Number 5

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12

IPP Bake Off 3 Testing Outline

Table of Contents

48

49

50

51 **1   General**

52 *1.1   Common restrictions for test purposes*

53 To facilitate testing and analysis of results we should conduct our tests under certain restrictions. If
54 time permits, specific restrictions may be lifted for specific tests.

55 - Security. Authentication, authorization and privacy will not be used except where explicitly
56   stated. There will be a series of test specifically targeting interoperability of security
57   implementations. The core protocol testing will eliminate these variables.

58 - Character set. We will use the UTF-8 character encoding of ISO646. This will simplify the
59   comparison of results. The exception will be tests specifically targeted at characters sets.

60 - Language. We will use en-us. This will simplify the comparison of results. Once again the
61   exception will be tests that are intended to test this aspect of the protocol.

62 - IPP Scheme. The URLs for printers will be ipp://* as specified in the IPP 1.1 specification.

63 - Http Chunking. No IPP component being tested will chunk its requests or responses. Testing of
64   chunking IPP requests and responses will specifically be performed.

65 - HTTP Version 1.1 will be used. Compatibility tests with 1.1 and 1.0 components will be
66   performed.

67 - Firewalls and proxies. . These will be used throughout the tests. The firewalls and proxies
68   may be bypassed if they interfere with a test not targeted at firewalls and proxies.

69

70 *1.2   Test print files*

71 Where possible a small standard file will be used. A large test file will be used for IPP contention
72 testing and real life printing scenario testing

73 *1.3   Result processing and documentation*

74 1.3.1 Anonymity

75 The participants of the tests will be aware of the identity of the participants. Any posting or
76 discussion of results will not identify the participants demonstrating the issue at hand. The
77 discussions will focus on issues regarding the IPP specification. The objective is to clarify the
78 specification's language to resolve the issue.

79 1.3.2 Test data collection method

80 Developers of IPP test tools should operate at the IPP application layer. This will simplify the
81 comparison of results. The format of the traces will be test tool specific.   It is recommended that
82 there be an indication of success or failure. The tool should also report expected and received
83 results.

84 Network analyzers are suggested to keep a detailed trace of various tests. All participants are
85 encouraged to bring their favorite.

86   1.3.3 Results determination

87   Humans can determine the results for many of the tests. An IPP Client submitting a job that is
88   printed by an IPP printer would seem to indicate interoperability. .

89   Some clients or tools will allow us to examine the attribute groups, tags, attributes and values.
90   The examination of these may be automated to some extent.

91   If all else fails the network analyzers will allow us to examine the bits on the wire.

92

93   1.3.4 Output

94   **1.3.4.1 Detailed results**

95   The detailed results of the bake-off will be emailed directly to the participants of the test. Some
96   of the detailed results will be made available during the bake-off. All participants are
97   encouraged to make their traces available to interested participants. Implementers of IPP
98   components involved in a test are entitled to the results of the test.

99   **1.3.4.2 Summary of results**

100   A summary of the test results will be circulated among the participants prior to posting on the
101   IPP distribution list. The results will be sanitized of any vendor specific information. The
102   object of the summary results is to give a high level overview of the bake-off results.

103   **1.3.4.3 Issues**

104   Issues will be recorded and tracked by the TES whip or designate. The issue will be sent to the
105   IPP Working Group for disposition.

106   **2   Procedure**

107   After setting up and establishing basic IP connectivity, every IPP component will be assigned a
108   designator. The relevant information for each IPP component will be recorded in the table similar to
109   the one in section 3.1.

110   Throughout the tests the term "interoperate" means that two independent IPP implementations
111   correctly understands the feature.

112   *2.1   IPP connectivity and basic printing*

113   Each IPP Client will send a simple print job to every IPP Printer. The results will be recorded in a
114   table similar to the one in section 3.2.This step should be performed during the initial set up day.
115   Any holes in the table can be filled in the following days.

116

117   *2.2   IPP model coverage testing*

118   Each IPP Printer will have an automated test suite run against it. The test suite will test only the
119   support of the operations and attributes.   This test is not intended to evaluate the robustness of an
120   implementation. The operations and attributes that interoperate will be rec orded anonymously on a

121   form and collected. Another test tool and printer(s) will be selected to verify interoperability
122   coverage of the IPP Model.
123   The model coverage is broken up into the following sections:
124   Mandatory operations
125   Optional operations
126   Mandatory printer attributes
127   Optional printer attribute
128   Mandatory Job attributes
129   Optional Job attribute

130
131

2.3   Common Error Conditions

133   The objective of this step is to compare the state of printers under common error conditions. The get-
134   printer-attributes operation will be used to obtain the printer-state and printer -state-reasons attributes.
135   Printers that support event notifications should also record the notifications and their content generated by
136   the following events.
137
138   **Out of paper/Paper low**
139   • Submit a job of a known size to a printer with the input tray(s) empty.
140   • Examine and record the "printer -state" and "printer -state-reasons".
141   • Put some paper into the input tray. There should not be enough to complete the job.
142   • While the printer is printing, examin e and record the "printer -state" and "printer -state-reasons".
143   • When the printer runs out of paper, examine and record the two attributes again.
144
145   **Out of marker supply/Marker supply low**
146   • Put a marker supply cartridge (spool, reservoir etc.) that is almost e mpty into the printer.
147   • Submit a small job to the printer.
148   • Examine and record the "printer -state" and "printer -state-reasons".
149   • Cause the printer to run out of marker supply.
150   • Examine the two attributes again.
151
152   **Output bin full/Output bin almost full**
153   • Almost fill an output bin.
154   • Submit a job of sufficient in size to fill the printer's output bin.
155   • While the printer is printing, examine and record the "printer -state" and "printer -state-reasons".
156   • When the printer' output bin is full of paper, examine the tw o attributes again.
157
158   **Cover open/Door open**
159   • Open the appropriate covers and doors.
160   • Examine and record the "printer -state" and "printer -state-reasons".
161
162   **Tray missing**
163   • Remove an input tray.
164   • Examine and record the "printer -state" and "printer -state-reasons".
165
166   **Pausing a printer**
167   • If possible, pause the printer.
168   • Examine and record the "printer -state" and "printer -state-reasons".
169
170   **Paper jam**
171   • If possible, cause the printer to jam.
172   • Examine and record the "printer -state" and "printer -state-reasons".

173

2.4   Version Interoperability

175   Use Clients and Printers of differing versions.   Submit a simple print job, get a list of jobs and get the
176   attributes of the job and the printer. Record results in table similar to the one in section 3.4
177

2.5   Notification Registration and Delivery Methods

179   Notification registration will be tested at the Printer and Job level. The registration will contain the
180   mandatory attributes. The registration will be carried in the "Create -Printer-Subscription" operation
181   and in the subscription attribute template group in the job creation operations. If time permits, the
182   optional attributes and the "Create -Job-Subscription" operation will be tested.
183   Upon registration, the "Get -Subscriptions" operation will be used to verify success. The "Get-
184   Subscriptions-Attributes" may also be tested at this time. The notification method used will be
185   based on printer and client capabilities.
186   The events to be tested are "printer -state-changed", "printer -stopped", "job -state-change", "job -
187   created" and "job -completed". Other events will be tested based on printer capabilities and time.
188   Results will be captured in a table similar to the one in section 3.7.
189

2.6   Firewall and Proxy Interactions

191   **This section requires input from the specific vendors that plan to attend. The capabilities of the**
192   **various products should be demonstrated. Security testing will be an integral part of this testing.**
193
194   Need to fill out this section.
195   Test inbound and outbound printing.
196   Test inbound and outbound notification.
197   Is there any firewall specific test that should be run?
198   Filtering at different layers
199   Content filtering
200   Policy based filtering
201   Virtual private Networks
202   Test security and printing through a proxy.
203

2.7   Authentication and Security

205   Authentication and security will be tested for interoperability. The IPP printers and client
206   participating will record the results in tables similar to the table in section 3.8   Authentication and
207   security schemes include Basic, Digest, SSL3, TLS and Kerboros
208
209

210 # 3 Sample Tables and Checklists

211 ## *3.1 IPP Components matrix*

212

ID	URL	Ethernet Address	Chunking (Send,Receive)	Security Schemes	Authentication Schemes	Notification Schemes
Clients						
C1						
C2						
C3						
Printers						
P1						
P2						
P3						
Test Suites						
TS1						
TS2						
TS3						

213 ## *3.2 Simple Print Table*

214

	Client ID							
Printer ID								

215
216

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217　　**3.3　IPP Operation/Attribute Coverage Tables**

218　　3.3.1 Mandatory Operations

Mandatory Operations	
Operation	Interoperate
print-job	
validate-job	
get-printer-attributes	
get-jobs	
cancel-job	
get-job-attributes	

219　　3.3.2 Optional Operations

Optional Operations	
Operation	Interoperate
print-uri	
create-job	
pause-printer	
resume-printer	
purge-printer	
send-document	
send-uri	
hold-job	
release-job	
restart-job	

220　　3.3.3 Operational attributes

Operational attributes		
Operational Attribute	Group	Interoperate
version-number	preamble	
operation-id	preamble	
request-id	preamble	
attributes-charset	operational-attribute	
attributes-natural-language	operational-attribute	
printer-uri	operational-attribute	
requesting-user-name	operational-attribute	
status code	preamble	
Status-message (Optional)	operational-attribute	

221　　3.3.4 Mandatory Printer Attributes

Mandatory Printer Attributes	
Attribute	Interoperate
printer-uri-supported	
uri-security-supported	
printer-name	
printer-state	
operations-supported	
charset-configured	
charset-supported	

Mandatory Printer Attributes	
Attribute	**Interoperate**
natural-language-configured	
generated-natural-language-supported	
printer-is-accepting-jobs	
pdl-override-supported	
document-format-default	
document-format-supported	
printer-up-time	

222 3.3.5 Optional Printer Attributes

Optional Printer Attributes	
Attribute	**Interoperate**
printer-location	
printer-info	
printer-more-info	
printer-driver-installer	
printer-make-and-model	
printer-more-info-manufacturer	
printer-state-reasons	
printer-state-message	
queued-job-count	
printer-message-from-operator	
color-supported	
reference-uri-schemes-supported	
printer-current-time	
multiple-operation-time-out	
compression-supported	
job-k-octets-supported	
job-impressions-supported	
job-media-sheets-supported	
job-priority-default	
job-priority-supported	
job-hold-until-default	
job-hold-until-supported	
job-sheets-default	
job-sheets-supported	
multiple-document-handling-default	
multiple-document-handling-supported	
copies-default	
copies-supported	
finishings-default	
finishings-supported	
page-ranges-supported	
sides-default	
sides-supported	
number-up-default	
number-up-supported	
orientation-requested-default	
orientation-requested-supported	
media-default	
media-supported	
media-ready	

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Optional Printer Attributes	
Attribute	**Interoperate**
printer-resolution-default	
printer-resolution-supported	
print-quality-default	
print-quality-supported	

223

224   3.3.6   Mandatory job Attributes

Mandatory job Attributes	
Attribute	**Interoperate**
Job-uri	
Job-id	
Job-printer-uri	
Job-name	
Job-originating-user-name	
Job-state	
job-state-reasons	
Time-at-creation	
Time-at-processing	
Time-at-completed	
Attributes-charset	
Attributes-natural-language	

225

226   3.3.7   Optional Job Attributes

Optional Job Attributes	
Attribute	**Interoperate**
Job-more-info	
Job-state-message	
Job-detailed-status-message	
Job-document-access-error	
Number-of-documents	
Output-device-assigned	
Date-time-at-creation	
Date-time-at-processing	
Date-time-at-completed	
Number-of-intervening-jobs	
Job-message-from-operator	
Job-k-octets	
job-impressions	
job-media-sheets	
compression-supported	
Job-k-octets-processed	
job-impressions-completed	
job-media-sheets-completed	
job-priority	
job-hold-until	
job-sheets	
multiple-document-handling	
copies	
finishings	

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Optional Job Attributes	
Attribute	**Interoperate**
page-ranges	
sides	
number-up	
orientation-requested	
media	
printer-resolution	
print-quality	

227

228 *3.4 Version interoperability Table*

Operation	**1.1 Printer 1.0 Client**	**1.0 Printer 1.1 Client**
Print-Job		
Get-Printer-Attributes		
Get-Job-Attributes		
Get-Jobs		

229 *3.5 Notification Table*

Printer/ Client	**Registration Operation**	**Notification Method**	**Events Registered**	**Registration Result**	**Events & Results**

230

231 *3.6 Common Error Conditions Table*

Condition	**Printer-state**	**Printer-state-reasons**	**Notification/rel evant content**
Paper low			
Paper out			
Marker supply low			
Marker supply out			
Output almost full			

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Condition	Printer-state	Printer-state-reasons	Notification/relevant content
Output full			
Cover open			
Tray missing			
Pause printer			
Paper jam			

232

3.7 Notification Table

233

	Printer ID & method			
Client ID & method	*Registration*			
	Delivery			

234

3.8 Authentication & Security Table

235

Security, Authentication, (Firewall/Proxy)	Client ID			
Printer ID				

236

3.9 Firewall Table

237

	Inbound Print	Outbound Notify	Outbound Print	Inbound Notify
Printer ID, Client ID				

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238 ## 4 Issues

Issue #	Originator	Description

239 ## 5 Revision History

Version	Date	Name	Change
0.1	8/14/00	Zehler	Initial version for comment
0.2	8/22/00	Zehler	Added model coverage test, procedure and associated tables
0.2	8/28/00	Zehler	Added common error conditions
0.2	8/30/00	Zehler	

240

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Document Number 6

8   Internet Printing Protocol (IPP):
9   **The 'ippgetw' Delivery Method**

10

12   Status of this Memo

21   **Abstract**

22   The notification extension document [ipp-ntfy] defines operations that a client can perform in order to create
23   *Subscription Objects* in a Printer and carry out other operations on them. A Subscription Object represents a
24   Subscription abstraction. The Subscription Object specifies that when one of the specified *Events* occurs, the
25   Printer sends an asynchronous *Event Notification* to the specified *Notification Recipient* via the specified
26   *Delivery Method* (i.e., protocol).

27   The notification extension document [ipp-ntfy] specifies that each Delivery Method is defined in another document.
28   This document is one such document, and it specifies the 'ippgetw' delivery method.

29   The 'ippgetw' Delivery Method is a 'pull and push' Delivery Method. That is, the Printer saves Event Notification
30   for a period of time and expects the Notification Recipient to fetch the Event Notifications (the pull part). The
31   Printer continues to send Event Notifications to the Notification Recipient as Events occur (the push part).

32   When a Printer supports this Delivery Method, it holds each Event Notification for an amount of time, called the
33   *Event Notification Lease Time.*

34   When a Notification Recipient wants to receive Event Notifications, it performs an IPP operation called 'Get-
35   Notifications', which this document defines. This operation causes the Printer to return all Event Notifications held

36   for the Notification Recipient and to continue sending Event Notifications to the Notification Recipient as additional
37   Events occur along with information that tells the client when to perform this operation again.

38   The basic set of IPP documents includes:

39   Design Goals for an Internet Printing Protocol [RFC2567]
40   Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
41   Internet Printing Protocol/1.1: Model and Semantics [ipp-mod]
42   Internet Printing Protocol/1.1: Encoding and Transport [ipp-pro]
43   Internet Printing Protocol/1.1: Implementer's Guide [ipp-iig]
44   Mapping between LPD and IPP Protocols [RFC2569]
45   Internet Printing Protocol/1.0 & 1.1: IPP Event Notification Specification [ipp-ntfy]
46

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

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

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

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

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

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

71   The "Event Notification Specification" document describes an extension to the IPP/1.0, IPP/1.1, and future
72   versions. This extension allows a client to subscribe to printing related Events. Subscriptions are modeled as
73   *Subscription Objects.* The Subscription Object specifies that when one of the specified *Event* occurs, the Printer
74   sends an asynchronous *Event Notification* to the specified *Notification Recipient* via the specified *Delivery*
75   *Method* (i.e., protocol). A client associates Subscription Objects with a particular Job by performing the Create-
76   Job-Subscriptions operation or by submitting a Job with subscription information. A client associates Subscription

77 Objects with the Printer by performing a Create-Printer-Subscriptions operation. Four other operations are
78 defined for Subscription Objects: Get-Subscriptions-Attributes, Get-Subscriptions, Renew-Subscription, and
79 Cancel-Subscription.

80

Table of Contents

98

99

99 # 1 Introduction

100 The notification extension document [ipp-ntfy] defines operations that a client can perform in order to create
101 *Subscription Objects* in a Printer and carry out other operations on them. A Subscription Object represents a
102 Subscription abstraction. The Subscription Object specifies that when one of the specified *Events* occurs, the
103 Printer sends an asynchronous *Event Notification* to the specified *Notification Recipient* via the specified
104 *Delivery Method* (i.e., protocol).

105 The notification extension document [ipp-ntfy] specifies that each Delivery Method is defined in another document.
106 This document is one such document, and it specifies the 'ippget' delivery method.

107 The 'ippgetw' Delivery Method is a 'pull and push' Delivery Method. That is, the Printer saves Event Notification
108 for a period of time and expects the Notification Recipient to fetch the Event Notifications (the pull part). The
109 Printer continues to send Event Notifications to the Notification Recipient as Events occur (the push part).

110 When a Printer supports this Delivery Method, it holds each Event Notification for an amount of time, called the
111 *Event Notification Lease Time.*

112 When a Notification Recipient wants to receive Event Notifications, it performs an IPP operation called 'Get-
113 Notifications', which this document defines. This operation causes the Printer to return all Event Notifications held
114 for the Notification Recipient along with information that tells the client when to perform this operation again. The
115 Printer continues to send Event Notifications to the Notification Recipient as Events occur.

116 # 2 Terminology

117 This section defines the following terms that are used throughout this document:

118 Capitalized terms, such as **MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, MAY, NEED**
119 **NOT,** and **OPTIONAL**, have special meaning relating to conformance to this specification. These terms are
120 defined in [ipp-mod section 13.1 on conformance terminology, most of which is taken from RFC 2119
121 [RFC2119].

122 **Event Notification Lease:** The lease that is associated with an Event Notification. When the lease expires, the
123 Printer discards the associated Event Notification.

124 **Event Notification Lease Time:** The expiration time assigned to a lease that is associated with an Event
125 Notification.

126 **Event Notification Attributes Group:** The attributes group in a response that contains attributes that are part of
127 an Event Notification.

128 For other capitalized terms that appear in this document, see [ipp-ntfy].

3 Model and Operation

129

130 In a Subscription Creation Operation, when the value of the "notify-recipient-uri" attributes has the scheme
131 "ippgetw", the client is requesting that the Printer use the 'ippgetw' Delivery Method for the Event Notifications
132 associated with the new Subscription Object. The client MUST choose a value for the address part of the "notify-
133 recipient-uri" attribute that uniquely identifies the Notification Recipient.

134 When an Event occurs, the Printer MUST generate an Event Notification and MUST assign it thean Event
135 Notification Lease Time. The Printer MUST hold an Event Notification for its assigned Event Notification Lease
136 Time and MUST discard it when its Event Notification Lease Time expires. The Printer MAY MUST assign the
137 same Event Notification Lease Time to each Event Notification or it MAY assign a different time.

138 ISSUE: should we say "The Printer MUST discard an Event Notifications after its lease expires" or leave unsaid
139 how long an Event Notification lasts after the lease expires.

140 When a Notification Recipient wants to receive Event Notifications, it performs the Get-Notifications operation,
141 which causes the Printer to return all unexpired Event Notifications held for the Notification Recipient along with
142 two time-intervals. The response to the Get-Notifications request continues indefinitely as the Printer continues to
143 send Event Notifications in the response as Events occur. The Printer sends only those Event Notifications that are
144 generated from Subscription Objects whose "notify-recipient-uri" equals the "notify-recipient-uri" Operation
145 Attribute in the Get-Notifications operation.

146 The first returned time-interval is the suggested time a Notification Recipient should wait before performing the Get-
147 Notifications operation again. The second time-interval is the time that Event Notification Leases begin to expire for
148 Event Notifications created after the Get-Notifications operation. A Notification Recipient SHOULD perform this
149 operation at the suggested time and somewhat before the Event Notification Leases begin to expire.

150 The Notification Recipient identifies its own Event Notifications with a "notify-recipient-uri" Operation attribute in
151 the request. It matches any Event Notifications associated with a Subscription Object whose "notify-recipient-uri"
152 attribute has the same value as the "notify-recipient-uri" Operation attribute of the request. To avoid getting Event
153 Notification that belong to another Notification Recipient, a client SHOULD pick values for the "notify-recipient-
154 uri" attribute that are unique, e.g. the client's host address.

155 If a Notification Recipient performs the Get-Notifications operation twice in quick succession, it will receive nearly
156 the same Event Notification both times because most of the Event Notifications are those that the Printer saves for
157 a few seconds after the Event occurs. There are two possible differences. Some old Event Notifications may not be
158 present in the second response because their Event Notification Leases have expired. Some new Event
159 Notifications may be present in the second response but not the first response.

160 When the Notification Recipient requests Event Notifications for per-Job Subscription Objects, the Notification
161 Recipient typically performs the Get-Notifications operation within a second of performing the Subscription
162 Creation operation. Because the Printer is likely to save Event Notifications for several seconds, the Notification
163 Recipient is unlikely to miss any Event Notifications that occur between the Subscription Creation and the Get-
164 Notifications operation.

165 ~~The Printer may keep the channel open if the suggested time interval is sufficiently short, but in any case the client~~
166 ~~performs a new Get-Notifications operation each time it wants more Event Notifications. Since the time interval~~
167 ~~between consecutive client requests is normally less than the Event Notification Lease Time, consecutive responses~~
168 ~~will normally contain some events that are identical.   The youngest ones in the previous response will become the~~
169 ~~oldest in the next response. The client is expected to filter out these duplicates, which is easy to do because of the~~
170 ~~sequence number in each Event Notification. The reason for not removing the Event Notifications from the Printer~~
171 ~~with every Get-Notifications request, is so that multiple Notification Recipients can be polling the same~~
172 ~~Subscription Object and so the Get-Notification operation satisfies the rule of idempotency. The former is useful if~~
173 ~~someone is logged in to several desktops at the same time and wants to see the same events at both places. The~~
174 ~~latter is useful if the network loses the response.~~

175 # 4   General Information

176 If a Printer supports this Delivery Method, the following are its characteristics.

177 **Table 1 – Information about the Delivery Method**

Document Method Conformance Requirement	Delivery Method Realization
1. What is the URL scheme name for the Delivery Method?	ippgetw
2. Is the Delivery Method REQUIRED or OPTIONAL for an IPP Printer to support?	OPTIONAL
3. What transport and delivery protocols does the Printer use to deliver the Event Notification Content, i.e., what is the entire network stack?	IPP with one new operation.
4. Can several Event Notifications be combined into a Compound Event Notification?	Yes.
5. Is the Delivery Method initiated by the Notification Recipient (pull), or by the Printer (push)?	This Delivery Method is a pull and a push.
6. Is the Event Notification content Machine Consumable or Human Consumable?	Machine Consumable
7. What section in this document answers the following question? For a Machine Consumable Event Notification, what is the representation and encoding of values defined in section 9.1 of [ipp-ntfy] and the conformance requirements thereof? For a Human Consumable Event Notification, what is the representation and encoding of pieces of information defined in section 9.2 of [ipp-ntfy]	Section 5

and the conformance requirements thereof?	
8. What are the latency and reliability of the transport and delivery protocol?	Same as IPP and the underlying HTTP transport
9. What are the security aspects of the transport and delivery protocol, e.g., how it is handled in firewalls?	Same as IPP and the underlying HTTP transport
10. What are the content length restrictions?	None
11. What are the additional values or pieces of information that a Printer sends in an Event Notification content and the conformance requirements thereof?	None
12. What are the additional Subscription Template and/or Subscription Description attributes and the conformance requirements thereof?	None
13. What are the additional Printer Description attributes and the conformance requirements thereof?	None

178

179 **5   Get-Notifications operation**

180 This operation causes the Printer to return all Event Notifications held for the Notification Recipient along with
181 information about when to perform this operation again.

182 A Printer MUST support this operation.

183 When a Printer performs this operation, it MUST return all and only those Event Notifications:

184   a)   Whose associated Subscription Object's "notify-recipient-uri" attribute equals the "notify-recipient-uri"
185   Operation attribute AND

186   b)   Whose associated Subscription Object's "notify-recipient-uri" attribute has a scheme value of 'ippget'
187   AND

188   c)   Whose Event Notification Lease Time has not yet expired AND

189   d)   Where the Notification Recipient is the owner of or has read-access rights to the associated
190   Subscription Object.

191 When a Printer performs this operation, it MUST also return two time-intervals:

192   a)the suggested time for a Notification Recipient to perform the Get-Notifications operation again.

193   b)the time at which the Printer will begin to discard Event Notifications that occur after this operation. This
194   may be the Event Notification Lease Time (see section 5.2 for details).

195   Note: the Subscription Creation Operations also return these two time intervals (see section 6).

196   The Printer MUST respond to this operation immediately with whatever Event Notifications it currently holds. It
197   MUST NOT wait for additional Events to occur before sending a response. The Printer MUST continue to send
198   Event Notifications as they occur. If the Subscription Object is cancelled, either via the Cancel-Subscription
199   operation or by the Printer (e.g. the Subscription Object is associated with a Job that completes), the Printer
200   MUST terminate the Get-Notifications operation in one of the following ways. If the Printer is sending chunked
201   data, it SHOULD send a 0 length chunk to denote the end of the operation. Otherwise, the Printer MUST close
202   the connection. If the Notification Recipient wishes to terminate the Get-Notifications operation, it MUST close
203   the connection.

204   The Printer MUST accept the request in any state (see [ipp-mod] "printer-state" and "printer-state-reasons"
205   attributes) and MUST remain in the same state with the same "printer-state-reasons".

206   *Access Rights:* If the policy of the Printer is to allow all users to access all Event Notifications, then the Printer
207   MUST accept this operation from any user. Otherwise, the authenticated user (see [ipp-mod] section 8.3)
208   performing this operation MUST either be the owner of each Subscription Object identified by the "notify-
209   recipient-uri" Operation attribute (as determined during a Subscription Creation Operation) or an operator or
210   administrator of the Printer (see [ipp-mod] Sections 1 and 8.5). Otherwise, the IPP object MUST reject the
211   operation and return: 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as
212   appropriate.

5.1 Get-Notifications Request

214   The following groups of attributes are part of the Get-Notifications Request:

215   Group 1: Operation Attributes

216   Natural Language and Character Set:
217   The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod] section
218   3.1.4.1.
219
220   Target:
221   The "printer-uri" (uri) operation attribute which is the target for this operation as described in [ipp-mod]
222   section 3.1.5.
223
224   Requesting User Name:
225   The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as described in
226   [ipp-mod] section 8.3.
227

228   "notify-recipient-uri" (url):
229   The client MUST supply this attribute. The Printer object MUST support this attribute. The Printer
230   matches the value of this attribute (byte for byte with no case conversion) against the value of the "notify-
231   recipient-uri" in each Subscription Object in the Printer. If there are no matches, the IPP Printer MUST
232   return the 'client-error-not-found' status code. For each matched Subscription Object, the IPP Printer
233   MUST return all unexpired Event Notifications associated with it.
234
235   Note: this attribute allows a subscribing client to pick URLs that are unique, e.g. the client's own URL or a
236   friend's URL, which in both cases is likely the URL of the person's host. An application could make a
237   URL unique for each application.

238   **5.2 Get-Notifications Response**

239   The following groups of attributes are part of the Get-Notifications Response:

240   Group 1: Operation Attributes

241   Status Message:
242   In addition to the REQUIRED status code returned in every response, the response OPTIONALLY
243   includes a "status-message" (text(255)) and/or a "detailed-status-message" (text(MAX)) operation
244   attribute as described in [ipp-mod] sections 13 and 3.1.6.
245
246   The Printer can return any status codes defined in [ipp-mod]. The following is a description of the
247   important status codes:
248
249   **successful-ok:** the response contains all Event Notification associated with the specified "notify-
250   recipient-uri". If the specified Subscription Objects have no associated Event Notification, the
251   response MUST contain zero Event Notifications.
252   **client-error-not-found:** The Printer has no Subscription Object's whose "notify-recipient-uri"
253   attribute equals the "notify-recipient-uri" Operation attribute.
254
255   Natural Language and Character Set:
256   The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod] section
257   3.1.4.2.
258
259   The Printer MUST use the values of "notify-charset" and "notify-natural-language", respectively, from one
260   Subscription Object associated with the Event Notifications in this response.
261
262   Normally, there is only one matched Subscription Object, or the value of the "notify-charset" and "notify-
263   natural-language" attributes is the same in all Subscription Objects. If not, the Printer MUST pick one
264   Subscription Object from which to obtain the value of these attributes. The algorithm for picking the
265   Subscription Object is implementation dependent. The choice of natural language is not critical because
266   'text' and 'name' values can override the "attributes-natural-language" Operation attribute. The Printer's

267   choice of charset is critical because a bad choice may leave it unable to send some 'text' and 'name' values
268   accurately.
269
270   "suggested-ask-again-time-interval" (integer(0:MAX)):
271   The value of this attribute is the suggested number of seconds that SHOULD elapse before the client
272   performs the Get-Notifications operation again for these Subscription Objects. A client MAY perform the
273   Get-Notifications operation at any time, and a Printer MUST respond with all unexpired Event
274   Notifications. A Notification Recipient waits until this time interval has elapsed in order to be a "good
275   network citizen". It is RECOMMENDED that the value of this attribute be 80% of the "begin-to-expire-
276   time-interval" (see the next attribute) in order to give a Notification Recipient plenty of time to perform the
277   Get-Notifications operation again before new Event Notifications expire.
278
279   "begin-to-expire-time-interval" (integer(0:MAX)):
280   The value of this attribute is the minimum number of seconds that MUST elapse before Event Notification
281   Leases begin to expire on Event Notifications produced by matching Subscriptions Objects after the
282   Printer sends the Get-Notifications response. The Printer MUST discard an Event Notification when its
283   Event Notification Lease has expired. That is, if the Printer performs the Get-Notifications operation before
284   the time specified by the "begin-to-expire-time-interval" attribute returned in the previous operation, the
285   Printer MUST still have all of the Event Notifications that have occurred since the previous operation. If the
286   Printer assigns the same Event Notification Lease Time to all Event Notifications, the value of this attribute
287   MUST equal the Event Notification Lease Time. If a Notification Recipient waits until after this time or
288   even slightly less than this time, the Notification Recipient MUST expect to lose some Event Notifications.
289
290   "printer-up-time" (integer(0:MAX)):
291   The value of this attribute is the Printer's "printer-up-time" attribute at the time the Printer sends this
292   response. Because each Event Notification also contains the value of this attribute when the event
293   occurred, the value of this attribute lets a Notification Recipient know when each Event Notification
294   occurred relative to the time of this response.
295
296   Group 2: Unsupported Attributes
297   See [ipp-mod] section 3.1.7 for details on returning Unsupported Attributes.
298
299   If the "subscription-ids" attribute contained subscription-ids that do not exist, the Printer returns them in this
300   group as value of the "subscription-ids" attribute.
301
302   Group 3 through N: Event Notification Attributes
303   The Printer responds with one Event Notification Attributes Group per matched Event Notification. The
304   initial matched Event Notifications are all un-expired Event Notification associated with the matched
305   Subscription Objects. The subsequent Event Notifications in the response are Event Notifications
306   associated with the matched Subscription Objects as the corresponding Event occurs.
307

308   From the Notification Recipient's view, the response appears as an initial burst of data, which includes the
309   Operation Attributes Group and one Event Notification Attributes Groups per Event Notification that the
310   Printer is holding. After the initial burst of data, the Notification Recipient receives occasional Event
311   Notification Attribute Groups. Proxy servers may delay some Event Notifications or cause time-outs to
312   occur. The client MUST be prepared to perform the Get-Notifications operation again when time-outs
313   occur.

314

315   Each Event Notification Group MUST start with an 'event-notification-attributes-tag' (see the section
316   "Encodings of Additional Attribute Tags" in [ipp-ntfy]).

317

318   Each attribute is encoded using the IPP rules for encoding attributes [ipp-pro] and may be encoded in any
319   order. Note: the Get-Jobs response in [ipp-mod] acts as a model for encoding multiple groups of
320   attributes.

321

322   Each Event Notification Group MUST contain all of attributes specified in section 9.1 ("Content of
323   Machine Consumable Event Notifications") of [ipp-ntfy] with exceptions denoted by asterisks in the tables
324   below.

325

326   The tables below are copies of the tables in section 9.1 ("Content of Machine Consumable Event
327   Notifications") of [ipp-ntfy] except that each cell in the "Sends" column is a "MUST".

328

329   For an Event Notification for all Events, the Printer includes the following attributes.

330   **Table 2 – Attributes in Event Notification Content**

Source Value	Sends	Source Object
notify-subscription-id (integer(1:MAX))	MUST	Subscription
notify-printer-uri (uri)	MUST	Subscription
notify-subscribed-event (type2 keyword)	MUST	Event Notification
printer-up-time (integer(MIN:MAX))	MUST	Printer
printer-current-time (dateTime)*	MUST	Printer
notify-sequence-number (integer (0:MAX))	MUST	Subscription
notify-charset (charset)	MUST	Subscription
notify-natural-language (naturalLanguage)	MUST	Subscription
notify-user-data (octetString(63)) **	MUST	Subscription

Source Value	Sends	Source Object
notify-text (text)	MUST	Event Notification
attributes from the "notify-attributes" attribute ***	MUST	Printer
attributes from the "notify-attributes" attribute ***	MUST	Job
attributes from the "notify-attributes" attribute ***	MUST	Subscription

331

332   * The Printer MUST send "printer-current-time" if and only if it supports the "printer-current-time"
333   attribute on the Printer object.
334

335   ** If the associated Subscription Object does not contain a "notify-user-data" attribute, the Printer MUST
336   send an octet-string of length 0.
337

338   *** If the "notify-attributes" attribute is present on the Subscription Object, the Printer MUST send all
339   attributes specified by the "notify-attributes" attribute. Note: if the Printer doesn't support the "notify-
340   attributes" attribute, it is not present on the associated Subscription Object.
341

342   For Event Notifications for Job Events, the Printer includes the following additional attributes.

343   **Table 3 – Additional Attributes in Event Notification Content for Job Events**

Source Value	Sends	Source Object
job-id (integer(1:MAX))	MUST	Job
job-state (type1 enum)	MUST	Job
job-state-reasons (1setOf type2 keyword)	MUST	Job
job-impressions-completed (integer(0:MAX)) *	MUST	Job

344

345   * The Printer MUST send the "job-impressions-completed" attribute in an Event Notification only for the
346   combinations of Events and Subscribed Events shown in Table 4.
347

348   **Table 4 – Combinations of Events and Subscribed Events for "job-impressions-completed"**

Job Event	Subscribed Job Event
'job-progress'	'job-progress'

'job-completed'	'job-completed'
'job-completed'	'job-state-changed'

349

350 For Event Notification for Printer Events, the Printer includes the following additional attributes.

351 **Table 5 – Additional Attributes in Event Notification Content for Printer Events**

Source Value	Sends	Source Object
printer-state (type1 enum)	MUST	Printer
printer-state-reasons (1setOf type2 keyword)	MUST	Printer
printer-is-accepting-jobs (boolean)	MUST	Printer

352 **6 Extensions to Subscription Creation OperationsNew Printer**
353 **Description Attributes**

354 **6.1 begin-to-expire-time-interval" (integer(0:MAX))Response**

355 This attribute specifies the number of seconds that a Printer keeps an Event Notification that is associated with this
356 Delivery Method.

357 The Printer MUST support this attribute if it supports this Delivery Method.

358 The value of this attribute is the minimum number of seconds that MUST elapse between the time the Printer
359 creates an Event Notification object for this Delivery Method and the time the Printer discards the same Event
360 Notification.

361 For example, assume the following:

362 1. a client performs a Job Creation operation that creates a Subscription Object associated with this Delivery
363 Method, AND

364 2. an Event associated with the new Job occurs immediately after the Subscription Object is created, AND

365 3. the same client or some other client performs a Get-Notifications operation N seconds after the Job
366 Creation operation.

367 Then, if N is less than the value of this attribute, the client performing the Get-Notifications operations can expect
368 not miss any Event-Notifications, barring some unforeseen lack of memory space in the Printer.

369 When a Subscription Creation Operation contains a "notify-recipient-uri" attribute and the scheme in its value is
370 'ippget', the response MUST contain two additional Operation Attributes that pertain to this Delivery Method.
371 Note: Subscription Creation Operations include: Print-Job, Print-URI, Create-Job, Create-Job-Subscriptions and
372 Create-Printer-Subscriptions.

373 Group 1: Operation Attributes

374   "suggested-ask-again-time-interval" (integer(0:MAX)):
375   This attribute has the same meaning as the "suggested-ask-again-time-interval" attribute in the Get-
376   Notifications operation except that it suggests when to perform the Get-Notifications operation for the first
377   time on all Subscription Objects in the response whose "notify-recipient-uri" scheme is 'ippget'.

378

379   "begin-to-expire-time-interval" (integer(0:MAX)):
380   This attribute has the same meaning as the "begin-to-expire-time-interval" attribute in the Get-Notifications
381   operation except that it indicates when the Event Notification Lease begins to expire for all Subscription
382   Objects in the response whose "notify-recipient-uri" scheme is 'ippget'.

7 Encoding

384 The operation-id assigned for the Get-Notifications operation is:

385   0x001C

386 and should be added to the next version of [ipp-mod] section 4.4.15 "operations-supported".

387 This notification delivery method uses the IPP transport and encoding [ipp-pro] for the Get-Notifications operation
388 with one extension:

389   notification-attributes-tag = %x07   ; tag of 7

8 IANA Considerations

391 There is nothing to register.

9 Internationalization Considerations

393 The IPP Printer MUST localize the "notify-text" attribute as specified in section 14 of [ipp-ntfy].

394 In addition, when the client receives the Get-Notifications response, it is expected to localize the attributes that
395 have the 'keyword' attribute syntax according to the charset and natural language requested in the Get-
396 Notifications request.

10 Security Considerations

The IPP Model and Semantics document [ipp-mod] discusses high-level security requirements (Client Authentication, Server Authentication and Operation Privacy). Client Authentication is the mechanism by which the client proves its identity to the server in a secure manner. Server Authentication is the mechanism by which the server proves its identity to the client in a secure manner. Operation Privacy is defined as a mechanism for protecting operations from eavesdropping.

Unlike other Event Notification delivery methods in which the IPP Printer initiates the Event Notification, with the method defined in this document, the Notification Recipient is the client who s the Get-Notifications operation. Therefore, there is no chance of "spam" notifications with this method. Furthermore, such a client can close down the HTTP channel at any time, and so can avoid future unwanted Event Notifications at any time.

11 References

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13 Full Copyright Statement

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1   Subj: Beginnings of Implementer's Guide section for IPP Event Notification
2   From: Tom Hastings
3   File: ipp-not-spec-for-IIG-00714-rev06.doc
4   Date: 7/1406/00
5
6   Shows the changes to produce the 7/13/00 documents.

7   1   Event Notification

8   This section discusses the IPP Event Notification extension defined in [ipp-ntfy].

9   1.1   Summary of the validation of Subscription Creation Operations

10   The following table shows the combinations of Subscription Template attributes supplied by the client and
11   the actions taken by the Printer in Subscription Creation operations. Assume a single Subscription object
12   was intended to be created.

13   Legend: The '-' character indicates no attribute or value. 'n/a' means not applicable.

Subscribing client		Printer			
supplies	MUST supply?	creates Subscription?	populates Subscription	returns Subscription Attributes Group	returns "notify-status-code" in
-	Y	N	n/a	-	client-error-bad-request
-	N	Y	-	-	successful-ok
xxx=bad	Y	N	n/a	xxx=bad	client-error-uri-scheme-not-supported
xxx=bad	N	Y	-	xxx=bad	successful-ok-ignored-or-substituted-values
bad=...	N	Y	-	bad='unsupported'	successful-ok-ignored-or-substituted-values
xxx=good	Y	Y	xxx=good	-	successful-ok
xxx=good	N	Y	xxx=good	-	successful-ok

14

15 **1.2   Summary of the usage of the Notification attributes**

16 This section summarizes the usage of Notification attributes in the Job operation attributes, Job object,
17 Subscription object, Event Notification content, Job operations, and Subscriptions operations. The legend
18 for the notation used in the tables is given following each table.

19 The column labeled "Printer sends" column indicates the conformance for a delivery method specification
20 document for Machine Consumable content. A delivery method definition document is free to increase the
21 conformance requirements, i.e., change a MAY to a SHOULD or a MUST or a SHOULD to a MUST. A
22 delivery method definition document MAY define additional attribute sources for the content. A delivery
23 method definition document SHOULD NOT decrease the conformance requirements for Machine
24 Consumable content.

25 The Objects column indicates the object for which the source attribute is defined. The "*event*" notation
26 indicates that the source is generated when the event occurs and does not reside in any object. The "n/a"
27 notation means NOT APPLICABLE and the Printer MUST NOT include such an attribute in the Event
28 Notification content.

29 **1.2.1 Subscription Template Attributes**

	Objects		Machine Consumable Event Notification	
Common Subscription Template Attributes for Per-Job and Per-Printer Subscriptions and related Printer attributes	Object	Printer support	Event category	Printer sends
1. notify-recipient-uri (uri)	Subscription	MUST	all	NEED NOT
notify-schemes-supported (1setOf uriScheme)	Printer		n/a	n/a
2. notify-events (1setOf type2 keyword)	Subscription	MUST	see #16	
notify-events-default (1setOf type2 keyword)	Printer		n/a	n/a
notify-events-supported (1setOf type2 keyword)	Printer		n/a	n/a
notify-max-events-supported (integer(2:MAX))	Printer		n/a	n/a
3. notify-attributes (1setOf type2 keyword)	Subscription	MAY	see #20	
notify-attributes-supported (1setOf type2 keyword)	Printer		n/a	n/a
4. notify-user-data (octetString(63))	Subscription	MUST	all	SHOULD
5. notify-charset (charset)	Subscription	MUST	all	SHOULD
charset-supported (1setOf charset)	Printer		n/a	n/a
6. notify-natural-language (naturalLanguage)	Subscription	MUST	all	SHOULD
generated-natural-language-supported (1setOf naturalLanguage)	Printer		n/a	n/a
7. notify-lease-duration (integer(0:MAX)) **	Subscription	MUST	n/a	n/a
notify-lease-duration-default (integer(0:67108863))	Printer		n/a	n/a
notify-lease-duration-supported (1setOf (integer(0: 67108863)	rangeOfInteger(0:67108863)))	Printer		n/a	n/a
8. notify-time-interval (0:MAX)	Subscription	MUST*	n/a	n/a
~~notify-persistence (boolean)~~	~~Subscription~~	~~MUST~~	~~n/a~~	~~n/a~~
~~notify-persistence-default (boolean)~~	~~Printer~~		~~n/a~~	~~n/a~~
~~notify-persistence-supported (1setOf boolean)~~	~~Printer~~		~~n/a~~	~~n/a~~

30 * The Printer MUST support the "notify-time-interval" attribute if it supports the 'job-progress' event.

31 ** "notify-lease-duration" is defined for Per-Printer Subscriptions only.

32   ~~1.1.2~~1.2.2   **Subscription Description Attributes**

	Objects		Machine Consumable Event Notification	
Subscription Description Attributes	Object	Printer support	Event category	Printer sends
9. notify-subscription-id (integer(1:MAX))	Subscription	MUST	all	MUST
10. notify-sequence-number (integer (0:MAX))	Subscription	MUST	all	SHOULD
11. notify-lease-expiration-time (integer(0:MAX))**	Subscription	MUST	all	NEED NOT
12. notify-printer-up-time (integer(1:MAX))**	Subscription	MUST	see #18	
13. notify-printer-uri (uri)	Subscription	MUST	all	MUST
14. notify-job-id (integer(1:MAX))	Subscription	MUST	see #21	
15. notify-subscriber-user-name (name(MAX))	Subscription	MUST	all	NEED NOT

33   ** Defined for Per-Printer Subscriptions only. The client can determine the number of seconds remaining
34   in the Subscription lease by subtracting "notify-printer-up-time" from "notify-lease-expiration-time". If the
35   Printer maintains the Subscription objects, then "notify-printer-up-time" is an alias for the Printer's "printer-
36   up-time" attribute. If the Printer is using a Notification Service to keep Subscription objects and lease time
37   expiration, then the Printer MUST adjust the values of these attributes returned from the Notification
38   Service to be relative to the Printer's "printer-up-time" before returning them to the client in Get-
39   Subscriptions and Get-Subscription-Attributes responses.

40   ~~1.1.3~~1.2.3   **Additional Event Notification *source* attributes**

	Objects		Machine Consumable Event Notification	
Additional Event Notification *source* attributes	Object	Conformance	Event category	Printer sends
16. notify-subscribed-event (type2 keyword)	Event	n/a	all	MUST
17. notify-text (text(MAX))	Event	n/a	all	SHOULD
18. printer-up-time (integer(MIN:MAX))	Printer	MUST	all	MUST
19. printer-current-time (dateTime)	Printer	MAY	all	MUST *
20. any requested attributes and their values (see #3)	Job or Printer	MAY	all	MAY

41   * MUST, if the Printer supports the "printer-current-time" (dateTime) Printer attribute.

42   ~~1.1.4~~1.2.4   **Job Description Attributes**

		Objects		Machine Consumable Event Notification	
Job Description Attributes		Object	Printer support	Event category	Printer sends
21. job-id (integer(1:MAX))		Job	MUST	job	MUST
22. job-state (type1 enum)		Job	MUST	job	MUST
23. job-state-reasons (1setOf type2 keyword)		Job	MUST	job	MUST
24. job-impressions-completed (integer(0:MAX))		Job	MUST	job-progress, job-completed	MUST

43

44   ~~1.1.5~~1.2.5   **Printer Description Attributes**

		Objects		Machine Consumable Event Notification	
Printer Description Attributes		Object	Printer support	Event category	Printer sends
25. printer-name (name(127))		Printer	MUST	all	MAY
26. printer-state (type1 enum)		Printer	MUST	printer	MUST
27. printer-state-reasons (1setOf type2 keyword)		Printer	MUST	printer	MUST
28. printer-is-accepting-jobs (boolean)		Printer	MUST	printer	MUST
~~notify-max-printer-subscriptions-supported (integer(0:MAX))~~		~~Printer~~	~~MUST~~	~~n/a~~	~~n/a~~
~~notify-max-job-subscriptions-supported (integer(0:MAX))~~		~~Printer~~	~~MUST~~	~~n/a~~	~~n/a~~
29. printer-state-change-time (integer(1:MAX))		Printer	MAY	n/a	n/a
30. printer-state-change-date-time (dateTime)		Printer	MAY	n/a	n/a

45

46   **1.3   Machine Consumable Event Notification content**

47   The [ipp-ntfy] defines certain conformance requirements for Delivery Method Documents with respect to
48   what a Printer sends in a Machine Consumable Event Notification. In other words, for every source
49   attribute value in [ipp-ntfy], each Document Delivery Method document MUST indicate whether the

50   Printer MUST, SHOULD, MAY, NEED NOT, SHOULD NOT, or MUST NOT send in Machine
51   Consumable Event Notifications. Table 1 lists these source values that [ipp-ntfy] says that the Delivery
52   Method Document MUST include and indicates the conformance requirements defined by each of the
53   Delivery Method Documents for: 'indp', 'ipp-get', and 'snmpnotify'.

54   **Table 1 - Machine Consumable Event Notification content by Delivery Method**

Source value	Source object	Printer sending requirement		
		indp:	ipp-get:	snmpnotify:
[ipp-ntfy] says the Delivery Method Document MUST require the Printer to send in each Machine Consumable Event Notification:				
notify-subscription-id (integer(1:MAX))	Subscription	MUST	MUST	no mapping
notify-printer-uri (uri)	Subscription	MUST	MUST	MUST
notify-subscribed-event (type2 keyword)	Event Notification	MUST	MUST	MUST
printer-up-time (integer(MIN:MAX))	Printer	MUST	MUST	MUST
printer-current-time (dateTime) *	Printer	MUST	MUST	no mapping
[ipp-ntfy] says the Delivery Method document MUST require the Printer to send in each Machine Consumable Event Notification, unless the source is incompatible with the Delivery Method:				
notify-sequence-number (integer (0:MAX))	Subscription	MUST	MUST	MUST
notify-charset (charset)	Subscription	MUST	MUST	no mapping
notify-natural-language (naturalLanguage)	Subscription	MUST	MUST	no mapping
notify-user-data (octetString(63)) *	Subscription	MUST	MUST	no mapping
notify-text (text)	Event Notification	MUST	MUST	no mapping
[ipp-ntfy] says the Delivery Method document MAY include for the Printer to send in each Machine Consumable Event Notification, with any conformance requirement. [ipp-ntfy] says a Printer MAY support the "notify-attributes" attribute. The Delivery Method MUST say that the Printer MUST, SHOULD, MAY, MUST NOT, SHOULD NOT, or NEED NOT support the "notify-attributes" attribute and specific values of this attribute. The Delivery Method MAY say that support for the "notify-attributes" is conditioned on support of the attribute by the Printer or it MAY say that Printer MUST support the "notify-attribute" attribute if the Printer supports the Delivery Method:				

Source value	Source object	Printer sending requirement		
		indp:	ipp-get:	snmpnotify:
attributes from the "notify-attributes" attribute	Printer	MAY	MUST	no mapping
attributes from the "notify-attributes" attribute	Job	MAY	MUST	no mapping
attributes from the "notify-attributes" attribute	Subscription	MAY	MUST	no mapping
[ipp-ntfy] says the Delivery Method document MUST require the Printer to send in each Machine Consumable Event Notification, for Job events *only*:				
job-id (integer(1:MAX))	Job	MUST	MUST	MUST
job-state (type1 enum)	Job	MUST	MUST	MUST
job-state-reasons (1setOf type2 keyword)	Job	MUST	MUST	MUST
[ipp-ntfy] says the Delivery Method document MUST require the Printer to send in each Machine Consumable Event Notification, for 'job-progress' and 'job-completed' events *only*:				
job-impressions-completed (integer(0:MAX))	Job	MUST	MUST	MUST **
[ipp-ntfy] says the Delivery Method document MUST require the Printer to send in each Machine Consumable Event Notification, for Printer events *only*:				
printer-state (type1 enum)	Printer	MUST	MUST	MUST
printer-state-reasons (1setOf type2 keyword)	Printer	MUST	MUST	MUST
printer-is-accepting-jobs (boolean)	Printer	MUST	MUST	MUST

55 * If the Subscription Object does not contain a "notify-user-data" attribute and the Delivery Method
56 document REQUIRES the Printer to send the "notify-user-data" source value in the Event Notification, the
57 Printer MUST send an octet-string of length 0.

58 ** For the 'snmpnotify' Delivery Method the Printer MUST send "job-k-octets" as well as "job-impressions-
59 completed" values for 'job-completed' and 'job-purged' events. The 'snmpnotify' Delivery Method has an
60 addition trap binding for 'job-progress' events for which the Printer MUST send: "job-k-octets", "job-
61 impressions", "job-copies", "job-collation-type", "job-media-sheets-completed", "sheet-completed-copy-
62 numbers" and "sheet-completed-document-number" values.

63 ## 1.4 Human Consumable Event Notification content

64 The [ipp-ntfy] document defines the following RECOMMENDATIONS for Human Consumable Event
65 Notification content. Each of the four delivery methods have ways to send Human Consumable. Those

66 that also support Machine Consumable send Human Consumable as the value of the "notify-text" attribute
67 in the Machine Consumable format.

68 There is a separate sub-table for each piece of information. Each row in the sub-table represents a source
69 value for the information and the values are listed in order of preference, with the first one being the
70 preferred one. An implementation SHOULD use the source value from the earliest row in each sub- table.

Source value	Source object	delivery method (scheme in "notify-recipient-uri"):		
		indp: "notify-text"	ipp-get: "notify-text"	mailto: mail body
The source of the information for the Printer Name. The "printer-name" is more user-friendly unless the Notification Recipient is in a place where the Printer name is not meaningful. For example, an implementation could have the intelligence to send the value of the "printer-name" attribute to a Notification Recipient that can access the Printer via value of the "printer-name" attribute and otherwise send the value of the "notify-printer-uri" attribute. Printer SHOULD include in each Human Consumable Event Notification for Job and Printer events:				
printer-name (name(127))	Printer	one or both	one or both	one or both
notify-printer-uri (uri)	Subscription			
Printer SHOULD include in each Human Consumable Event Notification for Job and Printer events:				
notify-trigger-event (type2 keyword)	Subscription	SHOULD	SHOULD	SHOULD
Printer MAY include in each Human Consumable Event Notification for Job and Printer events:				
printer-current-time (dateTime)	Printer	MAY	MAY	MAY
Printer SHOULD include in each Human Consumable Event Notification for Job events *only*:				
job-name (name(MAX))	Job	SHOULD	SHOULD	SHOULD
job-id (integer(1:MAX))	Job	MAY	MAY	MAY
For Job events *only*: the source of the information for the job state. If the Printer supports the "job-state-message" and "job-detailed-state-message" attributes, it SHOULD use those attributes for the job state information, otherwise it SHOULD fabricate such information from the "job-state" and "job-state-reasons". For some Events, a Printer MAY combine this information with Event information:				

Source value	Source object	delivery method (scheme in "notify-recipient-uri"):		
		indp: "notify-text"	ipp-get: "notify-text"	mailto: mail body
job-state-message (text(MAX))	Job	SHOULD or	SHOULD or	SHOULD or
job-detailed-status-messages (1setOf text(MAX))	Job			
job-state (type1 enum)	Job	SHOULD	SHOULD	SHOULD
job-state-reasons (1setOf type2 keyword)	Job			
For Printer events *only*: the source of the information for the printer state. If a Printer supports the "printer-state-message", it SHOULD use that attribute for the job state information, otherwise it SHOULD fabricate such information from the "printer-state" and "printer-state-reasons". For some Events, a Printer MAY combine this information with Event information.				
printer-state-message (text(MAX))	Printer	SHOULD or	SHOULD or	SHOULD or
printer-state (type1 enum)	Printer	SHOULD	SHOULD	SHOULD
printer-state-reasons (1setOf type2 keyword)	Printer			
printer-is-accepting-jobs (boolean)	Printer			

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Document Number 8

                    Internet Printing Protocol (IPP):
                            Resource Objects
                    <draft-ietf-ipp-get-resource-01.txt>

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Status of this Memo

Abstract

   This document is a submission to the Internet Printing Protocol
   Working Group of the Internet Engineering Task Force (IETF). The
   open issues in this document each begin 'ISSUE_n:'. Comments should
   be submitted to the ipp@pwg.org mailing list.

   This IPP Resource Objects document specifies an extension to IPP/1.0
   [RFC-2565] [RFC-2566] and IPP/1.1 [IPP-MOD] [IPP-PRO]. This document
   extends the current IPP object model with a passive polymorphic
   object type - Resource - to support the long-term evolution of IPP.

   This document defines:
   - Resource object (passive polymorphic object);
   - Resource query operations (e.g., Get-Resource-Attributes);
   - Resource admin operations (e.g., Create-Resource);
   - Resource template attributes (e.g., "resource-charset");
   - Resource description attributes (e.g., "resource-name"); and
   - new Printer attributes (e.g., "resource-type-supported").

60   Table of Contents
61

169
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172
173
174   1.   Introduction
175
176   See section 1 'Introduction' in [IPP-MOD] for a full description of
177   the IPP document set and overview information about IPP.
178
179   This document is a submission to the Internet Printing Protocol
180   Working Group of the Internet Engineering Task Force (IETF). The
181   open issues in this document each begin 'ISSUE_n:'. Comments should
182   be submitted to the ipp@pwg.org mailing list.
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184   This IPP Resource Object documents specifies an extension to IPP/1.0
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190   - Resource object (passive polymorphic object);
191   - Resource query operations (e.g., Get-Resource-Attributes);
192   - Resource admin operations (e.g., Create-Resource);
193   - Resource template attributes (e.g., "resource-charset");
194   - Resource description attributes (e.g., "resource-name"); and
195   - new Printer attributes (e.g., "resource-type-supported").
196
197   This document is laid out as follows:
198   - Section 2 adds the Resource object to the IPP object model.
199
200   - Section 3 is the terminology used throughout the document.
201
202   - Section 4 specifies the operations on Resource objects, including
203   new status codes for Resource operations.
204
205   - Section 5 specifies the attributes common to all Resource objects.
206
207   - Section 6 specifies the rules for defining new Resource object
208   types.
209
210   - Section 7 specifies the conformance requirements for this document.
211
212   - Section 8, 9, and 10 specify IANA, internationalization, and
213   security considerations.
214
215   - Section 11 allocates new protocol encoding values for this
216   document.
217
218   - Sections 12, 13, 14, and 15 list references, authors' addresses,
219   change history, and full IETF copyright statement.
220
221
222
223
225

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228
229
230   2.   IPP Model for Resources
231
232   See section 2 'IPP Objects' in [IPP-MOD] for a full description of
233   the IPP object model and terminology.
234
235
236
237   2.1.   Resource Object
238
239   IPP Resource objects are used to model installed features or
240   capabilities of IPP Printers (e.g., 'font'). All Resource object
241   instances contain a common set of base Resource object attributes.
242
243   Resource object instances MAY have an additional set of attributes,
244   according to their "resource-type" and IPP Printer implementation.
245
246   Resource objects instances MAY also have associated data, according
247   to their "resource-type" and IPP Printer implementation. Resource
248   data (if any) is available by reference in "resource-data-uri" or by
249   value if "resource-data-present" is 'true' (i.e., a local copy of the
250   Resource data is available on the IPP Printer).
251
252   Section 4 describes each of the Resource operations in detail.
253
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286   3.   Terminology
287
288   This specification document uses the terminology defined in this
289   section.
290
291
292   3.1.   Conformance Terminology
293
294   The terms "MUST", "MUST NOT", "REQUIRED", "SHOULD", "SHOULD NOT",
295   "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be
296   interpreted as described in [RFC-2119]. These terms are used to
297   specify conformance requirements which apply if this specification is
298   implemented (in addition to IPP/1.0 or higher).
299
300
301   3.2.   Model Terminology
302
303   See section 12.2 'Model Terminology' in [IPP-MOD].
304
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342   4.   Resource Operations
343
344   The common semantics of all IPP Resource operations are the ones
345   defined for all IPP operations in [IPP-MOD], e.g., "operation-id",
346   "status-code", "attributes-charset", etc.
347
348   See section 3.1 'Common Semantics' in [IPP-MOD].
349
350
351
352   4.1.   Resource Query Package - REQUIRED
353
354   The following three Resource query operations are REQUIRED for all
355   IPP Printers to implement, if they implement Resource objects.
356
357
358
359   4.1.1.   Get-Resource-Attributes Operation
360
361   REQUIRED - for IPP Printers to implement.
362
363   This operation allows an IPP Client to request the values of
364   attributes of a Resource object instance and is similar to the
365   Get-Job-Attributes operation (see section 3.2.5 in [IPP-MOD]). The
366   only differences are that the operation is directed at a Resource
367   object instance rather than a Job object instance, there is a
368   "resource-type" operation attribute required when querying a Resource
369   object, and the returned attribute group is a set of Resource object
370   attributes rather than a set of Job object attributes.
371
372   For Resources, the possible names of attribute groups are:
373
374   - 'resource-template': the subset of the Resource Template
375   attributes that the implementation supports for Resource objects
376   (see section 5.1).
377   - 'resource-description': the subset of the Resource Description
378   attributes that the implementation supports for Resource objects
379   (see section 5.2).
380   - 'all': the special group 'all' that includes all attributes that
381   the implementation supports for Resource objects.
382
383
384   Since an IPP Client MAY request specific attributes or named groups,
385   there is a potential that there is some overlap. For example, if an
386   IPP Client requests 'resource-create-time' and
387   'resource-description', the IPP Client is actually requesting the
388   "resource-create-time" attribute once by naming it explicitly, and
389   once by inclusion in the 'resource-description' group. In such
390   cases, the IPP Printer object NEED NOT return the attribute only once
391

396   in the response even if it is requested multiple times. The IPP
397   Client SHOULD NOT request the same attribute in multiple ways.
398
399
400
401   4.1.1.1. Get-Resource-Attributes Request
402
403   The IPP Client submits the Get-Resource-Attributes request to an IPP
404   Printer object.
405
406   The IPP Client supplies the following groups of attributes as part of
407   the Get-Resource-Attributes Request:
408
409
410   Group 1: Operation Attributes
411
412   Natural Language and Character Set:
413   The "attributes-charset" and "attributes-natural-language"
414   attributes as described in section 3.1.4.1 in [IPP-MOD].
415
416   Target:
417   The "printer-uri" (uri) operation attribute which is the target for
418   ALL Resource operations as described in section 3.1.5 in [IPP-MOD].
419
420   ISSUE_1: The target of all IPP Resource operations is always
421   simply "printer-uri" and separate required operation attributes are
422   used to specify resource type and name or ID. This is like IPP
423   Subscription objects but unlike the earlier IPP Job objects.
424   Should we continue to follow the IPP Subscription object model?
425
426   Resource Type:
427   The "resource-type (type2 keyword)" attribute as described in
428   section 5.4.1. The IPP Client MUST supply "resource-type" in all
429   IPP Resource operation requests. The IPP Printer MUST support and
430   validate "resource-type" in all IPP Resource operation requests.
431
432   Resource Name or ID:
433   The "resource-name (name(127))" attribute as described in section
434   5.4.2 in this document
435   <OR>
436   the "resource-id (integer(1:MAX))" attribute as described in
437   section 5.4.3.
438
439   Requesting User Name:
440   The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied
441   by the IPP Client as described in section 8.3 in [IPP-MOD].
442
443   "requested-attributes" (1setOf keyword):
444   The IPP Client OPTIONALLY supplies this attribute. The IPP Printer
445   MUST support this attribute. It is a set of attribute names and/or
446   attribute group names in whose values the requester is interested.
447

452   If the IPP Client omits this attribute, the IPP Printer MUST
453   respond as if this attribute had been supplied with a value of
454   'all'.
455
456
457
458   4.1.1.2. Get-Resource-Attributes Response
459
460   The Printer object returns the following sets of attributes as part
461   of the Get-Resource-Attributes Response:
462
463
464   Group 1: Operation Attributes
465
466   Status Message:
467   In addition to the REQUIRED status code returned in every response,
468   the response OPTIONALLY includes a "status-message" (text(255))
469   and/or a "detailed-status-message" (text(MAX)) operation attribute
470   as described in sections 13 and 3.1.6 in [IPP-MOD].
471
472   Natural Language and Character Set:
473   The "attributes-charset" and "attributes-natural-language"
474   attributes as described in section 3.1.4.2 in [IPP-MOD]. The
475   "attributes-natural-language" MAY be the natural language of the
476   Resource object, rather than the one requested.
477
478
479   Group 2: Unsupported Attributes
480
481   See section 3.1.7 in [IPP-MOD] for details on returning Unsupported
482   Attributes.
483
484   The response NEED NOT contain the "requested-attributes" operation
485   attribute with any supplied values (attribute keywords) that were
486   requested by the IPP Client but are not supported by the IPP
487   Printer. If the Printer object does include unsupported attributes
488   referenced in "requested-attributes" and such attributes include
489   group names, such as 'all', the unsupported attributes MUST NOT
490   include attributes described in this document but not supported by
491   the implementation.
492
493
494   Group 3: Resource Object Attributes
495
496   This is the set of requested Resource object attributes and their
497   current values, i.e., any of the Resource object attributes in the
498   tables in sections 5.1 and 5.2. The IPP Printer ignores (does not
499   respond with) any requested attribute or value which is not
500   supported or which is restricted by the security policy in force,
501   including whether the requesting user is the user that created the
502   Resource object instance. However, the IPP Printer MUST respond
503

508   with the 'unknown' value for any supported attribute (including all
509   REQUIRED attributes) for which the IPP Printer does not know the
510   value, unless it would violate the security policy. See the
511   description of the "out-of-band" values in the beginning of Section
512   4.1 in [IPP-MOD].
513
514   See section 5.1 'Table of Resource Template Attributes'.
515   See section 5.2 'Table of Resource Description Attributes'.
516
517
518
519   4.1.2. Get-Resource-Data Operation
520
521   REQUIRED - for IPP Printers to implement.
522
523   This operation allows an IPP Client to request the values of
524   attributes of a Resource object instance AND the value of associated
525   Resource data (i.e., this operation is like 'Print-Job' except that
526   the opaque data is transferred in the opposite direction). This
527   operation is a strict superset of the Get-Resource-Attributes
528   operation above. The only difference is that the operation returns
529   Resource data in addition to Resource attributes.
530
531   This operation is only supported for the "resource-type" values for
532   which the Resource is defined to allow data (e.g., 'form'). If the
533   IPP Client supplies a value for "resource-type" that does NOT allow
534   Resource data, the IPP Printer MUST return a status code of
535   'client-error-not-possible'.
536
537   Note: This separate operation is defined (rather than overloading
538   the 'Get-Resource-Attributes' operation above) to simplify access
539   control policies. Note that some Resource types (e.g, 'font') MAY
540   have have copyright and intellectual property considerations with
541   respect to IPP Clients reading their associated data.
542
543
544   4.1.2.1. Get-Resource-Data Request
545
546   See section 4.1.1.1 'Get-Resource-Attributes Request'.
547
548   The IPP Client submits the Get-Resource-Data request to an IPP
549   Printer object.
550
551   The IPP Client supplies the following groups of attributes as part of
552   the Get-Resource-Data Request:
553
554
555   Group 1: Operation Attributes
556
557   See 'Group 1: Operation Attributes' in section 4.1.1.1
558   'Get-Resource-Attributes Request'.
559

564
565
566   4.1.2.2. Get-Resource-Data Response
567
568   See section 4.1.1.2 'Get-Resource-Attributes Response'.
569
570
571   Group 1: Operation Attributes
572
573   See 'Group 1: Operation Attributes' in section 4.1.1.2
574   'Get-Resource-Attributes Response'.
575
576
577   Group 2: Unsupported Attributes
578
579   See 'Group 2: Unsupported Attributes' in section 4.1.1.2
580   'Get-Resource-Attributes Response'.
581
582
583   Group 3: Resource Object Attributes
584
585   See 'Group 3: Resource Object Attributes' in section 4.1.1.2
586   'Get-Resource-Attributes Response'.
587
588   See section 5.1 'Table of Resource Template Attributes'.
589
590
591   Group 4: Resource Object Data
592
593   See section 5.x 'resource-data-present'.
594   See section 3.2.1.1 'Print-Job Request' in [IPP-MOD].
595
596   The IPP Printer MUST return the Resource data (if any) to the IPP
597   Client, within the constraints of administratively configured
598   access control policies and any applicable copyright or other
599   intellectual property considerations.
600
601
602
603   4.1.3. Get-Resources Operation
604
605   REQUIRED - for IPP Printers to implement.
606
607   This operation allows an IPP Client to retrieve the list of Resource
608   object instances (of a specified resource type) belonging to the
609   target Printer object. The IPP Client may also supply a list of
610   Resource attribute names and/or attribute group names. A group of
611   Resource object attributes will be returned for each Resource object
612   instance that is returned.
613
614   This operation is similar to the Get-Resource-Attributes operation,
615

except that this Get-Resources operation returns attributes from
possibly more than one object.

See section 3.2.6 'Get-Jobs Operation' in [IPP-MOD].

4.1.3.1. Get-Resources Request

The IPP Client submits the Get-Resources request to an IPP Printer
object.

The IPP Client supplies the following groups of attributes as part of
the Get-Resources Request:

Group 1: Operation Attributes

  See 'Group 1: Operation Attributes' in section 4.1.1.1
  'Get-Resource-Attributes Request'.

Resource Name or ID:
  The IPP Client MUST NOT send either "resource-name" or
  "resource-id". The IPP Printer MUST return them as Unsupported
  Attributes if supplied and MUST reject the Get-Resources operation.

"limit" (integer(1:MAX)):
  [added]
  The IPP Client OPTIONALLY supplies this attribute. The IPP Printer
  MUST support this attribute. It is an integer value that
  determines the maximum number of resources that an IPP Client will
  receive from the IPP Printer.

Groups 2 to N: Resource Filter Attributes

  See 'Group 3: Resource Object Attributes' in section 4.1.1.2
  'Get-Resource-Attributes Response'.

  This is the set of filter attributes and their filter values. The
  IPP Printer ignores Resources which do not satisfy the specified
  filter. A multi-valued filter attribute matches if the
  corresponding Resource object instance attribute contains all of
  the one or more values of the multi-valued filter attribute.

  The filter criteria in each Resource Filter Attribute group MUST
  all be true for a match (logical AND within the set). But only ONE
  Resource Filter Group need be true for a match (logical OR across
  the sets).

  ISSUE_2: What mechanism should we use for filters?

676   1. Group mechanism with multiple new Resource Filter Attributes
677   groups, limited to simple logical AND and OR filters?
678
679   2. Simple mechanism with new "resource-filter (collection)"
680   operation attribute in Get-Resources operations, limited to one
681   simple logical AND filter?
682
683   3. Robust mechanism with new "resource-filter (text)" operation
684   attribute in Get-Resources operations, supporting full LDAPv3
685   string attribute filters or a profile (subset) of LDAPv3
686   filters?
687   See 'String Representation of LDAP Search Filters' [RFC-2254].
688
689   [Editor - favors solution 3 at this writing]
690
691
692
693
694   4.1.3.2. Get-Resources Response
695
696   The Printer object returns all of the Resource object instances, up
697   to the number specified by the "limit" attribute, that match the
698   criteria as defined by the filter attribute values supplied by the
699   IPP Client in the request. It is possible that no Resource objects
700   are returned since there may literally be none at the Printer, or
701   there may be no Resource objects that match the criteria supplied by
702   the IPP Client. If the IPP Client requests any Resource attributes
703   at all, there is a set of Resource Object Attributes returned for
704   each Resource object instance.
705
706   It is not an error for the IPP Printer to return 0 Resources. If the
707   response returns 0 Resources because there are no Resources matching
708   the criteria, and the request would have returned 1 or more Resources
709   with a status code of 'successful-ok' if there had been Resources
710   matching the criteria, then the status code for 0 Resources MUST be
711   'successful-ok'.
712
713
714   Group 1: Operation Attributes
715
716   See 'Group 1: Operation Attributes' in section 4.3.1
717   'Get-Resources Request'.
718
719
720   Group 2: Unsupported Attributes
721
722   See 'Group 2: Unsupported Attributes' in section 4.1.1.2
723   'Get-Resource-Attributes Response'.
724
725
726   Groups 3 to N: Resource Object Attributes
727
729

732
733   See 'Group 3: Resource Object Attributes' in section 4.1.1.2
734   'Get-Resource-Attributes Response'.
735
736   See section 5.1 'Table of Resource Template Attributes'.
737
738   Resource object instances MUST be returned sorted by "resource-id".
739
740   ISSUE_3: Should we require that Resource object instances are always
741   returned sorted by "resource-id" (as stated above) and not by
742   "resource-name" (more user-friendly). Should we add an operation
743   attribute to control the choice of sort order?
744
745
746
747   4.2. Resource Admin Package - OPTIONAL
748
749   The following four Resource admin operations are OPTIONAL for all IPP
750   Printers to implement, if they implement Resource objects. However,
751   when implemented, these four Resource admin operations MUST be
752   implemented as a package (all four).
753
754   Note: The Set-Resource operation is intentionally NOT defined here.
755   For simplicity and robustness, Resource object instances are entirely
756   static, except that their leases MAY be renewed with the
757   Renew-Resource operation.
758
759
760   4.2.1. Create-Resource Operation
761
762   OPTIONAL - for IPP Printers to implement.
763
764   This operation allows an authorized IPP Client to create a Resource
765   object instance on this IPP Printer and to send OPTIONAL Resource
766   data for local storage on the IPP Printer along with the Resource
767   object attributes for those values of "resource-type" which are
768   defined to allow Resource data.
769
770   Note: Specific Resource types (values of "resource-type") constrain
771   whether Resource data may be sent with the Create-Resource operation.
772
773
774
775   4.2.1.1. Create-Resource Request
776
777   The IPP Client submits the Create-Resource request to an IPP Printer
778   object.
779
780   The IPP Client supplies the following groups of attributes as part of
781   the Create-Resource Request:
782
783

    Group 1: Operation Attributes

       See 'Group 1: Operation Attributes' in section 4.1.1.1
       'Get-Resource-Attributes Request'.

    "resource-name" (name(127)):
       The IPP Client MUST supply this attribute.
       Note: Unlike the "job-name" attribute, the value of
       "resource-name" MUST be unique among Resources of the SAME
       "resource-type". IPP Printers MUST not allow Resource object
       instances of the SAME "resource-type" to exist with duplicate
       "resource-name" values. IPP Printers MUST reject Create-Resource
       operations that specify duplicate "resource-name" values.

    "resource-id" (integer(1:MAX)):
       [omitted]
       The IPP Client MUST NOT send "resource-id" and the IPP Printer MUST
       return it in Unsupported Attributes if supplied.

    "requested-attributes" (1setOf keyword):
       The IPP Client OPTIONALLY supplies this attribute. The IPP Printer
       MUST support this attribute. It is a set of attribute names and/or
       attribute group names in whose values the requester is interested.
       If the IPP Client omits this attribute, the IPP Printer MUST
       respond as if this attribute had been supplied with a value of
       'all'.

       ISSUE_4: Should we make Resources more Subscriptions (and Jobs)
       and just drop the "requested-attributes" from all of the Resource
       admin operations? Then "requested-attributes" would only be
       permitted in the Resource query operations.

    Group 2: Resource Object Attributes

       This is the set of IPP Client supplied Resource Template attributes
       and their new values, i.e., any of the Resource object attributes
       in section 5.1.

       The IPP Client MUST supply the "resource-create-date-time"
       attribute (see section 5.3.5). All other Resource attributes are
       OPTIONAL for the IPP Client to supply.

       See 'Group 3: Resource Object Attributes' in section 4.1.1.2
       'Get-Resource-Attributes Response'.

       See section 5.1 'Table of Resource Template Attributes'.

845   Group 3: Resource Object Data
846
847   See section 5.x 'resource-data-present'.
848   See section 3.2.1.1 'Print-Job Request' in [IPP-MOD].
849
850   The IPP Client OPTIONALLY sends the Resource data (if any) to the
851   IPP Printer, within the constraints of administratively configured
852   access control policies and any applicable copyright or other
853   intellectual property considerations. If the IPP Client supplies
854   Resource data for a Resource type that is not defined to allow
855   Resource data, the IPP Printer MUST reject the request and return a
856   status code of 'client-error-not-possible'.
857
858
859
860   4.2.1.2. Create-Resource Response
861
862   See section 4.1.1.2 'Get-Resource-Attributes Response'.
863
864
865   Group 1: Operation Attributes
866
867   See 'Group 1: Operation Attributes' in section 4.1.1.2
868   'Get-Resource-Attributes Response'.
869
870
871   Group 2: Unsupported Attributes
872
873   See 'Group 2: Unsupported Attributes' in section 4.1.1.2
874   'Get-Resource-Attributes Response'.
875
876
877   Group 3: Resource Object Attributes
878
879   This group MUST be returned if and only if the "status-code"
880   parameter returned in Group 1 has the value 'successful-ok' or
881   'successful-ok-ignored-or-substituted-attributes'. All IPP
882   Printers MUST return the following Resource attributes in
883   successful Create-Resource responses:
884   "resource-id" (integer(1:MAX)) -- generated by the IPP Printer
885   "resource-lease-duration" (integer(0:MAX)) -- lease actually
886   granted
887
888   All IPP Printers MUST support the "requested-attributes" operation
889   attribute and conform to the behavior described in section 4.1.1.1
890   'Get-Resource-Attributes Request'.
891
892   See 'Group 3: Resource Object Attributes' in section 4.1.1.2
893   'Get-Resource-Attributes Response'.
894
895

900
901   See section 5.1 'Table of Resource Template Attributes'.
902
903
904   In addition to the MANDATORY parameters required for every operation
905   request, the simplest Create-Resource Request consists of just the
906   "attributes-charset", "attributes-natural-language", "resource-type",
907   and "resource-name" operation attributes; the "printer-uri" target
908   operation attribute; the OPTIONAL Resource data (if any) and nothing
909   else. In this simplest case, the IPP Printer object:
910
911   - creates a new Resource object (the Resource object MAY contain
912   Resource data);
913   - generates a locally unique "resource-id" for the new Resource;
914   - stores the name supplied by the IPP Client in the "resource-name"
915   attribute in the natural language and charset requested (see
916   Section 3.1.4.1 of [IPP-MOD]) (if those are supported, otherwise
917   using the Printer object's default natural language and charset);
918   and
919   - uses its corresponding default value attributes (e.g.,
920   "resource-lease-duration-default") for the supported Resource
921   Template attributes that were not supplied by the IPP Client in the
922   Create-Resource operation.
923
924
925
926   4.2.2. Delete-Resource Operation
927
928   OPTIONAL - for IPP Printers to implement.
929
930   This operation allows an authorized IPP Client to delete a Resource
931   object instance on this IPP Printer.
932
933
934
935   4.2.2.1. Delete-Resource Request
936
937   The IPP Client submits the Delete-Resource request to an IPP Printer
938   object.
939
940   The IPP Client supplies the following groups of attributes as part of
941   the Delete-Resource Request:
942
943
944   Group 1: Operation Attributes
945
946   See 'Group 1: Operation Attributes' in section 4.1.1.1
947   'Get-Resource-Attributes Request'.
948
949   Resource Name or ID:
950
951

955
956   The "resource-name (name(127))" attribute as described in section
957   5.4.2 in this document
958   <OR>
959   the "resource-id (integer(1:MAX))" attribute as described in
960   section 5.4.3.
961
962   "requested-attributes" (1setOf keyword):
963   The IPP Client OPTIONALLY supplies this attribute. The IPP Printer
964   MUST support this attribute. It is a set of attribute names and/or
965   attribute group names in whose values the requester is interested.
966   If the IPP Client omits this attribute, the IPP Printer MUST
967   respond as if this attribute had been supplied with a value of
968   'all'.
969
970
971
972   4.2.2.2. Delete-Resource Response
973
974   See section 4.1.1.2 'Get-Resource-Attributes Response'.
975
976
977   Group 1: Operation Attributes
978
979   See 'Group 1: Operation Attributes' in section 4.1.1.2
980   'Get-Resource-Attributes Response'.
981
982
983   Group 2: Resource Object Attributes
984
985   This group MUST be returned if and only if the "status-code"
986   parameter returned in Group 1 has the value 'successful-ok'. All
987   IPP Printers MUST return the following Resource attribute in
988   successful Delete-Resource responses:
989   "resource-id" (integer(1:MAX))
990
991   All IPP Printers MUST support the "requested-attributes" operation
992   attribute and conform to the behavior described in section 4.1.1.1
993   'Get-Resource-Attributes Request'.
994
995
996
997   4.2.3. Refresh-Resource Operation
998
999   OPTIONAL - for IPP Printers to implement.
1000
1001   This operation allows an authorized IPP Client to refresh a Resource
1002   object instance on this IPP Printer (i.e., fetch the Resource data
1003   and locally cache it, setting "resource-data-present" to 'true' and
1004   "resource-data-k-octets" to the actual size).
1005
1006
1007
1009

1012
1013
1014   4.2.3.1. Refresh-Resource Request
1015
1016   The IPP Client submits the Refresh-Resource request to an IPP Printer
1017   object.
1018
1019   The IPP Client supplies the following groups of attributes as part of
1020   the Refresh-Resource Request:
1021
1022
1023   Group 1: Operation Attributes
1024
1025   See 'Group 1: Operation Attributes' in section 4.1.1.1
1026   'Get-Resource-Attributes Request'.
1027
1028   Resource Name or ID:
1029   The "resource-name (name(127))" attribute as described in section
1030   5.4.2 in this document
1031   <OR>
1032   the "resource-id (integer(1:MAX))" attribute as described in
1033   section 5.4.3.
1034
1035   "requested-attributes" (1setOf keyword):
1036   The IPP Client OPTIONALLY supplies this attribute. The IPP Printer
1037   MUST support this attribute. It is a set of attribute names and/or
1038   attribute group names in whose values the requester is interested.
1039   If the IPP Client omits this attribute, the IPP Printer MUST
1040   respond as if this attribute had been supplied with a value of
1041   'all'.
1042
1043
1044
1045   4.2.3.2. Refresh-Resource Response
1046
1047   See section 4.1.1.2 'Get-Resource-Attributes Response'.
1048
1049
1050   Group 1: Operation Attributes
1051
1052   See 'Group 1: Operation Attributes' in section 4.1.1.2
1053   'Get-Resource-Attributes Response'.
1054
1055
1056   Group 2: Resource Object Attributes
1057
1058   This group MUST be returned if and only if the "status-code"
1059   parameter returned in Group 1 has the value 'successful-ok'. All
1060   IPP Printers MUST return the following Resource attribute in
1061   successful Refresh-Resource responses:
1062
1063

1068   "resource-id" (integer(1:MAX))
1069
1070   All IPP Printers MUST support the "requested-attributes" operation
1071   attribute and conform to the behavior described in section 4.1.1.1
1072   'Get-Resource-Attributes Request'.
1073
1074
1075
1076   4.2.4. Renew-Resource Operation
1077
1078   OPTIONAL - for IPP Printers to implement.
1079
1080   This operation allows an authorized IPP Client to renew the (finite)
1081   lease of a Resource object instance on this IPP Printer (i.e., renew
1082   the Resource lease for "resource-duration" forward from the current
1083   time).
1084
1085
1086
1087   4.2.4.1. Renew-Resource Request
1088
1089   The IPP Client submits the Renew-Resource request to an IPP Printer
1090   object.
1091
1092   The IPP Client supplies the following groups of attributes as part of
1093   the Renew-Resource Request:
1094
1095
1096   Group 1: Operation Attributes
1097
1098   See 'Group 1: Operation Attributes' in section 4.1.1.1
1099   'Get-Resource-Attributes Request'.
1100
1101   Resource Name or ID:
1102   The "resource-name (name(127))" attribute as described in section
1103   5.4.2 in this document
1104   <OR>
1105   the "resource-id (integer(1:MAX))" attribute as described in
1106   section 5.4.3.
1107
1108   "requested-attributes" (1setOf keyword):
1109   The IPP Client OPTIONALLY supplies this attribute. The IPP Printer
1110   MUST support this attribute. It is a set of attribute names and/or
1111   attribute group names in whose values the requester is interested.
1112   If the IPP Client omits this attribute, the IPP Printer MUST
1113   respond as if this attribute had been supplied with a value of
1114   'all'.
1115
1116
1117   Group 2: Resource Object Attributes
1118
1119

1124
1125   "resource-lease-duration" (integer(0:MAX))
1126   Note: Even though Resource objects are static (i.e, there is no
1127   Set-Resource operation defined, intentionally), an IPP Client MAY
1128   supply a new (possibly different) value for
1129   "resource-lease-duration". As always, the IPP Printer MAY grant a
1130   shorter lease according to the value of the Printer attribute
1131   "resource-lease-duration-supported".
1132
1133   in a Renew-Resource operation.
1134
1135
1136
1137   4.2.4.2. Renew-Resource Response
1138
1139   See section 4.1.1.2 'Get-Resource-Attributes Response'.
1140
1141
1142   Group 1: Operation Attributes
1143
1144   See 'Group 1: Operation Attributes' in section 4.1.1.2
1145   'Get-Resource-Attributes Response'.
1146
1147
1148   Group 2: Resource Object Attributes
1149
1150   This group MUST be returned if and only if the "status-code"
1151   parameter returned in Group 1 has the value 'successful-ok'. All
1152   IPP Printers MUST return the following Resource attributes in
1153   successful Renew-Resource responses:
1154   "resource-id" (integer(1:MAX))
1155   "resource-lease-duration" (integer(0:MAX))
1156
1157   All IPP Printers MUST support the "requested-attributes" operation
1158   attribute and conform to the behavior described in section 4.1.1.1
1159   'Get-Resource-Attributes Request'.
1160
1161
1162
1163   4.3. Printer Operation Extensions - REQUIRED
1164
1165
1166
1167   4.3.1. Get-Printer-Attributes Operation
1168
1169   This operation is extended so that it returns Printer attributes
1170   defined .
1171
1172   All IPP Printers that support IPP Resource objects MUST implement
1173   this extension to the 'Get-Printer-Attributes' operation.
1174

1181   In addition to the requirements of [IPP-MOD] section 3.2.5, an IPP
1182   Printer MUST support the following additional values for the
1183   "requested-attributes" Operation attribute in this operation and
1184   return such attributes in the Printer Object Attributes group of its
1185   response.
1186
1187
1188   1. Resource Template Attributes: ALL "xxx-default" attributes in
1189   column 1 of section 5.1 'Table of Resource Template Attributes'.
1190
1191   2. New Printer Description Attributes: ALL "xxx-supported"
1192   attributes in column 1 of section 5.1 'Table of Resource Template
1193   Attributes'.
1194
1195   3. New Group Name: The 'resource-template' group name, which names
1196   all supported Resource Template attributes in section 5.1 'Table
1197   of Resource Template Attributes'. This group name is also used in
1198   the Get-Resources-Attributes and Get-Resources operation with an
1199   analogous meaning.
1200
1201   4. Extended Group Name: The 'all' group name, which names all IPP
1202   Printer attributes according to [IPP-MOD] section 3.2.5. In this
1203   extension 'all' names all attributes specified in [IPP-MOD] plus
1204   those named in items 1 and 2 of this list.
1205
1206
1207
1208   4.4. Resource Operation Response Status Codes
1209
1210   client-error-not-authenticated
1211   client-error-not-authorized
1212   client-error-resource-type-not-supported
1213   client-error-resource-data-not-supported
1214   client-error-resource-data-not-present
1215

1238   5.   Resource Attributes
1239
1240   All IPP Resource attributes presently defined are REQUIRED for all IPP
1241   Printer implementations of Resource objects.
1242
1243
1244
1245   5.1.   Table of Resource Template Attributes
1246
1247   All IPP Printers that support IPP Resource objects MUST implement ALL
1248   of the following REQUIRED Resource Template attributes defined in
1249   this specification (on the Resource object or the Printer object as
1250   specified below).
1251
1252   All Resource Template attributes are passed in a Resource Attributes
1253   Group in IPP Resource operations.
1254
1255   Resource Object Attribute   Resource Attribute Type
1256   Printer Object Attribute(s)   Printer Attribute Type(s)
1257   --------------------------------   ----------------------------
1258   resource-charset   (charset)
1259   charset-configured   (charset)
1260   charset-supported   (1setOf charset)
1261
1262   resource-natural-language   (naturalLanguage)
1263   natural-language-configured   (naturalLanguage)
1264   generated-natural-language-supported (1setOf naturalLanguage)
1265
1266   resource-info   (text(127))
1267   [no default/supported on Printer]
1268
1269   resource-document-formats   (1setOf mimeMediaType)
1270   document-format-default   (mimeMediaType)
1271   document-format-supported   (1setOf mimeMediaType)
1272
1273   resource-create-date-time   (dateTime)
1274   [no default/supported on Printer]
1275
1276   resource-lease-duration   (integer(0:MAX))
1277   resource-lease-duration-default   (integer(0:MAX))
1278   resource-lease-duration-supported   (rangeOfInteger(0:MAX))
1279
1280   resource-data-present   (boolean)
1281   [no default on Printer]
1282   resource-data-present-supported   (1setOf boolean)
1283
1284   resource-data-uri   (1setOf uri)
1285   [no default on Printer]
1286   reference-uri-schemes-supported   (1setOf uriScheme)
1287
1289

1292
```
1293      resource-data-k-octets                  (integer(0:MAX))
1294          [no default on Printer]
1295          resource-data-k-octets-supported      (rangeOfInteger (0:MAX))
1296
1297      resource-data-compression               (type3 keyword)
1298          [no default on Printer]
1299          compression-supported                 (1setOf type3 keyword)
1300
```
1301
1302   5.2. Table of Resource Description Attributes
1303
1304   All IPP Printers that support IPP Resource objects MUST implement ALL
1305   of the following REQUIRED Resource Description attributes defined in
1306   this specification (on the Resource object or the Printer object as
1307   specified below).
1308
1309   All Resource Description attributes that MAY be supplied by an IPP
1310   Client are passed in an Operation Attributes Group in IPP Resource
1311   operations.
1312
```
1313      Resource Description Attribute          Resource Attribute Type
1314      ---------------------------------       -------------------------
1315      resource-type                           (type2 keyword)
1316
1317      resource-name                           (name(127))
1318
1319      resource-id                             (integer(1:MAX))
1320
1321      resource-printer-uri                    (uri)
1322
1323      resource-create-user-name               (name(MAX))
1324
1325      resource-create-time                    (integer(0:MAX))
1326
1327      resource-expiration-time                (integer(0:MAX))
1328
```
1329
1330   5.3. Resource Template Attributes
1331
1332
1333
1334   5.3.1. resource-charset (charset)
1335
1336   REQUIRED - for IPP Printers to implement.
1337
1338   This attribute specifies the charset of 'text' and 'name' attributes
1339   of the Resource and of textual data in the associated Resource data
1340   (if any).
1341
1342
1343

1348
1349
1350   5.3.2. resource-natural-language (naturalLanguage)
1351
1352   REQUIRED - for IPP Printers to implement.
1353
1354   This attribute specifies the natural language of 'text' and 'name'
1355   attributes of the Resource and of textual data in the associated
1356   Resource data (if any).
1357
1358
1359
1360   5.3.3. resource-info (text(127))
1361
1362   REQUIRED - for IPP Printers to implement.
1363
1364   This attribute specifies descriptive information about this Resource
1365   object. This may include manufacturer, version, copyright, etc.
1366
1367   See section 4.4.6 'printer-info' in [IPP-MOD].
1368   See section 4.4.9 'printer-make-and-model' in [IPP-MOD].
1369
1370
1371
1372   5.3.4. resource-document-formats (1setOf mimeMediaType)
1373
1374   REQUIRED - for IPP Printers to implement.
1375
1376   This attribute specifies the list of document formats supported by
1377   the Resource (e.g., 'application/postscript' for a Resource of type
1378   'font').
1379
1380
1381
1382   5.3.5. resource-create-date-time (dateTime)
1383
1384   REQUIRED - for IPP Printers to implement.
1385
1386   This attribute indicates the date and time at which the Resource
1387   object instance was created.
1388
1389   IPP Resource objects created during product manufacturing (via
1390   software download to the IPP Printer, for example) MUST include a
1391   vendor-supplied value for "resource-create-date-time". This value
1392   SHOULD reflect the actual 'build date' of the Resource, rather than
1393   simply the 'install date' on the IPP Printer, because this is more
1394   informative for the end user.
1395
1396   IPP Resource objects created with the Create-Resource operation MUST
1397   include an IPP Client-supplied value for "resource-create-date-time"
1398   in the create request.
1399
1401

1403
1404
1405   See section 4.4.30 'printer-current-time' in [IPP-MOD].
1406   See section 4.3.14.5 'date-time-at-creation' in [IPP-MOD].
1407
1408
1409
1410   5.3.6. resource-lease-duration (integer(0:MAX))
1411
1412   REQUIRED - for IPP Printers to implement.
1413
1414   This attribute indicates length of the Resource object instance lease
1415   in seconds.
1416
1417   If this attribute is zero '0', then the lease on this Resource object
1418   instance is infinite (i.e., the lease never expires).
1419
1420   If this attribute is non-zero, then this Resource object instance has
1421   a finite lease and expires according to "resource-expiration-time"
1422   granted by the IPP Printer.
1423
1424   See section 5.x 'resource-create-time'.
1425   See section 5.x 'resource-expiration-time'.
1426
1427
1428
1429   5.3.7. resource-data-present (boolean)
1430
1431   REQUIRED - for IPP Printers to implement.
1432
1433   The attribute indicates whether or not a local copy of the Resource
1434   data is present at the IPP Printer.
1435
1436   This attribute MUST default to 'false', if not supplied by the IPP
1437   Client in the Create-Resource operation.
1438
1439   When "resource-data-present" is 'true' on a Resource object instance,
1440   it indicates that the IPP Printer has stored a local copy of the
1441   Resource data or has fetched a local copy of the Resource data that
1442   was specified by reference in "resource-data-uri".
1443
1444   When "resource-data-present" is 'false' on a Resource object instance
1445   and "resource-data-uri" is empty, it indicates that there is no
1446   Resource data.
1447
1448   When "resource-data-present" is 'false' on a Resource object instance
1449   and "resource-data-uri" is non-empty, it indicates that the IPP
1450   Printer has NOT yet fetched a local copy of the Resource data that
1451   was specified by reference and the value of "resource-data-k-octets"
1452   is unverified.
1453
1454   See section 4.2.3 'Refresh-Resource Operation'.
1455
1457

1460
1461
1462
1463   5.3.8. resource-data-uri (1setOf uri)
1464
1465   REQUIRED - for IPP Printers to implement.
1466
1467   This attribute contains the URI of associated Resource data (if any)
1468   as a reference.
1469
1470   Lazy Refresh:
1471   An IPP Printer NEED NOT immediately fetch a local copy of the
1472   Resource data specified by reference in "resource-data-uri", but MUST
1473   set "resource-data-present" to 'false' until a local copy is fetched.
1474
1475   When an IPP Printer does fetch a local copy of the Resource data, it
1476   MUST set (REQUIRED) "resource-data-present" to 'true' and set
1477   (REQUIRED) "resource-data-k-octets" to the actual size.
1478
1479   ISSUE_5: This 'lazy refresh' behavior may have performance and
1480   'stale data' consequences for IPP Clients. Because the manufacturer
1481   may also be slow to inform installed IPP Printers of a new version of
1482   a Resource (for update by means outside of this specification) the
1483   'stale data' problem may also apply to IPP Printers. Should we add
1484   an operation attribute to PREVENT this 'lazy refresh' behavior?
1485
1486   See section 4.2.3 'Refresh-Resource Operation'.
1487   See section 5.x 'resource-data-present'.
1488   See section 4.4.27 'reference-uri-schemes-supported' in [IPP-MOD].
1489   See section 3.2.2 'Print-URI' in [IPP-MOD].
1490
1491
1492
1493   5.3.9. resource-data-k-octets (integer(0:MAX))
1494
1495   REQUIRED - for IPP Printers to implement.
1496
1497   This attribute contains the size of associated Resource data (if
1498   any). An IPP Printer MUST set this attribute to zero for Resource
1499   types that MUST not have Resource data supplied by reference in
1500   "resource-data-uri" or by value in a Create-Resource operation.
1501
1502   See 'Lazy Refresh' in section 5.x 'resource-data-uri' of this
1503   document for IPP Printer behavior with respect to
1504   "resource-data-k-octets".
1505
1506   See section 4.2.3 'Refresh-Resource Operation'.
1507   See section 5.x 'resource-data-present'.
1508
1509
1510
1511
1513

5.3.10. resource-data-compression (type3 keyword)

REQUIRED - for IPP Printers to implement.

This attribute identifies the compression of the associated Resource
data (if any).

See section 4.4.32 'compression-supported' in [IPP-MOD] for standard
keyword values.

5.4. Resource Description Attributes

5.4.1. resource-type (type2 keyword)

REQUIRED - for IPP Printers to implement.

This attribute identifies the type of this Resource object instance
which determines additional Resource attributes specific to the named
type.

The following standard keyword values are defined:

    'font': The Resource contains font characteristics and
    (OPTIONALLY) font data.

    'form': The Resource contains form characteristics and
    (OPTIONALLY) form data.

    'image': The Resource contains image characteristics and
    (OPTIONALLY) image data.

    'logo': The Resource contains logo characteristics and
    (OPTIONALLY) logo data.

    'media': The Resource contains media characteristics for a
    single medium and MUST NOT contain media data.

See section 5.5 'Job Template Attributes for Resources'.

5.4.2. resource-name (name(127))

REQUIRED - for IPP Printers to implement.

1572
1573   This attribute is the human-readable name of the Resource object
1574   instance. This name is more user-friendly than the integer
1575   "resource-id" attribute.
1576
1577   Note: Unlike the "job-name" attribute, the value of "resource-name"
1578   MUST be unique among Resources of the SAME "resource-type". IPP
1579   Printers MUST not allow Resource object instances of the SAME
1580   "resource-type" to exist with duplicate "resource-name" values. IPP
1581   Printers MUST reject Create-Resource operations that specify
1582   duplicate "resource-name" values.
1583
1584   Note: This attribute has been specified as REQUIRED (unlike
1585   "job-name") in the interests of ease-of-use. IPP Printers are
1586   expected to implement large numbers of Resource objects and the
1587   guaranteed presence of a user-friendly name will benefit ease-of-use.
1588
1589   See section 4.3.5 'job-name' in [IPP-MOD].
1590
1591
1592
1593   5.4.3. resource-id (integer(1:MAX))
1594
1595   REQUIRED - for IPP Printers to implement.
1596
1597   This attribute contains the locally unique ID (for a given value of
1598   "resource-type") of the Resource object instance.
1599
1600   The IPP Printer, on creation of a new Resource object instance, (by
1601   means outside of this specification) generates an ID which identifies
1602   the new Resource object instance on the Printer specified by the
1603   value of "resource-printer-uri" (but not globally). The zero '0'
1604   value is not included to allow for compatibility with SNMP index
1605   values which also cannot be zero '0'.
1606
1607   See section 4.3.2 'job-id' in [IPP-MOD].
1608
1609
1610
1611   5.4.4. resource-printer-uri (uri)
1612
1613   REQUIRED - for IPP Printers to implement.
1614
1615   This attribute identifies the IPP Printer that hosts this Resource
1616   object instance (i.e., records the value of the "printer-uri" target
1617   attribute from a Create-Resource operation).
1618
1619   See section 4.3.3 'job-printer-uri' in [IPP-MOD].
1620
1621
1622
1623

1628
1629
1630   5.4.5. resource-create-user-name (name(MAX))
1631
1632   REQUIRED - for IPP Printers to implement.
1633
1634   This attribute contains the name of the end user that created this
1635   Resource object instance.
1636
1637   For factory-installed resources, "resource-create-user-name" MUST be
1638   set to the empty string to prevent namespace conflicts in end user
1639   networks.
1640
1641   See section 4.3.6 'job-originating-user-name' in [IPP-MOD].
1642
1643
1644
1645   5.4.6. resource-create-time (integer(0:MAX))
1646
1647   REQUIRED - for IPP Printers to implement.
1648
1649   This attribute indicates the time at which the Resource object
1650   instance was created (i.e., the value of "printer-up-time" when the
1651   Resource object instance was created).
1652
1653   If this Resource was created prior to the most recent system startup,
1654   then the IPP Printer MUST set this attribute to zero '0'.
1655
1656   See section 5.x 'resource-expiration-time'.
1657   See section 5.x 'resource-lease-duration'.
1658   See section 4.4.29 'printer-up-time' in [IPP-MOD].
1659   See section 4.3.14.1 'time-at-creation' in [IPP-MOD].
1660
1661
1662
1663   5.4.7. resource-expiration-time (integer(0:MAX))
1664
1665   REQUIRED - for IPP Printers to implement.
1666
1667   This attribute indicates the time at which the Resource object
1668   instance lease will expire. (i.e., the value of "printer-up-time"
1669   when the Resource object instance will be deleted by the IPP
1670   Printer).
1671
1672   If "resource-lease-duration" is zero '0', then the IPP Printer MUST
1673   set "resource-expiration-time" also to zero '0' (i.e., infinite
1674   lease).
1675
1676   See section 5.x 'resource-create-time'.
1677   See section 5.x 'resource-lease-duration'.
1678
1679

See section 4.4.29 'printer-up-time' in [IPP-MOD].
See section 4.3.14.3 'time-at-completed' in [IPP-MOD].

5.5. Job Template Attributes for Resources

Each Resource Type Definition MUST specify whether or not the
Resource type MAY be associated with a Job object. If so, then two
new Job Description attributes are algorithmically added to the
definition of a Job object:

5.5.1. restype (name (127))

Where 'restype' is a standard keyword for "resource-type" (e.g.,
'media' yields the Job attribute named simply "media").

This Job attribute specifies the "resource-name" value of a single
Resource object instance with "resource-type" of 'restype' that is
REQUIRED for this Job and that SHOULD override any PDL instructions
in the Job datastream.

This attribute supplies advice for job scheduling to the IPP Printer.

See section 4.2.1 "media" in [IPP-MOD].
See 'media-needed' keyword in section 4.4.12 "printer-state-reasons"
in [IPP-MOD].

5.5.2. restype-required (1setOf name(127))

Where 'restype' is a standard keyword for "resource-type" (e.g.,
'media' yields the Job attribute named "media-required").

This Job attribute specifies the "resource-name" values of a set of
Resource object instances with "resource-type" of 'restype' that are
REQUIRED for this Job and that SHOULD override any PDL instructions
in the Job datastream.

This attribute supplies advice for job scheduling to the IPP Printer.

See section 4.2.1 "media" in [IPP-MOD].
See 'media-needed' keyword in section 4.4.12 "printer-state-reasons"
in [IPP-MOD].

1740
1741
1742 6. Rules for Resource Type Definitions
1743
1744
1745
1746   6.1. Do NOT define new operations for Resource
1747
1748   REQUIRED - Do NOT define any new operations for the Resource.
1749
1750
1751
1752   6.2. Define new type keyword for Resource
1753
1754   REQUIRED - Define a new type keyword 'restype' for the Resource.
1755
1756
1757
1758   6.3. Define new type-specific attributes for Resource
1759
1760   OPTIONAL - Define type-specific attributes for the Resource with
1761   names of the form "restype-yyy" (e.g., "media-size"), using the
1762   'restype' keyword chosen above. is a simple attribute name for this
1763   Resource type.
1764
1765
1766
1767   6.4. Define new Printer attributes for Resource
1768
1769   REQUIRED - Define new Resource Template attributes on the Printer
1770   object for the Resource, named "restype-default" and
1771   "restype-supported", using the 'restype' keyword chosen above (e.g.,
1772   "media-default" and "media-supported"). "restype-supported" lists
1773   all the current values of "resource-name" for this Resource type.
1774
1775   OPTIONAL - Define new Resource Template attributes on the Printer
1776   object for the Resource, if this Resource has type-specific
1777   attributes (e.g., "media-size-default").
1778
1779
1780
1781   6.5. Define new Job attributes for Resource
1782
1783   OPTIONAL - Define new Job Template attributes for the Resource, if
1784   this Resource MAY be associated with a Job (e.g., "media-required").
1785
1786   See section 5.5 'Job Template Attributes for Resources'.
1787
1788
1789
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1793

   6.6. Define Printer operation extensions for Resource

1851
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1853
1854   7. Conformance Requirements
1855
1856
1857
1858   7.1. IPP Client Conformance Requirements
1859
1860   IPP Clients MUST supply the required operation attributes in Resource
1861   operations.
1862
1863
1864   7.2. IPP Printer Conformance Requirements
1865
1866
1867
1868   7.2.1. Resource Operations
1869
1870   All IPP Printers that support IPP Resource objects MUST implement the
1871   following REQUIRED operations defined in this specification:
1872
1873   Resource Operation
1874   ------------------
1875   Get-Resource-Attributes
1876   Get-Resource-Data
1877   Get-Resources
1878
1879
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1909
1910   7.2.2. Resource Attributes
1911
1912   All IPP Resource attributes presently defined are REQUIRED for all
1913   IPP Printer implementations of Resource objects.
1914
1915   See section 5.1 'Table of Resource Template Attributes'
1916   See section 5.2 'Table of Resource Description Attributes'.
1917
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1964
1965
1966   8.   IANA Considerations
1967
1968   See section 6 'IANA Considerations' in [IPP-MOD].
1969
1970
1971
1972   9.   Internationalization Considerations
1973
1974   This IPP Resource Objects specification continues support for the
1975   internationalization in [IPP-MOD] attributes containing text strings
1976   and names.
1977
1978   See section 7 'Internationalization Considerations' in [IPP-MOD].
1979
1980
1981
1982   10.   Security Considerations
1983
1984   This IPP Resource Objects specification inherits the same security
1985   considerations for Resources as are specified for Jobs in [IPP-MOD].
1986
1987   See section 8 'Security Considerations' in [IPP-MOD].
1988
1989
1990
1991   11.   Encodings of Additional Protocol Tags
1992
1993
1994
1995   11.1.   Encodings of Additional Attribute Tags
1996
1997   The section assigns a value to a new attribute tag as an extension to
1998   the encoding defined in [IPP-PRO].
1999
2000   The resource-attributes-tag delimits Resource Template Attributes
2001   Groups in requests and Resource Attributes Groups in responses.
2002
2003   Tag Value (Hex)   Tag Meaning
2004   ---------------   -----------
2005   0x08   resource-attributes-tag
2006
2007
2008
2009   11.2.   Encodings of Additional Operation Tags
2010
2011   The section assigns values to new operation tags as extensions to the
2012   encoding defined in [IPP-PRO].
2013
2014
2015
2017

2019
2020   Tag Value (Hex)   Tag Meaning
2021   ---------------   -----------
2022   0x1E   Get-Resource-Attributes
2023   0x1F   Get-Resource-Data
2024   0x20   Get-Resources
2025   [TBD]   Create-Resource
2026   [TBD]   Delete-Resource
2027   [TBD]   Refresh-Resource
2028   [TBD]   Renew-Resource
2029
2030
2031
2032 12. References
2033
2034   See section 9 'References' in [IPP-MOD].
2035

2036   [IPP-MOD] R. deBry, T. Hastings, R. Herriot, S. Isaacson, P. Powell.
2037   IPP/1.1 Model and Semantics, <draft-ietf-ipp-model-v11-07.txt>, May
2038   2000 (adopted by IESG as Proposed Standard in June 2000).
2039
2040   [IPP-NOT] S. Isaacson, J. Martin, R. deBry, T. Hastings, M. Shepherd,
2041   R. Bergman. IPP Event Notification Specification,
2042   <draft-ietf-ipp-not-spec-02.txt> (work-in-progress), March 2000.
2043
2044   [OS-TYPE] IANA Registry of Operating System Names at
2045   ftp://ftp.isi.edu/in-notes/iana/assignments/operating-system-names.
2046
2047
2048
2049 13. Authors' Addresses
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14. Appendix A - Change History

   [To be deleted before RFC publication]

   7 September 2000 - draft-ietf-ipp-get-resource-01.txt
   - revised Abstract and Introduction for admin operations
   - deleted all references to the resource type 'driver'
   - named package of Resource query (Get) operations in section 4
   - added package of Resource system admin operations to section 4
   - added Create-Resource to create (install) static resources
   - added Delete-Resource to delete (remove) static resources
   - added Refresh-Resource to refresh (locally cache) resource data
   - added Renew-Resource to renew (finite) resource leases
   - revised section 5.1 'Table of Resource Template Attributes'
   - revised section 5.2 'Table of Resource Description Attributes'
   - added section 6 'Rules for Resource Type Definitions'
   - deleted "resource-persistence" (redundant with zero lease)
   - renamed "resource-duration" to "resource-lease-duration"
   - deleted "resource-os-types" (was used for 'driver' resources)
   - deleted "resource-change-time" and "resource-refresh-time"

   7 July 2000 - draft-ietf-ipp-get-resource-00.txt
   - initial version - Get operations and Driver resource type

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Document Number 9

1 INTERNET-DRAFT
2 <draft-ietf-ipp-finishings-fold-trim-bale-01~~0~~.txt>

3 <div align="right">T. Hastings</div>

T. Hastings
4   Xerox Corporation
5   D. Fullman
6   Xerox Corporation
7   May 31, 2000~~October 20, 1999~~
8

9   Internet Printing Protocol/1.1: "finishings" ~~'fold', 'trim', and 'bale'~~ attribute values extension
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11

12 Status of this Memo

13 This document is an Internet-Draft and is in full conformance with all provisions of Section 10 of
14 [RFC2026]. Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its
15 areas, and its working groups. Note that other groups may also distribute working documents as Internet-
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22 **Abstract**

23 This document specifies the additional enum values 'fold', 'trim', ~~and~~ 'bale', 'booklet-maker', 'jog-offset',
24 'bind-left', 'bind-top', 'bind-right', and 'bind-bottom' ~~'booklet-maker'~~ for the IPP/1.1 "finishings" Job
25 Template attribute for use with the Internet Printing Protocol/1.1 (IPP) [ipp-mod, ipp-pro]. This attribute
26 permits the client to specify additional finishing options, including values that include a specification of a
27 coordinate system for the placement of finishings operation with respect to the corners and edges of portrait
28 and landscape documents.

T. Hastings, D. Fullman   [page 1]

Expires ~~April 20~~November 30, 2000

29   The full set of IPP documents includes:

30   Design Goals for an Internet Printing Protocol [RFC2567]
31   Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
32   Internet Printing Protocol/1.1: Model and Semantics [ipp-mod]
33   Internet Printing Protocol/1.1: Encoding and Transport [ipp-pro]
34   Internet Printing Protocol/1.1: Implementer's Guide [ipp-iig]
35   Mapping between LPD and IPP Protocols [RFC2569]
36

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

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

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

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

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

58

59

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72

1   Additional values for the "finishings" Job Template attribute

1.1   Problem

Need additional enum values for finishing to specify which of four corners to put a single staple, which of four edges to put two staples, which of four edges to bind, and generic values for the following: fold, trim, bale, saddle stitch, and edge stitch, signature booklet maker and jog-offset.

1.2   Suggested solution

This solution has been proposed at two three previous meetings with comments returned and incorporated. The suggestion is to add additional enum values to the "finishings" Job Template attributes (also applies to "finishings-default" and "finishings-supported" attributes).

Coordination with the Finisher MIB has been done. There appears to be no direct way to use the same enum values, since the Finisher MIB divides up finishing into separate enum values by type. So all the stapling is done as a separate enum. Also all the punching is done as a separate enum.

The coordinate system scheme has been selected to agree with the Finisher MIB which in turn follows the ISO DPA approach of using a coordinate system as if the document were portrait. The approach for coordinate system being relative to the intended reading direction depends on the device being able to understand the orientation embedded in the PDL, which is too problematic for many PDLs. The approach for the coordinate system of being relative to the media feed direction is too dependent on the way the device is currently set up, i.e., pulling short edge first vs. long edge first, and can vary between different output-bins in the same device.

Additional (new) keyword symbolic names of these enum values are:
<div style="text-align:center">

fold

trim

bale

booklet-maker

jog-offset

bind-left

bind-top

bind-right

bind-bottom
</div>

Although not a part of this specification, more specific values for saddle-stitch and fold could be considered once adequate definitions have been developed. Some examples are:
<div style="text-align:center">

saddle-stitch-single-long

saddle-stitch-single-short

saddle-stitch-dual-long
</div>

108		saddle-stitch-dual-short
109		fold-in-half-long
110		fold-in-half-short
111		fold-in-thirds-long
112		fold-in-thirds-short
113		fold-z-long
114		fold-z-short
115		

1.3   Proposed Text

117 Add the following paragraphs indicated with revision marks to the description of the "finishings" Job
118 Template attribute, section 4.2.6, so that the entire section would be:

4.2.6 finishings (1setOf type2 enum)

120 This attribute identifies the finishing operations that the Printer uses for each copy of each printed
121 document in the Job. For Jobs with multiple documents, the "multiple-document-handling" attribute
122 determines what constitutes a "copy" for purposes of finishing.

123 Standard enum values are:

124	Value	Symbolic Name and Description
125		
126	'3'	'none': Perform no finishing
127	'4'	'staple': Bind the document(s) with one or more staples. The exact number and placement of
128		the staples is site-defined.
129	'5'	'punch': This value indicates that holes are required in the finished document. The exact
130		number and placement of the holes is site-defined The punch specification MAY be
131		satisfied (in a site- and implementation-specific manner) either by drilling/punching,
132		or by substituting pre-drilled media.
133	'6'	'cover': This value is specified when it is desired to select a non-printed (or pre-printed)
134		cover for the document. This does not supplant the specification of a printed cover
135		(on cover stock medium) by the document itself.
136	'7'	'bind': This value indicates that a binding is to be applied to the document; the type and
137		placement of the binding is site-defined.
138	'8'	'saddle-stitch': Bind the document(s) with one or more staples (wire stitches) along the
139		middle fold. The exact number and placement of the staples and the middle fold is
140		implementation and/or site-defined.
141	'9'	'edge-stitch': Bind the document(s) with one or more staples (wire stitches) along one edge.
142		The exact number and placement of the staples is implementation and/or site-
143		defined.
144	'10'	'fold': Fold the document(s) with one or more folds. The exact number and orientations of
145		the folds is implementation and/or site-defined.
146	'11'	'trim': Trim the document(s) on one or more edges. The exact number of edges and the
147		amount to be trimmed is implementation and/or site-defined.

148	'12'	'bale': Bale the document(s). The type of baling is implementation and/or site-defined.
149	'13'	'booklet-maker': Deliver the document(s) to the signature booklet maker. This value is a
150		short cut for specifying a job that is to be folded, trimmed and then saddle-stitched.
151	'14'	'jog-offset': Shift each copy of an output document from the previous copy by a small
152		amount which is device dependent. This value has no effect on the "job-sheet". This
153		value SHOULD NOT have an effect if each copy of the job consists of one sheet.
154	'1543'-'19'	reserved for future generic finishing enum values.

155 The following values are more specific stapling, and stitching and binding values; they indicate a corner or
156 an edge as if the document were a portrait document (see section 4.2.6.1 1.3.1):

157	'20'	'staple-top-left': Bind the document(s) with one or more staples in the top left corner.
158	'21'	'staple-bottom-left': Bind the document(s) with one or more staples in the bottom left
159		corner.
160	'22'	'staple-top-right': Bind the document(s) with one or more staples in the top right corner.
161	'23'	'staple-bottom-right': Bind the document(s) with one or more staples in the bottom right
162		corner.
163	'24'	'edge-stitch-left': Bind the document(s) with one or more staples (wire stitches) along the
164		left edge. The exact number and placement of the staples is implementation and/or
165		site-defined.
166	'25'	'edge-stitch-top': Bind the document(s) with one or more staples (wire stitches) along the
167		top edge. The exact number and placement of the staples is implementation and/or
168		site-defined.
169	'26'	'edge-stitch-right': Bind the document(s) with one or more staples (wire stitches) along the
170		right edge. The exact number and placement of the staples is implementation and/or
171		site-defined.
172	'27'	'edge-stitch-bottom': Bind the document(s) with one or more staples (wire stitches) along
173		the bottom edge. The exact number and placement of the staples is implementation
174		and/or site-defined.
175	'28'	'staple-dual-left': Bind the document(s) with two staples (wire stitches) along the left edge.
176	'29'	'staple-dual-top': Bind the document(s) with two staples (wire stitches) along the top edge.
177	'30'	'staple-dual-right': Bind the document(s) with two staples (wire stitches) along the right
178		edge.
179	'31'	'staple-dual-bottom': Bind the document(s) with two staples (wire stitches) along the bottom
180		edge.
181	'37'-'49'	reserved for future specific stapling and stitching enum values.
182		
183	'50'	'bind-left': Bind the document(s) along the left edge; the type of the binding is site-defined.
184	'51'	'bind-top': Bind the document(s) along the top edge; the type of the binding is site-defined.
185	'52'	'bind-right': Bind the document(s) along the right edge; the type of the binding is site-
186		defined.
187	'53'	'bind-bottom': Bind the document(s) along the bottom edge; the type of the binding is site-
188		defined.
189	'54'-MAX	reserved for future specific binding enum values and other groups of enum values, such as
190		folding, trimming, and baling.

191   **4.2.6.1   Coordinate system for enum values**

192   The values, for which the symbolic name contains "top", "bottom", "left" and "right", are specified with
193   respect to the document as if the document were a portrait document. If the document is actually a
194   landscape or a reverse-landscape document, the client supplies the appropriate transformed value. This
195   applies to values such as 'staple-xxx' and 'edge-stitch-xxx'. For example, to position a staple in the upper
196   left hand corner of a landscape document when held for reading, the client supplies the 'staple-bottom-left'
197   value (since landscape is defined as a +90 degree rotation from portrait, i.e., anti-clockwise). On the other
198   hand, to position a staple in the upper left hand corner of a reverse-landscape document when held for
199   reading, the client supplies the 'staple-top-right' value (since reverse-landscape is defined as a -90 degree
200   rotation from portrait, i.e., clockwise).

201   The angle (vertical, horizontal, angled) of each staple with respect to the document depends on the
202   implementation which may in turn depend on the value of the attribute.

203   Note: The effect of this attribute on jobs with multiple documents is controlled by the "multiple-document-
204   handling" job attribute (section 4.2.4) and the relationship of this attribute and the other attributes that
205   control document processing is described in section 15.316.3.

206   If the client supplies a value of 'none' along with any other combination of values, it is the same as if only
207   that other combination of values had been supplied (that is the 'none' value has no effect).

208   **2   IANA Considerations**

209   These "finishings" type2 enum attribute values will be published by IANA according to the procedures in
210   RFC 2566 [rfc2566] section 6.1 with the following URL:

211   ftp.isi.edu/iana/assignments/ipp/attribute-values/finishings/fold-trim-bale.txt

212   **3   Internationalization Considerations**

213   Normally a client will provide localization of the enum values of this attribute to the language of the user.

214   **4   Security Considerations**

215   This extension poses no additional security threats or burdens than those in IPP/1.0 [RFC2566, RFC2565]
216   and IPP/1.1 [ipp-mod, ipp-pro]. However, implementations MAY support different access control to
217   various finishing features, depending on the identity of the job submitting user.

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[RFC2568]
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```

7   Full Copyright Statement

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Document Number 10

```
I had an action item from the last meeting to write up the "job-
recipient-name" Job Template attribute.  Such an attribute is needed
when a user submits a print job that is intended to be picked up by
another user, such as is typical when an IPP job is submitted across a
firewall.  This attribute will also be useful for QUALDOCS.

Here is the proposed definition:


   +==================+====================+====================+
   | Job Attribute    |Printer: Default Value| Printer: Supported |
   |                  |    Attribute       |   Values Attribute |
   +==================+====================+====================+
   | job-recipient-   | job-recipient-name-| job-recipient-name-|
   | name (name(MAX)) | default (name(MAX))| supported (0:255)  |
   +==================+====================+====================+
```

job-recipient-name (name(MAX))

This attribute contains the name of the person that is to receive the output of the job. The value of the "job-recipient-name" attribute is commonly printed on job sheets printed with the job. An example of another use of the "job-recipient-name" attribute is if the printer accesses a database to get job delivery instructions for the recipient of a job. A zero-length value indicates that there is no job recipient name.

If the client omits this attribute in a create request, the printer MAY use the "job-recipient-name-default" (name(MAX)) Printer attribute value, unless it has not been configured by the administrator, or MAY use the "authenticated user" name (see [IPP-MOD] section 8.3), depending on implementation.

The "job-recipient-name-supported" (integer(0:255) Printer attribute indicates the maximum length that the Printer will accept for the "job-recipient-name" Job Template attribute without truncation. A conforming Printer MUST be able to accept 255 octets (i.e., MAX) without truncation. However, an IPP Printer MAY be implemented as a gateway to another print system that cannot accept the full 255 octet range, in which case the value will be truncated to the maximum length specified by the "job-recipient-name-supported" attribute.

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Internet Printing Protocol/1.1: Set3 Operations

Status of this Memo

This document is an Internet-Draft and is in full conformance with all provisions of Section 10 of [RFC2026]. Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

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                                    Abstract

This document specifies 12 additional OPTIONAL operations for use with the Internet Printing Protocol/1.0 (IPP) [RFC2565, RFC2566] and IPP/1.1 [ipp-mod, ipp-pro]. These Set3 operations are Device operations that operators/administrators may perform that directly affect the output device:

        Disable-Device   Enable-Device
        Pause-Device-Now   Pause-Device-After-Current-Copy
        Pause-Device-After-Current-Job   Resume-Device
        Deactivate-Device   Activate-Device
        Purge-Device   Reset-Device
        Power-Off-Device

This document does not define any new objects and does not define any Job operations. A companion specified, entitled "Internet Printing Protocol/1.1: Set2 Operations [ipp-set2] defined Printer operations that affect the Printer object, rather than the output device. Both the Set2 Printer operations and the Set3 Device operations have the Printer object as the target, i.e., the client must supply the "printer-uri" operation attribute and must direct the operation to the network entity that is implied by that URI.

31   The scope of IPP, is characterized in RFC2526 "Design Goals for an Internet Printing Protocol". It is not
32   the intent of this document to revise or clarify this scope or conjecture as to the degree of industry adoption
33   or trends related to IPP within printing systems. It is the intent of this document to extend the original set
34   of operations - in a similar fashion to the Set1 extensions which referred to IPP/1.0 and were later
35   incorporated into IPP/1.1.

36   This document is intended for registration following the registration procedures of IPP/1.0 [RFC2566] and
37   IPP/1.1 [ipp-mod] and to be published as an RFC that extends IPP/1.0 and IPP/1.1. The material will also
38   be added to a new minor revision of IPP if and when such a minor version is published.

39   The full set of IPP documents includes:

40   Design Goals for an Internet Printing Protocol [RFC2567]
41   Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
42   Internet Printing Protocol/1.1: Model and Semantics (this document)
43   Internet Printing Protocol/1.1: Encoding and Transport [IPP-PRO]
44   Internet Printing Protocol/1.1: Implementer's Guide [IPP-IIG]
45   Mapping between LPD and IPP Protocols [RFC2569]
46

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

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

56   The "Internet Printing Protocol/1.1: Encoding and Transport" document is a formal mapping of the abstract
57   operations and attributes defined in the model document onto HTTP/1.1 [RFC2616]. It defines the
58   encoding rules for a new Internet MIME media type called "application/ipp". This document also defines
59   the rules for transporting over HTTP a message body whose Content-Type is "application/ipp". This
60   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 the
63   considerations that may assist them in the design of their client and/or IPP object implementations. For
64   example, a typical order of processing requests is given, including error checking. Motivation for some of
65   the specification decisions is also included.

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

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129   1. Introduction

130   The Internet Printing Protocol (IPP) is an application level protocol that can be used for distributed printing
131   using Internet tools and technologies. IPP version 1.1 (IPP/1.1) focuses on end user functionality with a
132   few administrative operations included. This document defines additional OPTIONAL operator and
133   administrator operations used to control Jobs and Printers. This document is a registration proposal for an
134   extension to IPP/1.0 and IPP/1.1 following the registration procedures in those documents.

135   2. Terminology

136   This section defines terminology used throughout this document.

137   2.1 Conformance Terminology

138   Capitalized terms, such as MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, MAY, NEED
139   NOT, and OPTIONAL, have special meaning relating to conformance. These terms are defined in [ipp-
140   mod] section 12.1 on conformance terminology, most of which is taken from RFC 2119 [RFC2119].

141   The following specialization of these terms apply to this document:

142   REQUIRED: if an implementation supports the extensions described in this document, it MUST
143   support a REQUIRED feature.
144   OPTIONAL: if an implementation supports the extensions described in this document, it MAY support
145   an OPTIONAL feature.

146   2.2 Other terminology (copied from Set2)

147   This document uses terms such as "attributes", "keywords", and "support". These terms have special
148   meaning and are defined in the model terminology [ipp-mod] section 12.2.

149   **IPP Printer object (or Printer for short) -** a software abstraction defined by [ipp-mod].
150   **output device** - the physical imaging mechanism that an IPP Printer controls.
151   **output device fan-out** - a configuration in which an IPP Printer controls more that one output
152   device.
153   **Printer fan-out** - a configuration in which an IPP Printer object controls more than one subordinate IPP
154   Printer object.
155   **output device fan-in** - a configuration in which an output device is controlled by more than one IPP
156   Printer object.
157   **Printer fan-in** - a configuration in which an IPP Printer object is controlled by more than one IPP
158   Printer object.
159   **Subordinate Printer** - an IPP Printer object that is controlled by another IPP Printer object. Such a
160   Subordinate Printer object MAY have one or more Subordinate Printers.
161   **Leaf Printer** - a Subordinate Printer object that has no Subordinate Printer objects.

162   **Non-Leaf Printer** - an IPP Printer object that has one or more Subordinate Printer objects.

163   **Chained Printer** - a Non-Leaf Printer object that has exactly one Subordinate Printer object.

164   **Job Creation operations** - IPP operations that create a Job object: Print-Job, Print-URI, and Create-
165   Job.

166   Embedded Printer - a Printer object that is implemented as part of the output device and shares the same
167   power supply.

168   Hosted Printer - a Printer object that is implemented as part of some host that is separate from the
169   output device, or at least as a separate power supply, and uses some connection mechanism, such as
170   a serial port, a parallel port, or a network connection to communicate with the output device.

171   3. Requirements and Use Cases (copied from Set2)

172   The following requirements and usage cover both the Set2 [ipp-set2] and Set3 [ipp-set3this document]
173   operations. They are presented here together to show the parallelism.

174   1. Have separate operations for affecting the IPP Printer versus affecting the output device, so its clear
175   what the intent of each is and implementers can implement one or the other or both.

176   2. Support fan-out of Printer objects.

177   3. Support fan-out of output devices.

178   4. Support fan-in of Printer objects, as long as it doesn't make the semantics more complicated when not
179   supporting fan-in.

180   5. Support fan-in of output objects, as long as it doesn't make the semantics more complicated when not
181   supporting fan-in.

182   6. Instead of having operation attributes that alter the behavior of the operation significantly, have separate
183   operations, so that it is simple and clear to a client which semantics the Printer is supporting (by
184   querying the "operations-supported" attribute) and it is simple to describe the capabilities of a Printer
185   implementation in written documentation (just list the OPTIONAL operations supported).

186   7. Need a Printer operation to prevent a Printer object from accepting new IPP jobs, but currently accepted
187   jobs continue unaffected to be scheduled and processed. Need a companion one to restore the Printer
188   object to accept new IPP jobs.

189   Usage: Operator is preparing to take the IPP Printer out of service or to change the configuration of the
190   IPP Printer.

191   Suggested name and operations: **Disable-Printer** and **Enable-Printer**

192   8. Need a Device operation to prevent an output device from accepting any new jobs from any job
193   submission protocol and a companion one to restore the output device to accepting any jobs.

194   Usage: Operator is preparing to take the output device out of service.

195   Suggested name and operations: **Disable-Device** and **Enable Device**

196   9. Need a Printer operation to stop the processing after the current IPP job completes and not start
197   processing any additional IPP jobs (either by scheduling the jobs or sending them to the output device),
198   but continue to accept new IPP jobs. Need a companion operation to start processing/sending IPP jobs
199   again.

200   Usage: Operator wants to gracefully stop the IPP Printer ats the next job boundary. Theis Pause-
201   Printer-After-Current-Job operation is also invoked implicitly by the Deactivate-Printer and the
202   Shutdown-Printer operations.

203   Suggested name and operations: **Pause-Printer-After-Current-Job**, **Resume-Printer**

204   10. Need a Device operation to stop the processing the current job "immediately", no matter what protocol.
205   Its like the Pause button on the output device. This operation is for emergencies. The stop point
206   depends on implementation, but can be mid page, end of page, end of sheet, or after a few sheets for
207   output devices that can't stop that quickly. The paper path isn't run out. Need a companion operation to
208   start processing the current any-protocol job without losing any thing.

209   Usage: Operator sees something bad about to happen, such as the paper is about to jam, or the toner is
210   running out, or the device is overheating or wants to add more paper.

211   Suggested name and operations: **Pause-Device-Now**, **Resume-Device**

212   11. Need a Printer operation to stop the processing of IPP jobs after all of the currently accepted jobs that
213   have been processed, but any newly accepted jobs go into the 'processing-held' state.

214   Usage: This allows an operator to reconfigure the output device in order to let jobs that are held waiting
215   for resources, such as special media, to get a chance. Then the operator uses Resume-Printer after
216   reconfiguring. He repeats the two operations to restore the output device to its normal media.

217   Suggested name and operations: **Pause-Device-After-All-Current-Jobs**, **Resume-Device**

218   12. Need a Device operation to stop the processing the current any-protocol job at a convenient point, such
219   as after the current copy (or end of job if last or only copy). Need a companion operation to start
220   processing the current any-protocol job or next job without losing any thing.

221   Usage: The operator wants to empty the output bin that is near full. The paper path is run out.

222   Suggested name and operations: **Pause-Device-After-Current-Copy**, **Resume-Devic**e

223   13. Need a Device operation that always pauses on a job boundary, no matter how many copies, in order to
224   not break up a job. Need a companion operation to start processing the current any-protocol job or next
225   job without losing any thing.

226   Usage: The operator wants to empty the output bin that is near full, but he doesn't want to break up a
227   job in case it has multiple copies. The paper path is run out.

228   Suggested name and operations: **Pause-Device-After-Current-Job**, **Resume-Device**

229   14. Need a Printer operation that combines Disable-Printer, Pause-Printer-After-Current-Job, and rejects all
230   other Job, Printer, and Device operations, except Job and Printer queries, System Administrator Set-
231   Printer-Attributes, and the companion operation to resume activity. In other words, this operation
232   makes the Printer a read-only object in a graceful manner for end-users and the operator.

233   Usage: The administrator wants to reconfigure the Printer object using the Set-Printer-Attributes
234   operation without disturbing the current in process work, but wants to make sure that the operator isn't
235   also trying to change the Printer object as part of running the Printer.

236   Suggested name and operation: **Deactivate-Printer, Activate-Printe**r

237   15. Need a Device operation that combines Disable-Device, Pause-Device-After-Current-Job, and rejects
238   all other Device operations, except Job and Printer queries and the companion operation to resume
239   activity. In other words, this operation makes the output device a read-only object in a graceful manner.

240   Usage: The field service person wants to open up the device without disturbing the current in process
241   work, perhaps to replace staples, or replace the toner cartridge.

242   Suggested name and operation: **Deactivate-Device, Activate-Device**

243   16. Need a Printer operation to recover from the IPP Printer software that has gotten confused (run out of
244   heap memory or gotten into a state that it doesn't seem to be able to get out of). This is a condition that
245   shouldn't happen, but does in real life. Any volatile information is saved if possible before the software
246   is re-initialized. No companion operation is needed to undo this. We don't want to go back to the
247   "confused" state :-).

248   Usage: The IPP Printer software has gotten confused or isn't responding properly.

249   Suggested name and operation: **Restart-Printer**

250   17. Need a Device operation to recover from the output device hardware and software that has gotten
251   confused (gotten into a state that it doesn't seem to be able to get out of, run out of heap memory, etc.).
252   This is a condition that shouldn't happen, but does in real life. Any volatile information is saved if
253   possible before the software and hardware is re-initialized. This is the same and has the same options as
254   the Printer MIB reset. No companion operation is needed to undo this. We don't want to go back to the
255   "confused" state :-).

256   Usage: The output device has gotten confused or need resetting to some initial conditions.

257   Suggested name and operation: **Reset-Device**

258 18. Need a Printer operation to put the IPP Printer object out of business with no way in the protocol to
259   bring that instantiation back to life. (but see Startup-Printer which brings up exactly one new
260   instantiation to life with the same URL).

261   Usage: The Printer is being moved or the building's power is being shut off.

262   Suggested name and operation: **Shutdown-Printer**

263 19. Need a Printer operation to bring an IPP Printer to life when there is an already running host. Note:
264   This operation is unlikely to be supported for the embedded Printer configuration.

265   Usage: After the host is started (by means outside the IPP protocol), the operator is able to ask the host
266   to bring up any number of Printer objects (that the host has been configured in some way) each with
267   distinct URLs.

268   Suggested name and operation: **Startup-Printer**

269 20. Need a Device operation to power off the output device after writing out any software state. It is
270   assumed that other operations have more gracefully prepared the output device for this drastic and
271   immediate. There is no companion Device operation to bring the power back on.

272   Usage: The output device is going to be moved, the power in the building is going to be shutoff, the
273   repair man has arrived and needs to take the output device apart.

274   Suggested name and operation: **Power-Off-Device**

275 3.1 List of the Printer and Device operations

276 The list of Printer and the corresponding Device operations is shown in Table 1:

277   **Table 1 - List of Printer operations and corresponding Device operations**

Printer operation (see [ipp-set2])	Corresponding Device operation equivalent
Get-Printer-Attribute	no
Set-Printer-Attributes	no
Disable-Printer	Disable-Device
Enable-Printer	Enable-Device
Pause-Printer-After-Current-Jobno	Pause-Device-Now
Pause-Printer-After-Current-Jobno	Pause-Device-After-Current-Copy
Pause-Printer-After-Current-Job (= IPP/1.1 Pause-Job??)	Pause-Device-After-Current-Job
Pause-Printer-After-All-Current-Jobs	no
Resume-Printer (IPP/1.1 - [ipp-mod])	Resume-Device
Deactivate-Printer	Deactivate-Device
Activate-Printer	Activate-Device
Purge-Jobs (IPP/1.1 - [ipp-mod])	Purge-Device
Restart-Printer	Reset-Device
Shutdown-Printer	Power-Off-Device
Startup-Printer	no

278 When a Printer object receives a Device operation, it performs the corresponding Printer operation as
279 shown in Table 1 and simultaneously controls the output device, so that the effect of the Device operation
280 also happens to the IPP Jobs and the IPP Printer object, thereby keeping the IPP semantics correctly
281 representing the state of the output device.

282 ISSUE 01 - Ok that every Device operation REQUIRES the IPP Printer to perform the corresponding
283 Printer operation, if implemented?

284 ISSUE 02 - Which corresponding Printer operations MUST an implementation support, if it supports a
285 particular Device operation?

286 4. Relationship between Printer objects and the output device

287 From [ipp-mod] section 2.1, we have:

288 The term "IPP Printer" is a network entity that accepts IPP operation requests and returns IPP operation
289 responses. As such, an IPP object MAY be:

290   1. an (embedded) device component that accepts IPP requests and controls the device or

291   2.   a component of a print server that accepts IPP requests (where the print server controls one or
292   more networked devices using IPP or other protocols).

293   The [ipp-set2] specification generalizes the IPP Printer object to be a parent and/or a subordinate Printer
294   object to represent both IPP Printer fan-out and IPP Printer fan-in. IPP Printer fan-out is where a parent IPP
295   Printer object has one or more subordinate Printer objects. IPP Printer fan-in is where a subordinate Printer
296   object has two or more parent Printer objects.

297   4.1 The relationship between the Printer object and the output device

298   This Set3 document adds the following constraints to the definition of Printer objects relationships to
299   output devices (see section 2.2 entitled "Other terminology (copied from Set2)":

300   A Leaf Printer object MUST "directly control" one or more (output device fan-out) output devices.

301   A Non-Leaf Printer object MUST NOT "directly control" any output devices. However, Non-Leaf
302   Printer objects MAY "represent" output devices that its Subordinate Printer objects control.

303   An output device MUST have one or more (output device fan-in) Printer objects that "control" it.

304   Several Leaf Printer objects MAY "control" a single output device (output device fan-in).

305   Several Leaf Printer objects MAY "control" several output device objects (combination of output device
306   fan-in and output device fan-out)

307   4.1.1 The output device fan-out configuration

308   IPP/1.0 [rfc2566] and IPP/1.1 [ipp-mod] define the output device fan-out as a configuration in which one
309   Printer object represents more than one output device. Such a configuration is useful in order to provide
310   load balancing between several output devices. Uses submit jobs to the IPP Printer and that Printer selects
311   the least busy output device. If the output devices have differing capabilities, then the selection of which
312   output device is more complicated. The Printer's "xxx-supported" attributes reflect the union of the output
313   devices. If one or more identical output devices are a super set of the capabilities of the remaining output
314   devices, then the Printer's "xxx-supported" attributes represent that superset. However, if the some output
315   devices possess capabilities that others don't and those others possess capabilities that the first don't, the
316   Printer's "xxx-capabilities" will include capabilities that cannot be utilized by a single job. It is
317   RECOMMENDED to avoid such a configuration.

318   4.1.2 The output device fan-in configuration

319   The Set2 document [ipp-set2] introduces the Printer fan-in configuration. This document introduces the
320   analogous configuration for the output device, namely, output device fan-in. While not explicitly provided
321   in IPP/1.1 [ipp-mod], output device fan-in is not precluded by the IPP/1.1 semantics. Output device fan-in
322   is where an output device is represented by more than one Printer object. Such a configuration can be used
323   to offer different classes of service for a single output device, including differing capabilities and/or
324   defaults for each Printer object with possibly differing access control that represent the single output device.

325 When an output device is represented by more than one Printer object, the Printer objects MAY be all
326 hosted within a single server (see Figure 7 - single-server output device fan in) or each Printer object MAY
327 be hosted in separate servers (see Figure 8 - multiple-server output device fan in). In either case, there are
328 duplicate Printer objects attempting to represent the same output device.

329

330   4.1.3 Figures to show all possible configurations

331   Figure 1, Figure 2, and Figure 3 are taken from [ipp-mod] to show the configurations possible with IPP/1.0
332   and IPP/1.1 where all Printer objects are Leaf Printer objects. The remaining figures show additional
333   configurations that this document defines using non-Leaf and Leaf Printer objects. Legend for all figures:

```
334    ----> indicates a network protocol with the direction of its requests
335
336    ##### indicates a Printer object which is either:
337            - embedded in an output device or
338            - hosted in a server.  The Printer object
339         might or might not be capable of queuing/spooling.
340
341    any   indicates any network protocol or direct
342         connect, including IPP
343                                                       output device
344                                                       +---------------+
345                                                       |  ##########   |
346     O    +--------+                                   |  # (Leaf)  #  |
347    /|\   | client |------------IPP------------------># Printer #  |
348    / \   +--------+                                   |  # Object  #  |
349                                                       |  ##########   |
350                                                       +---------------+
```
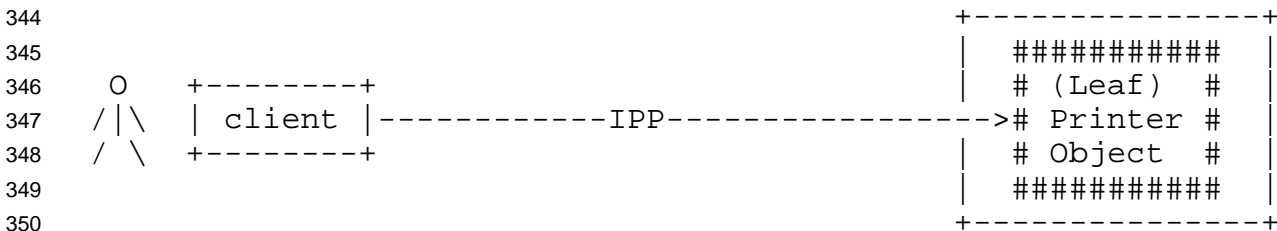
Figure 1 - embedded Printer object

```
353                                ##########        output device
354     O    +--------+            # (Leaf)  #       +---------------+
355    /|\   | client |---IPP---># Printer #---any->|               |
356    / \   +--------+            # object  #       |               |
357                                ##########        +---------------+
```
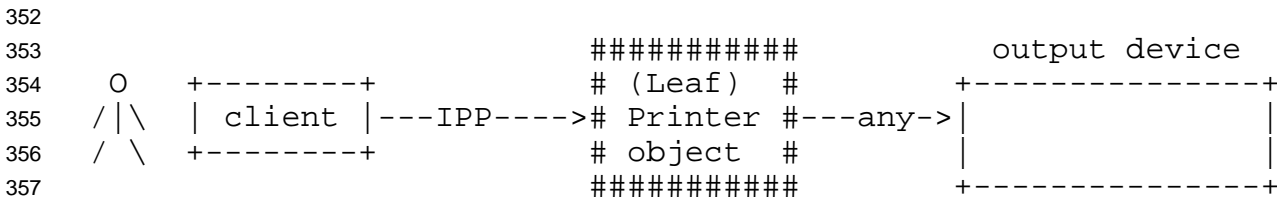
Figure 2 - hosted Printer object

```
361                                               +---------------+
362                                               |               |
363                                         +->| output device |
364                         ########## any/     |               |
365     O    +--------+     # (Leaf)  #   /      +---------------+
366    /|\   | client |---IPP---># Printer #--*
367    / \   +--------+     # Object  #   \      +---------------+
368                         ########## any\     |               |
369                                         +->| output device |
370                                               |               |
371                                               +---------------+
```
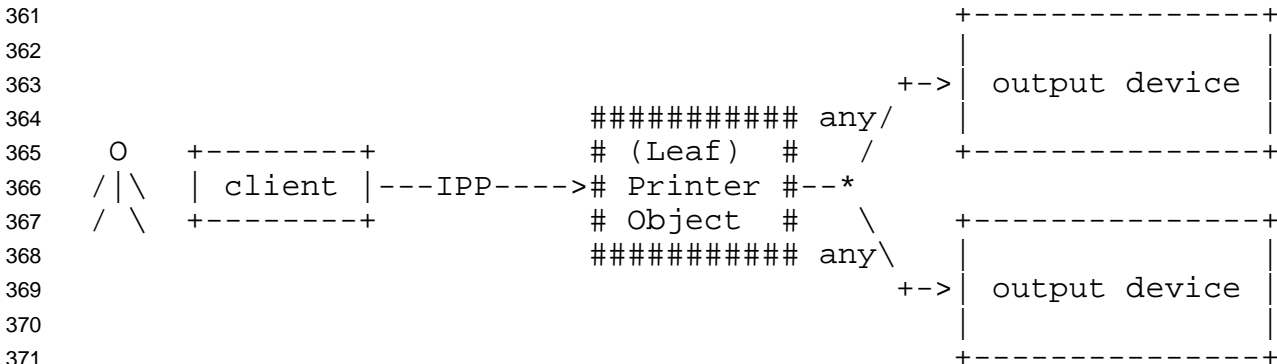
Figure 3 - output device fan out

```
373                          ###########              ###########
374   O    +--------+        # non-Leaf#              # subord. #
375  /|\   | client |---IPP---># Printer #---IPP---># Printer #
376  / \   +--------+        # object  #              # object  #
377                          ###########              ###########
378
```

379   The subordinate Printer can be a non-Leaf Printer as in Figure 4 to
380   Figure 6, or can be a Leaf Printer as in Figure 1 to Figure 3.

Figure 4 - Chained IPP Printer

```
382
383              +------IPP-------------------->###########
384             /                      +---># subord. #
385            /                      /       # Printer #
386           /            ##########  any     # object  #
387    O    +--------+      # non-Leaf#   /       ###########
388   /|\   | client |---IPP---># Printer #--*
389   / \   +--------+      # object  #   \
390            \            ##########  any     ###########
391             \                      \       # subord. #
392              \                      +---># Printer #
393              +------IPP--------------------># object  #
394                                            ###########
395
```

396   The subordinate Printer can be a non-Leaf Printer as in Figure 4 to
397   Figure 6, or can be a Leaf Printer as in Figure 1 to Figure 3.

Figure 5 - IPP Printer fan out

```
399
400                          (non-Leaf)
401                          ##########
402                          # non-Leaf#
403                    +---># Printer #-+
404                   /     # object  # \
405             IPP    ##########  \      ###########
406    O    +--------+  /                    +-IPP-># subord. #
407   /|\   | client |--+----------IPP-------------># Printer #
408   / \   +--------+  \                    +-IPP-># object  #
409             IPP    ########## /       ###########
410              \     # non-Leaf#  /
411               +---># Printer #-+
412                    # object  #
413                    ##########
414                    (non-Leaf)
```

415   The subordinate Printer can be a non-Leaf Printer as in Figure 4 to,
416   ~~Figure 5, or~~ Figure 6, or can be a Leaf Printer as in Figure 1 to,
417   ~~Figure 2, or~~ Figure 3.

Figure 6 - IPP Printer fan in

419
420
421   server
422   +---------------+
423 | ########### |
424 | # Leaf   # |
425   +---># Printer #-+ |
426   / | # object   # \
427   IPP | ########### \   +---------------+
428   O   +--------+   / | +-->| |
429   /|\ | client |--+ | | | output device |
430   / \   +--------+   \ | +-->| |
431   IPP | ########### /   +---------------+
432   \ | # Leaf   # /
433   +---># Printer #-+ |
434 | # object   # |
435 | ########### |
436   +---------------+

437   **Figure 7 - single-server output device fan in**

438
439   server
440   +---------------+
441 | ########### |
442 | # Leaf   # |
443   +---># Printer #--+|
444   / | # object   # \
445   IPP | ########### |\ +---------------+
446   O   +--------+   /   +---------------+ +-->| |
447   /|\ | client |--+ | output device |
448   / \   +--------+   \   +---------------+ +-->| |
449   IPP | ########### |/ +---------------+
450   \ | # Leaf   # /
451   +---># Printer #--+|
452 | # object   # |
453 | ########### |
454   +---------------+
455   server

456   **Figure 8 - multiple-server output device fan in**

Note: the addition of subordinate Printer objects and output device fan-in is completely compatible with IPP/1.0 and IPP/1.1. The protocol and semantics are the same between a client and a (parent) Printer object for all configurations.

4.2 Summary of the relationship between the Printer object and the output device

This section summarizes the relationships between the Printer object and the output device:

462 An output device "is represented by" one (Figure 1, Figure 2, and Figure 3) or more (Figure 7 and Figure 8)
463 Leaf Printer objects.

464 A Printer object is either a Leaf Printer or a non-Leaf Printer, but not both:

465   A Leaf Printer object "represents" one (Figure 1, Figure 2, Figure 7, and Figure 8) or more (Figure
466   3) physical output devices.

467   A non-Leaf Printer object "supports" one (Figure 4 and Figure 6) or more (Figure 5) subordinate
468   Printer objects.

469 4.3 Forwarding requests

470 This section describes the forwarding of Device operations.

471 4.3.1 Forwarding requests that affect output devices

472 The [ipp-set2] contains the following restrictions about forwarding Printer operations to subordinate Printer
473 objects:

474   When there is Printer fan-out, Printer fan-in, and Chained Printers, the non-Leaf IPP Printer object
475   MUST NOT forward the Printer operations that affect Printer objects to its subordinate Printer
476   objects. If a client wants to explicitly target a subordinate Printer, the client MUST specify the URI
477   of the subordinate Printer.   The client can determine the URI of any subordinate Printers by
478   querying the Printer's "subordinate-printers-supported (1setOf uri) attribute (see [ipp-set2] section
479   6.6).

480 There are similar, though not identical, conformance requirements and restrictions about forwarding Device
481 operations:

482   1. If a Printer object supports a Device operation and is controlling a single output device (Figure 1,
483   Figure 2, Figure 7, and Figure 8) or a single subordinate Printer object (Figure 4 and Figure 6), the
484   Printer object MUST forward the Device operation to that single output device or Printer object,
485   respectively. Note: This rule differs from the rule in [ipp-set2] for Printer operations, since Printer
486   operations MUST NOT be forwarded to subordinate Printer objects for all configurations. This
487   exception is made for Device operations so that there is no difference in the Device operation
488   semantics as seen by an operator or administrator client whether the first Printer object is (1) using
489   IPP (to control the single immediate downstream Printer object) versus (2) using some other
490   protocol (to control the single immediate downstream output device).

491   2. A Printer object MUST NOT support (and MUST NOT forward) a Device operation when the
492   (Leaf) Printer object is controlling more than one output device (device fan-out - Figure 3) or the
493   (non-Leaf) Printer object is controlling more than one immediate subordinate IPP Printer object
494   (Printer object fan-out - Figure 5). Otherwise, the "printer-state" and "printer-state-reasons" become
495   too complicated to represent the collective states of several output printers. Also if some of the

496   forwarded Device operations were to succeed and others fail, the resulting state is too hard to
497   represent. If a client wants to explicitly target a subordinate Printer, the client MUST specify the
498   URI of the subordinate Printer.   The client can determine the URI of any subordinate Printers by
499   querying the Printer's "subordinate-printers-supported (1setOf uri) attribute (see [ipp-set2 section
500   6.6).

501   Table 2 lists the Device operations and the forwarding behavior that a Leaf Printer to its output device(s)
502   and a non-Leaf Printer MUST exhibit to its immediate subordinate Printer object(s).

503   **Table 2 - Forwarding Device operations**

Device operation	1 embedded (no fan-out) (Leaf)	2 hosted (no fan-out) (Leaf)	3 output device fan-out (Leaf)	4 Chained Printer (non-Leaf)	5 Printer fan-out (non-Leaf)	6 Printer fan-in (non-Leaf)	7&8 output device-fan-in (Leaf)
Disable-Device	forward	forward	no	forward	no	forward	forward
Enable-Device	forward	forward	no	forward	no	forward	forward
Pause-Device-Now	forward	forward	no	forward	no	forward	forward
Pause-Device-After-Current-Copy	forward	forward	no	forward	no	forward	forward
Pause-Device-After-Current-Job	forward	forward	no	forward	no	forward	forward
Resume-Device	forward	forward	no	forward	no	forward	forward
Deactivate-Device	forward	forward	no	forward	no	forward	forward
Activate-Device	forward	forward	no	forward	no	forward	forward
Purge-Device	forward	forward	forward*	forward	forward*	forward	forward
Reset-Device	forward	forward	no	forward	no	forward	forward
Power-Off-Device	forward	forward	no	forward	no	forward	forward

504   * An exception is made for Purge-Device, since its purpose is to affect jobs, not the output device itself.
505   Therefore, Purge-Jobs is always forwarded, just like all operations that directly affect jobs (see [ipp-set2]).

506   5. New Printer Description Attributes

507   The following new Printer Description attributes are defined for use in this extension.

508   5.1 output-devices-supported (1setOf name(127))

509   ISSUE 10 - For consistency with [ipp-mod], shouldn't this be singular even though it is multi-valued, i.e.,
510   device-name-supported (1setOf name(127))?

511   This OPTIONAL Printer attribute contains the user-friendly device name or device names which this
512   Printer object is "representing".   If this Printer object is a Leaf Printer object, then the Printer object MUST
513   control the output device(s) so named. If this Printer object is a non-Leaf Printer, then the values in this
514   attribute MUST be the union of the values of the "output-devices-supported" attributes of its immediate
515   subordinate Printer objects.   Therefore an end user client querying this attribute of this Printer object will
516   discover all possible (down steam) output devices on which a job could be assigned if submitted to this
517   Printer object.

518   ISSUE 03 - Ok to REQUIRE roll-up of the "output-devices-supported" Printer Description attribute.

519   An Administrator determines device names and configures this attribute to contain those device names via
520   IPP Set-Printer-Attributes operation (see [ipp-set2]) or by some means outside the scope of this document.
521   The precise format of these device names is implementation dependent and MAY depend on the protocol
522   stack and the directory namespace.

523   Note: This attribute enhances the usefulness of the IPP/1.1 Job object attribute "output-device-assigned"
524   (see [ipp-mod] section 4.3.13). The "output-device-assigned" Job attribute identifies the user-friendly
525   output device to which the Printer object has assigned a job, for example, when a single Printer object is
526   supporting multiple devices.

527   6. Additional values for the "printer-state-reasons" Printer Description attribute

528   This section defines additional values for the "printer-state-reasons" Printer Description attribute.

529   6.1 'device-deactivated'

530   'device-deactivated': Someone has issued a Deactivate-Device operation for the Printer object (see
531   section 9.3.1) and the output device is in the process of becoming deactivated or has become
532   deactivated. The Printer MUST reject all requests except: Activate-Device, queries (Get-Printer-
533   Attributes, Get-Job-Attributes, Get-Jobs, etc.), Send-Document, and Send-URI (so that partial job
534   submission can be completed - see section 9.3.1) and return the 'server-error-service-unavailable'
535   status code.
536   ISSUE 04 - What additional 'device-moving-to-xxx' are needed as "printer-state-reasons" values? What
537   target 'device-xxx' delayed states are needed as "printer-state-reasons" values?

538   7. New status codes

539   This section defines new status codes used by the operations defined in this document.

₅₄₀ <mark>ISSUE 05 - What new status codes are needed, if any?</mark>

₅₄₁ 8. New out-of-band values

₅₄₂ This section defines additional out-of-band values that can be used with any attribute in principle. See the
₅₄₃ beginning of [ipp-mod] section 4.1.

₅₄₄ <mark>ISSUE 06 - What new out-of-band values are needed, if any?</mark>

₅₄₅ 9. Definition of the Set 3 Device operations

₅₄₆ All Device operations are directed at Printer objects. A client MUST always supply the "printer-uri"
₅₄₇ operation attribute in order to identify the correct target of the operation. These descriptions assume all of
₅₄₈ the common semantics of IPP/1.1 Model and Semantics document [ipp-mod] section 3.1.

₅₄₉ The Set 3 Device operations are summarized in the following table:

₅₅₀ **Table 3 - Device operation Operation-Id assignments**

Operation Name	Operation-Id	Brief description
Disable-Device	0x??	Prevents the output device from accepting jobs with any job submission protocol.
Enable-Device	0x??	Allows the output device to accept jobs from any job submission protocol.
Pause-Device-Now	0x??	Stops the output device from marking media as soon as possible on the page or sheet.
Pause-Device-After-Current-Copy	0x??	Stops the output device from marking media after the current copy has been stacked.
Pause-Device-After-Current-Job	0x??	Stops the output device from marking media after the current job has been stacked.
Resume-Device	0x??	Continues the output device from the last Pause Device operation.
Deactivate-Device	0x??	Puts the output device into a read-only deactivated state.
Activate-Device	0x??	Restores the output device to normal activity.
Purge-Device	0x??	Removes all traces of jobs in the output device.
Reset-Device	0x??	Resets the hardware state of the output device and re-initializes the output device software.
Power-Off-Device	0x??	Powers off the output device

₅₅₁ All of the operations in this document are OPTIONAL for an IPP object to support. Unless the
₅₅₂ specification of an OPTIONAL operation requires support of another OPTIONAL operation, conforming

553   implementations may support any combination of these operations. Many of the operations come in pairs
554   and so both are REQUIRED if either one is implemented.

555   9.1   The Disable and Enable Device Operations

556   This section defines the OPTIONAL Disable-Device and Enable-Device operations that stop and start the
557   output device from accepting new jobs and, therefore, the IPP Printer from accepting IPP Jobs. If either of
558   these operations are supported, both MUST be supported.

559   These operations allow the operator to control whether or not the output device (and the IPP Printer object)
560   will accept new jobs using any of its supported job submission protocols. These operations have no other
561   effect on any of the other operations of the output device, so that the output device continues to accept all
562   other operations and continues to schedule and process jobs normally that it has already received. In other
563   words, these operation control the "input of new jobs" to the output while the Pause and Resume Device
564   operations (see section 9.2) independently control the "output of new jobs" from the output device to the
565   output media.

566   Note: Contrast the Disable Device operations which affect all job submission protocols that the output
567   device supports and the Disable Printer operations (see [ipp-set2]) which affect only the IPP Job Creation
568   operations to the Printer object. In other words, the Disable Device operations have the same effect on all
569   job submission protocols that the Disable Printer operations have on the IPP job submission protocol.

570   9.1.1   Disable-Device Operation

571   This OPTIONAL operation allows a client to stop the output device from accepting new jobs, i.e., cause the
572   output device to reject subsequent operations to create new jobs using any job submission protocol. The
573   Printer object performs a Disable-Printer operation (see [ipp-set2]) (which sets the Printer's "printer-is-
574   accepting-jobs" READ-ONLY Printer Description attribute to 'false') plus controls the output device to stop
575   accepting new jobs with any of the output device's job submission protocols. The output device still
576   accepts all other operations. All previously created or submitted jobs and currently processing jobs
577   continue unaffected on the output device.

578   The IPP Printer MUST accept the request in any state of the IPP Printer or the output device. This
579   operation has no immediate or direct effect on the Printer's "printer-state" and "printer-state-reasons"
580   attributes.

581   *Access Rights:* The authenticated user (see [ipp-mod] section 8.3) performing this operation must be an
582   operator or administrator of the Printer object (see [ipp-mod] Sections 1 and 8.5).

583   The Disable-Device request and response have the same attribute groups and attributes as the Pause-Device
584   operation (see [ipp-mod] sections 3.2.7.1 and 3.2.7.2), including the new "printer-message-from-operator"
585   operation attribute (see [ipp-set2] section 5.1).

586

9.1.2 Enable-Device Operation

This OPTIONAL operation allows a client to start the output device accepting new jobs, i.e., cause the output device to accept subsequent operations to create new jobs using any job submission protocol. The Printer object performs an Enable-Printer operation (see [ipp-set2]) (which sets the Printer's "printer-is-accepting-jobs" READ-ONLY Printer Description attribute to 'true') plus controls the output device to start accepting new jobs with any of the output device's job submission protocols.

The IPP Printer MUST accept the request in any state. This operation has no immediate or direction effect on the Printer's "printer-state" and "printer-state-reasons" attributes.

Access Rights: The authenticated user (see [ipp-mod] section 8.3) performing this operation must be an operator or administrator of the Printer object (see [ipp-mod] Sections 1 and 8.5).

The Enable-Device request and response have the same attribute groups and attributes as the Pause-Device operation (see [ipp-mod] sections 3.2.8.1 and 3.2.8.2), including the new "printer-message-from-operator" operation attribute (see [ipp-set2] section 5.1).

9.2 The Pause and Resume Device operations

This section defines the OPTIONAL Pause-Device-Now, Pause-Device-After-Current-Copy, Pause-Device-After-Current-Job, and Resume-Device operations. These operations affect the scheduling of jobs from any job submission protocol on the output device. The Pause-Device-Now and Pause-Device-After-Current-Job operation are possible implementation options of the OPTIONAL IPP/1.1 Pause-Printer (see [ipp-mod] sections 3.2.7 and Table 4 below). If any of the Pause Device operations are supported, then the Resume-Device operation MUST be supported.

These operations allow the operator to control the current job's marking of media by the output device. These operations have no other effect on the output device, so that the output device continues to accept all operations. In other words, these operation control the "output of" the output device(s) while the Disable and Enable Printer operations (see section 9.1) independently control the "input of new jobs" to the IPP Printer.

Note: Contrast the Pause Device operations which affect all job submission protocols that the output device supports and the Pause Printer operations (see [ipp-set2]) which affect only the IPP Job Creation operations to the Printer object. In other words, the Disable Device operations have the same effect on all job submission protocols that the Disable Printer operations have on the IPP job submission protocol.

The Set2 and Set3 documents define distinct operations in order to disambiguate the IPP/1.1 Pause-Printer operation (see [ipp-mod] section 4.4.12 and [ipp-set2]) as shown in Table 4. Set2 Printer operations affect only Jobs submitted using IPP, while Set3 Device operations affect all jobs no matter what job submission protocol was used to submit them to the output device.

620 **Table 4 - Set2 and Set3 Pause and Resume operations**

Set2 and Set3 Pause and Resume Printer and Device operations	Description
Pause-Printer-After-Current-Job	Stops the IPP Printer from sending new IPP Jobs to the output device(s) after the current jobs finish
Pause-Printer-After-All-Current-Jobs	Stops the IPP Printer from sending IPP Jobs that are accepted subsequently to the output device(s). All currently pending jobs are scheduled and printed.
Resume-Printer	Starts the IPP Printer sending IPP Jobs to the output device again.
Pause-Device-Now	Stops the output device immediately from producing marked media (current page, sheet, depending on implementation) for any job. Like the Pause button on the output device.
Pause-Device-After-Current-Copy	Stops the output device from producing marked media after the current copy of the current job.
Pause-Device-After-Current-Job	Stops the output device from producing marked media after the current job.
Resume-Device	Starts the output device processing any jobs again.

621 ISSUE 07 - Should Pause-Printer-After-Current-Job be a new operation with a new operation-id code or be
622 a clarification of the existing IPP/1.1 Pause-Printer operation and use its operation-id? Or should the
623 Pause-Device-Now operation be a new operation-id code or be the clarification of the existing IPP/1.1
624 Pause-Printer operation and use its operation-id? Or should both Pause-Printer-After-Current-Job and
625 Pause-Device-Now be new operation-id codes and leave the IPP/1.1 Pause-Printer with its current
626 ambiguous (implementer free-for-all) semantics?

627 9.2.1 Pause-Device-Now, Pause-Device-After-Current-Copy, Pause-Device-After-Current-Job operations

628 These OPTIONAL operations allows a client to stop the output device from marking the current job. If the
629 output device is in the middle of marking on output media, the IPP Printer MUST stop marking with the
630 immediacy defined for the operation (see Table 4). The Printer object performs a Pause-Printer-After-
631 Current-Job operation (see [ipp-set2]) (which eventually sets the Printer's "printer-state" to 'stopped' and
632 "printer-state-reasons" to 'moving-to-paused' and 'paused') plus controls the output device to stop marking
633 the output media for the current job submitted with any of the output device's job submission protocols.
634 After the IPP Printer receives this operation, the output device MUST NOT start processing or marking any
635 additional jobs. However, the output device MUST continue to accept other operations, including
636 additional jobs, if it would have accepted them before the Printer object received the Pause Device
637 operation.

638 If the output device is not processing any jobs and/or is not marking output media, the Printer object
639 transitions immediately to the 'stopped' state by setting its "printer-state" attribute to 'stopped', removing the
640 'moving-to-paused' value, if present, from its "printer-state-reasons" attribute, and adding the 'paused' value
641 to its "printer-state-reasons" attribute.

642 If the output device will take appreciable time to stop marking the current job that it is marking , the IPP
643 Printer object adds the 'moving-to-paused' value to the Printer object's "printer-state-reasons" attribute (see
644 section [ipp-mod] 4.4.12). When the output device has marking the current job, the Printer object
645 transitions to the 'stopped' state by setting its "printer-state" attribute to 'stopped', removing the 'moving-to-
646 paused' value, if present, from its "printer-state-reasons" attribute, and adding the 'paused' value to its
647 "printer-state-reasons" attribute.

648 This operation MUST NOT affect the acceptance of other requests (see Disable-Device section 9.1.1).

649 The IPP Printer MUST accept any of the Pause Device requests in any state and transition the Printer object
650 to the indicated new "printer-state" before returning as follows:

Current "printer-state"	New "printer-state"	"printer-state-reasons"	IPP Printer's response status code and action:
'idle'	'stopped'	'paused'	'successful-ok'
'processing'	'processing'	'moving-to-paused'	'successful-ok'; Later, when the IPP Printer has stopped marking the current job, the "printer-state" becomes 'stopped', and the 'paused' value replaces the 'moving-to-paused' value in the "printer-state-reasons" attribute
'processing'	'stopped'	'paused'	'successful-ok'; the IPP Printer was able to stop the output device immediately
'stopped'	'stopped'	'paused'	'successful-ok'

651 ISSUE 08 - Or should the Printer's "printer-state" attribute be independent of the Pause Printer operations
652 so that the Pause Device (and Pause Printer) operations don't set the "printer-state" to 'stopped', i.e., the
653 "printer-state" tries to reflect 'idle', 'processing', or 'stopped' of the output device(s) as best it can
654 independent of whether the IPP Printer object is paused or not?

655 *Access Rights:* The authenticated user (see [ipp-mod] section 8.3) performing this operation must be an
656 operator or administrator of the Printer object (see [ipp-mod] Sections 1 and 8.5).

657 The Pause-Device-Now, Pause-Device-After-Current-Copy, and Pause-Device-After-Current-Job requests
658 and responses have the same attribute groups and attributes as the Pause-Printer operation (see [ipp-mod]
659 sections 3.2.7.1 and 3.2.7.2), including the new "printer-message-from-operator" operation attribute (see
660 [ipp-set2 section 5.1).

661 9.2.2 Resume-Device operations

662 This operation allows a client to resume the output device marking output media. The Printer object
663 performs a Resume-Printer operation (see [ipp-mod] section 3.2.8) (which MUST remove the 'paused' and
664 'moving-to-paused' values from the Printer object's "printer-state-reasons" attribute, if present, and remove
665 the 'printer-stopped' value from any job's "job-state-reasons" attributes contained in that Printer). If there
666 are no other reasons to keep the output device paused (such as media-jam), the IPP Printer transitions itself

667 to the 'processing' or 'idle' states, depending on whether there are jobs to be processed or not, respectively,
668 and the output device resumes processing jobs.

669 The IPP Printer MUST accept the request in any state, transition the Printer object to the indicated new state
670 as follows:

Current "printer-state"	New "printer-state"	IPP Printer's response status code and action:
'idle'	'idle'	'successful-ok'
'processing'	'processing'	'successful-ok'
'stopped'	'processing'	'successful-ok'; when there are jobs to be processed
'stopped'	'idle'	'successful-ok'; when there are no jobs to be processed.

671 *Access Rights:* The authenticated user (see [ipp-mod] section 8.3) performing this operation must be an
672 operator or administrator of the Printer object (see [ipp-mod] Sections 1 and 8.5).

673 The Disable-Device request and response have the same attribute groups and attributes as the Pause-Device
674 operation (see [ipp-mod] sections 3.2.7.1 and 3.2.7.2), including the new "printer-message-from-operator"
675 operation attribute (see [ipp-set2] section 5.1).

676 9.3 The Deactivate and Activate Device operations

677 This section defines the OPTIONAL Deactivate-Device and Activate-Device operations that stop and start
678 the output device performing work and accepting all requests, except queries and, therefore, the IPP Printer
679 object performing work and accepting all IPP requests, except queries. If either of these operations are
680 supported, both MUST be supported.

681 These operations allow the operator to put the output device (and IPP Printer object) into a dormant read-
682 only condition and to take it out of such a condition. These operations are a combination of the Deactivate
683 and Pause Device operations, plus preventing the acceptance of any other requests, except queries.

684 The Deactivate and Activate Device operations MUST affect the submission of jobs using other job
685 submission protocols to the associated output device; the Deactivate and Activate Printer operations (see
686 [ipp-set2]) are intended to stop the IPP Printer object from performing IPP work and accepting IPP
687 operations, except IPP query operations.

688 9.3.1 Deactivate-Device operation

689 This OPTIONAL operation allows a client to stop the output device from processing jobs and stop the
690 output device from accepting any, but query requests. The Printer object performs a Deactivate-Printer
691 operation immediately (which performs a Disable-Printer and a Pause-Printer-After-Current-Job including
692 use of all of the "printer-state-reasons" if the operation cannot be completed immediately and immediate
693 rejection all subsequent requests, except Activate-Printer, queries, Send-Document, and Send-URI - see
694 [ipp-set2]).

695   The IPP Printer MUST accept the request in any state. Immediately, the Printer MUST set the 'device-
696   deactivated' value (see section 6.1) in its "printer-state-reasons" attribute.

697   *Access Rights:* The authenticated user (see [ipp-mod] section 8.3) performing this operation must be an
698   operator or administrator of the Printer object (see [ipp-mod] Sections 1 and 8.5).

699   The Deactivate-Device request and response have the same attribute groups and attributes as the Pause-
700   Printer operation (see [ipp-mod] sections 3.2.7.1 and 3.2.7.2), including the new "printer-message-from-
701   operator" operation attribute (see [ipp-set2] section 5.1).

702   9.3.2 Activate-Device operation

703   This OPTIONAL operation allows a client to undo the effects of the Deactivate-Device operation, i.e.,
704   allow the output device to start or continue marking output media and start the output device accepting any
705   requests from any protocol. The Printer object performs an Enable-Device and a Resume-Device operation
706   immediately. In addition, the output device (and Printer object) MUST immediately start accepting all
707   requests.

708   The IPP Printer MUST accept the request in any state. Immediately, the Printer MUST immediately
709   remove the device-deactivated' value from its "printer-state-reasons" attribute.

710   *Access Rights:* The authenticated user (see [ipp-mod] section 8.3) performing this operation must be an
711   operator or administrator of the Printer object (see [ipp-mod] Sections 1 and 8.5).

712   The Activate-Device request and response have the same attribute groups and attributes as the Pause-Printer
713   operation (see [ipp-mod] sections 3.2.7.1 and 3.2.7.2), including the new "printer-message-from-operator"
714   operation attribute (see [ipp-set2] section 5.1).

715   9.4 Purge-Device

716   This OPTIONAL operation allows a client to remove all jobs from the output device regardless of their job
717   submission protocol and regardless of their job states. The IPP Printer object performs a Purge-Jobs
718   operation (see [ipp-mod] section 3.2.9 (which removes all IPP jobs from the IPP Printer, including the
719   Printer object's Job History (see [ipp-mod] section 4.3.7.2). After a Purge-Device operation has been
720   performed, a Printer object MUST return no jobs in subsequent Get-Job-Attributes and Get-Jobs responses
721   (until new jobs are submitted to the output device by any job submission protocol).

722   IPP/1.1 Purge-Jobs operation has the following implementation option:

723   Whether the Purge-Jobs (and Get-Jobs) operation affects jobs that were submitted to the device
724   from other sources than the IPP Printer object in the same way that the Purge-Jobs operation affects
725   jobs that were submitted to the IPP Printer object using IPP, depends on implementation, i.e., on
726   whether the IPP protocol is being used as a universal management protocol or just to manage IPP
727   jobs, respectively.

728 The Purge-Device allows an implementation to support the Purge-Jobs operation to affect only IPP jobs and
729 the Purge-Device to affect all jobs that the output device supports (including IPP jobs).

730 The effect of this operation on the currently processing job(s), if any, is not specified by this document.
731 Note: If this operation does affect the current job(s), it is expected that the operator would issue this
732 operation on a Printer in the 'idle' state after deactivating the output device (see section 9.3.1) in order to
733 prevent a job from inadvertently being affected by this operation.

734 ISSUE 09 - Or should we define Purge-Device to cancel any current job rather than having the behavior
735 undefined on output device?

736 Note: if an operator wants to cancel all jobs without clearing out the Job History, the operator uses the
737 Cancel-Job operation on each job instead of using the Purge-Device or Purge-Jobs operation.

738 The Printer object MUST accept this operation in any state and transition the Printer object to the 'idle'
739 state.

740 *Access Rights:* Authentication and access control (see [ipp-mod] sections 1, 8.3, and 8.5) apply to this
741 operation.

742 The Purge-Device request and response have the same attribute groups and attributes as the Pause-Printer
743 operation (see [ipp-mod] sections 3.2.7.1 and 3.2.7.2), including the new "printer-message-from-operator"
744 operation attribute (see [ipp-set2] section 5.1).

745 9.5   Reset-Device operation

746 This OPTIONAL operation allows a client to reset the output device in a number of ways. The Printer
747 object performs a Restart-Printer operation, if implemented, (see [ipp-set2]) (which has the effect of a
748 software reboot which causes the Printer object to set its "printer-state" to 'idle', remove the state reasons
749 from its "printer-state-reasons" attribute, and set its "printer-is-accepting-jobs" attribute to 'true') plus
750 controls the output device to stop marking the output media for the current job submitted with any of the
751 output device's job submission protocols. Then the IPP Printer performs a reset of the output device
752 depending on the "reset-function" operation attribute. The keyword values of this attribute map one-to-one
753 to the enum values that the SNMP Network Management Station (NMS), i.e., the SNMP client, writes into
754 the prtGeneralReset object in the Printer MIB [RFC1759] to affect a reset operation. As in the Printer MIB,
755 the 'reset-to-nvram' (soft reset) value MUST be supported, if this operation is supported. The other values
756 are OPTIONAL.

757 As the Printer MIB specification [RFC1759] states, if a device does not have NVRAM (non-volatile RAM),
758 the device MUST none-the-less respond to this operation for the 'reset-to-nvram' value with some sort of
759 warm reset that resets the device to some implementation-defined state that is preferably under control of
760 the system administrator by some means outside the scope of the Printer MIB and this document.

761 The effect of this operation on the currently processing job(s), if any, is not specified by this document.
762 Note: If this operation does affect the current job(s), it is expected that the operator would issue this

763 operation on a Printer in the 'idle' state after deactivating the output device (see section 9.3.1) in order to
764 prevent a job from inadvertently being affected by this operation.

765 ISSUE 10 - Or should we define Reset-Device to cancel any current job rather than having the behavior
766 undefined on current jobs in the output device?

767 The Printer object MUST accept this operation in any state and transition the Printer object to the 'idle'
768 state.

769 *Access Rights:* Authentication and access control (see [ipp-mod] sections 1, 8.3, and 8.5) apply to this
770 operation.

771 The Reset-Printer request and response have the same attribute groups and attributes as the Pause-Printer
772 operation (see [ipp-mod] sections 3.2.7.1 and 3.2.7.2), including the new "printer-message-from-operator"
773 operation attribute (see [ipp-set2] section 5.1), with the addition of the following Group 1 operation
774 attributes in the request:

775   "reset-function" (type3 keyword):
776   The client OPTIONALLY supplies this attribute. The Printer object MUST support this attribute, if
777   it supports this operation. The value of this attribute indicates the reset function to be performed. If
778   the client omits this attribute, the Printer assumes the 'reset-to-nvram' value.
779
780   Standard keyword values are:
781   'power-cycle-reset' - Cold start, i.e., to the state when the device is powered up.
782   'reset-to-nvram' - Warm start.
783   'reset-to-factory-defaults' - reset NVRAM to factory defaults, i.e. to factory settings and/or
784   values established at install time.

785 ISSUE 11 - What happens to 'pending' jobs on a Reset-Device for various values of "reset-function"? If the
786 output device implements persistent jobs, aren't they saved?

787 9.6 Power-Off-Device operation

788 This OPTIONAL operation allows a client to power off the output device. The Printer object performs a
789 Shutdown-Printer operation, if implemented, (see [ipp-set2]) (which shuts down the IPP Printer object so
790 that it cannot be access by any IPP protocol operations) plus turns the power off for the output device after
791 the current job completes.   There is no way to bring back the output device using the IPP protocol either.

792 The Printer object MUST accept this operation in any state and transition the Printer object to the 'idle'
793 state.

794 *Access Rights:* Authentication and access control (see [ipp-mod] sections 1, 8.3, and 8.5) apply to this
795 operation.

796 The Power-Off-Device request and response have the same attribute groups and attributes as the Pause-
797 Printer operation (see [ipp-mod] sections 3.2.7.1 and 3.2.7.2), including the new "printer-message-from-
798 operator" operation attribute (see [ipp-set2] section 5.1).

799 10. IANA Considerations

800 The operations and attributes in this registration proposal will be published by IANA according to the
801 procedures in RFC 2566 [rfc2566] section 6.4 for operations with the following URL:

802   ftp.isi.edu/iana/assignments/ipp/operations/set2.txt

803 11. Internationalization Considerations

804 This document has the same localization considerations as the [ipp-mod].

805 12. Security Considerations

806 The IPP Model and Semantics document [ipp-mod] discusses high level security requirements (Client
807 Authentication, Server Authentication and Operation Privacy). Client Authentication is the mechanism by
808 which the client proves its identity to the server in a secure manner. Server Authentication is the mechanism
809 by which the server proves its identity to the client in a secure manner. Operation Privacy is defined as a
810 mechanism for protecting operations from eavesdropping.

811 13. Author's Addresses

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837   14. References

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840   Semantics", <draft-ietf-ipp-model-v11-03.txt>, June, 1999.

841   [RFC1759]
842   Smith, R., Wright, F., Hastings, T., Zilles, S., and Gyllenskog, J., "Printer MIB", RFC 1759, March
843   1995.

844   [RFC2566]
845   R. deBry, T. Hastings, R. Herriot, S. Isaacson, P. Powell, "Internet Printing Protocol/1.0: Model and
846   Semantics", RFC 2566, April 1999.

847   15. Change History

848   This section summarizes the changes. Each sub-section is in reverse chronological order.

849   This is the first version of the Set3 document which separates the Device operations (Set3) from the Printer
850   operations (Set2).

851   16. Appendix A: Full Copyright Statement

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862 successors or assigns.

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