6   Internet Printing Protocol (IPP): Production Printing Attributes - Set1
7   <pwg-ipp-prod-print-set1-0006050509.rtf, .pdf>
8
9   Status of this Memo
10

11   This document is a draft of an IEEE-ISTO PWG Proposed Standard and is in full conformance with all
12   provisions of the PWG Process (see http://www.pwg.org/chair/pwg-process-990825.pdf). PWG Proposed
13   Standards are working documents of the IEEE-ISTO PWG and its working groups.
14
15   The list of current PWG drafts can be obtained at http://www.pwg.org/pub/pwg/ipp
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

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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

2.4   Enumeration and Ordering of print-stream pages

265
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
309   **2.5   Collection Attributes**
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
320   **2.6   Definition of 'none' values**
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 defineds 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)
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

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

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

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

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

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

3.1.2   cover-type (type2 keyword)

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

Standard keyword values for "cover-type" are:

'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 **1.1.43.2.4   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

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

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
3.5.5   job-error-sheet-supported (1setOf type2 keyword)

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

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

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

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 SHOULD MUST both be
819   configured to specify job-sheet instances and they SHOULD specify the same job sheet instance. If
820   the administrator sets one of them to a value (either locally or with the Set-Printer-Attributes
821   operation - see [ipp-set]), the Printer SHOULD MUST set the other attribute's value to specify the
822   same job sheet instance or to the 'unknown' out-of-band value, if there isn't a corresponding value to
823   be set for the other attribute. If a client attempts to set both attributes, but their values specify
824   different job sheet instances, the Printer MUST reject the Set-Printer-Attributes operation and return
825   the 'client-error-conflicting-attributes' status code. The reason to have both default attributes
826   configured, is so that clients that only know about the "job-sheets" attribute will see the "job-sheets-
827   default" attribute, while clients that know about the "job-sheets-col" attribute will be able to
828   determine the characteristics of the job sheet default.
829

830 ### 3.8.4   job-sheets-col-supported (1setOf type2 keyword)
831

832 The "job-sheets-col-supported" attribute identifies the keyword names of the member attributes
833 supported in the "job-sheets-col" collection Job Template attribute, i.e., the keyword names of the
834 member attributes in Table 6 that the Printer supports.
835
836

837 ## 3.9   job-sheet-message (text(MAX))
838

839 This attribute is used to convey a message that is delivered with the job, and may be printer on a job sheet
840 (e.g., the 'standard' job sheet). The message may contain any type of information, but typically includes
841 either instructions for offline processing (e.g., finishing), or a message for the job recipient.
842

843 ### 3.9.1   job-sheet-message-supported (integer(0:1023))
844

845 The "job-sheet-message-supported" Printer attribute indicates the maximum length that the Printer
846 is able to accept for the "job-sheet-message" Job Template attribute without truncation. A
847 conforming Printer MUST be able to accept 1023 octets without truncation. However, an IPP
848 Printer MAY be implemented as a gateway to another print system that cannot accept the full 1023
849 octet range, in which case the value will be truncated to the maximum length specified by the "job-
850 sheet-message-supported" attribute.
851
852

853 ## 3.10 media-col (collection) - augments IPP/1.1 "media"
854

855 This attribute augments the "media" Job Template attribute (defined in [ipp-mod] section 4.2.11). This
856 collection attribute enables a client end user to submit a list of media characteristics to the Printer as a way
857 to more completely specify the media for the Printer to be used. Each member attribute of the collection
858 identifies a media characteristic. A Printer MAY support the "media" attribute without supporting the
859 "media-col" attribute. However, if a Printer supports the "media-col" attribute, it MUST also support the
860 "media" attribute.
861

862 Each value of the "media" (type32 keyword | name) attribute uniquely identifies an instance of media. Each
863 combination of values of the "media-col" collection attribute also uniquely identify an instance of media.
864 Depending on implementation and site policy, not all media instances need have media names. Such media
865 instances that do not have media names associated with them are accessible using the "media-col" attribute
866 only. In other words, when a media data base is created by an implementation and/or an administrator, each
867 media name is associated with a media instance, but each media instance NEED NOT have a media name
868 associated with it. Thus the standard name 'iso-a4-white' is associated with a particular instance of media,
869 say, a 20 pound, 210 mm x 297 mm size, and white color media instance. If there are other media instances
870 of the same size and color, but differ in some other characteristic, such as weight, then they MUST each
871 have different names or not have a name at all. A Printer MUST NOT have two instances of media that
872 have all of the same characteristics. The "media-description" member attribute (see section 3.10.1) MUST
873 be used to distinguish two or more media instances that would otherwise have the same characteristics.

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

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

3.10.1 media-description (type3 keyword | name(MAX))

The "media-description" member attribute is used to specify a media description. The "media-description" member attribute is treated as just another characteristic of the media that the printer must match to select the correct media. Furthermore, more than one medium instance can have the same 'keyword' or 'name' value. As with any 'keyword | name' value, the client SHOULD localize the 'keyword' value, but not the 'name' value.

The value of the "media-description" member attribute can be any of the keyword or name values defined for the "media" Job Template attribute (see [ipp-mod] section 4.2.11 and section 6.3 in this document) or any other name value defined by the implementation or administrator that is a description. But, unlike the "media" attribute 'keyword' values, the 'keyword' value of the "media-description" member attribute MUST have no specific semantic meaning to the Printer. For example, if the keyword value is one of the input tray keywords, the Printer MUST NOT use that value to pull the media from that tray. If the client wants to select the media in a particular tray, no matter what it is, then the client MUST supply that tray keyword name, say, 'top', in the "media" Job Template attribute, instead of using the "media-description" member attribute. Similarly, if the text string happens to be the same as one of the media size names, the Printer MUST NOT use that value to select a media of that size. When supplying the "media-col" attribute, the client MUST use the "media-size" member attribute to specify the size. If the client wants to select the media of a particular size, no matter what it is, then the client MUST supply that size keyword name, say 'iso-a4', in the "media" Job Template attribute, instead of using the "media-description" member attribute.

For example, suppose that a Printer supports two A4 media that are identical, except that one has three punched holes and the other does not. If the "media-hole-count" member attribute (see section 3.10.6) is supported, then one will have the value, say, '3' and the other '0'. In such a case, the "media-description" attribute is not needed to distinguish between the two media instances. However, if the "media-hole-count" member attribute is not supported, the "media-description" MUST have different values for the two media, say, 'punched' and 'un-punched' (or a zero length 'name' string), respectively. The "media-description" member attribute could contain any additional information, such as the size, weight, color, etc. However, the client cannot localize any 'name' values (only pre-defined standard 'keyword' values) to the locale of the user. In order to allow the users to access these two media instances most simply using the "media" attribute, they SHOULD each have names associated with them, such as the 'iso-a4-punched' name (defined by the administrator) and the 'iso-a4-white' keyword (defined in IPP/1.1 - see [ipp-mod] Appendix C).

As another example of the use of the "media-description" member attribute to distinguish two media instances that otherwise would have identical characteristics, there are a number of IPP/1.1 media

946   keywords that a user would expect to have the same characteristics. For example, 'na-letter' and 'a'
947   are both 8.5 by 11 inches. If they would be associated with media instances that have the same
948   characteristics, the administrator MUST put two different values in their "media-description"
949   member attributes, say, 'na-letter' and 'a'.
950
951   The "media-description-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute
952   identifies the values of this "media-description" member attribute that the Printer supports, i.e., the
953   descriptions supported.
954
955   **3.10.2 media-color (type3 keyword | name(MAX))**
956
957   The "media-color" attribute indicates the desired color of the media being specified.
958
959   Standard keyword values for "media-color" are:
960

'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.

961
962   Note: The standard keyword values for the "media-color" attribute are derived primarily from the
963   Printer MIB [RFC1759] prtInputMediaColor standard values with the addition of 'blue', 'red', 'gray',
964   'ivory', 'orange', and 'clear' (instead of 'transparent' - see section 3.10.3).
965
966   Custom paper colors can be specified using the 'name' (MAX) attribute syntax of the color attribute.
967
968   The "media-color-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute identifies the
969   values of this "media-color" member attribute that the Printer supports, i.e., the colors supported.
970
971   **3.10.3 media-opacity (type3 keyword)**
972
973   The "media-opacity" attribute indicates the desired opaqueness of the media being specified.
974
975   Standard keyword values for "opacity" are:
976

'opaque'	The specified media should be opaque.

'transparent'	The specified media should be transparent.

977
978   The "media-opacity-supported" (1setOf type3 keyword) Printer attribute identifies the values of this
979   "media-opacity" member attribute that the Printer supports, i.e., the opacities supported.
980
981   **3.10.4 media-pre-printed (type3 keyword | name(MAX))**
982
983   The "media-pre-printed" attribute indicates that the pre-printed characteristics of the desired media.
984   Examples of pre-printed media include forms and company letterhead. If the value is 'blank', the
985   Printer MAY use an electronic representation of a form, if the medium has some imaged
986   information already associated with it. The standard keyword values for "media-pre-printed" are:
987

'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.

988
989   The "media-pre-printed-supported" (1setOf (type3 keyword | name(MAX)) Printer attribute
990   identifies the values of this "media-pre-printed" member attribute that the Printer supports.
991
992   **3.10.5 media-tabs (type3 keyword)**
993
994   The "media-tabs" member attribute indicates that the desired media should have tabs.
995
996   Standard keyword values for "media-tabs" are:
997

'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.

998
999   The "media-tabs" member attribute does not imply that media is ordered in any way. Ordered media
1000   is specified only using the "media-order-count" member attribute (see section 3.10.7). If the tabbed
1001   media is ordered, then the order MUST be indicated using the "media-order-count" member
1002   attribute.
1003
1004   The "media-tabs-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute identifies the
1005   values of this "media-tabs" member attribute that the Printer supports, i.e., the tabs supported.
1006
1007   **3.10.6 media-hole-count (integer(0:MAX))**
1008
1009   The "media-hole-count" attribute indicates the number of pre-drilled holes in the desired media. A
1010   value of 0 (zero) indicates that no holes should be present in the media.

1011
1012   The "media-hole-count-supported" (1setOf rangeOfInteger(0:MAX)) Printer attribute identifies the
1013   ranges of values of this "media-hold-count" member attribute that the Printer supports.
1014

3.10.7 media-order-count (integer(1:MAX))

1016
1017   The "media-order-count" attribute indicates the number of sheets, within an ordered sequence of
1018   sheets; after which the sequence begins to repeat. For example, third cut tab stock has an order
1019   count of 3 (this is also sometimes called the modulus of the ordered media).
1020

1021   If the "media-order-count" is 1, then the media is not ordered.
1022

1023   The "media-order-count-supported" (rangeOfInteger(1:MAX)) Printer attribute identifies the range
1024   of values of this "media-order-count" member attribute that the Printer supports.
1025

3.10.8 media-label-type (type3 keyword | name(MAX))

1027
1028   The "media-label-type" member attribute identifies the label characteristics of the media. The
1029   standard keyword values are:
1030

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

1031
1032   If this member attribute is supported, the Printer MUST support at least the 'none' and 'standard'
1033   values.
1034

1035   The "media-label-type-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute
1036   identifies the values of this "media-label-type" member attribute that the Printer supports, i.e., the
1037   label characteristics supported, which MUST include the 'none' keyword value so that validation
1038   follows the normal rules.
1039

3.10.9 media-size (collection)

1041
1042   The "media-size" member attribute is a collection that explicitly specifies the numerical media
1043   width and height dimensions.
1044

1045   It is RECOMMENDED that a client localize the collection values to the size names that users are
1046   familiar with, such as 'letter' and 'A4', possibly also including the exact dimensions as well (and in
1047   the units appropriate for the user's locale). If a client does not recognize a pair of numbers as a
1048   named size, it can simply display the two numbers instead. Thus the pair of size dimensions serve
1049   the same function as keyword values, except that the client has an obvious fallback display for an
1050   unrecognized pair, namely, the actual dimension numbers.
1051   The "media-size" collection member attributes are:
1052

1053   **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

1054
1055
1056   3.10.9.1 x-dimension (integer(0:MAX))
1057
1058   Indicates the size of the media in hundredths of a millimeter along the bottom edge of the
1059   media. See section 2.3 regarding the coordinate system. This unit is equivalent to 1/2540 th
1060   of an inch resolution.
1061
1062   3.10.9.2 y-dimension (integer(0:MAX))
1063
1064   Indicates the size of the media in hundredths of a millimeter along the left edge of the media.
1065   See section 2.3 regarding the coordinate system. This is equivalent to 1/2540 th of an inch
1066   resolution.
1067
1068   3.10.9.3 media-size-supported (1setOf collection)
1069
1070   Indicates the sizes supported by the Printer. A requested media size dimension matches a
1071   supported media dimension if it is within an implementation-defined tolerance. For
1072   example, PostScript [redbook] specifies a tolerance of 5 points (5/72 of an inch = 1.7 mm) of
1073   a supported dimension, i.e., within 176 units of the value of the dimension.
1074
1075   The "media-size-supported " collection member attributes are:
1076

1077   **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

1078
1079
1080   **3.10.9.3.1 x-dimension (integer(0:MAX) | rangeOfInteger(0:MAX))**
1081
1082   Indicates the size of the media in hundredths of a millimeter along the bottom edge
1083   of the media. The rangeOfInteger attribute syntax accommodated variable size
1084   implementations, including web printers. See section 2.3 regarding the coordinate
1085   system. This is equivalent to 1/2540 th of an inch resolution.
1086

1087   **3.10.9.3.2 y-dimension (integer(0:MAX) | rangeOfInteger(0:MAX))**

1088

1089   Indicates the size of the media in hundredths of a millimeter along the left edge of the
1090   media. The rangeOfInteger attribute syntax accommodated variable size
1091   implementations, including web printers. See section 2.3 regarding the coordinate
1092   system. This is equivalent to 1/2540 th of an inch resolution.

1093

1094

1095   **3.10.10   media-weight-metric (integer(0:MAX))**

1096

1097   The "media-weight" member attribute indicates the weight of the desired media rounded to the
1098   nearest whole number of grams per square meter. The "media-weight-supported" (1setOf
1099   integer(MAX)) Printer attribute identifies the values of this "media-weight" member attribute that
1100   the Printer supports, i.e., the weights supported in metric units.

1101

1102   **3.10.11   media-weight-english (integer(0:MAX))**

1103

1104   The "media-weight-english" member attribute indicates the weight of the desired media rounded to
1105   the nearest whole number of pounds.

1106

1107   If a Printer supports the "media-weight-english" member attribute, it MUST also support the
1108   "media-weight-metric" member attribute (but vice-versa is OPTIONAL). If the Printer supports
1109   both weight member attributes, the values SHOULD be available in both units for each medium.
1110   Then users can request media with either units.

1111

1112   Note: The use of pounds is actually pounds per ream. However, the size of a ream depends on the
1113   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

1114   .

1115

1116   Note: Even for bond paper, the conversion between the two units of measure is approximate in
1117   order to give integer values in both system of units.

1118

1119   The "media-weight-english-supported" (1setOf integer(0:MAX)) Printer attribute identifies the
1120   values of this "media-weight-english" member attribute that the Printer supports, i.e., the weights
1121   supported in English units.

1122

1123   **3.10.12   media-front-coating (type3 keyword | name(MAX)) and media-back-coating**
1124   **(type3 keyword | name(MAX))**

1125

1126   The "media-front-coating" and "media-back-coating" member attributes indicate what pre-process
1127   coating has been applied to the front and back of the desired media, respectively.
1128
1129   Standard keyword values for "media-front-coating" and "media-back-coating" are:
1130

'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.

1131
1132   The "media-front-coating-supported" (1setOf (type3 keyword | name(MAX))) and "media-back-
1133   coating-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute identifies the values of
1134   these "media-front-coating" and "media-back-coating" member attributes that the Printer supports.
1135
1136   **3.10.13   media-recycled (type3 keyword | name(MAX))**
1137
1138   The "media-recycled" member attribute indicates the recycled characteristics of the media. The
1139   standard keyword values are:
1140

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

1141
1142   If this member attribute is supported, the Printer MUST support at least the 'none' and 'standard'
1143   values.
1144
1145   The "media-recycled-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute identifies
1146   the values of this "media-recycled" member attribute that the Printer supports, i.e., the recycled
1147   characteristics supported, which MUST include the 'none' keyword value so that validation follows
1148   the normal rules.
1149
1150   **3.10.14   media-default (type3 keyword | name(MAX)) or media-col-default (collection)**
1151
1152   The "media-default" (see [ipp-mod] section 4.2.11) or the "media-col-default" Printer attribute
1153   specifies the media that the Printer uses, if the client omits both the "media" and the "media-col" Job
1154   Template attributes in the Job Creation operation (and the PDL doesn't include a media
1155   specification). The member attributes are defined in Table 7. A Printer MUST support the same
1156   member attributes for this default collection attribute as it supports for the corresponding "media-
1157   col" Job Template attribute.
1158
1159   The "media-default" and "media-col-default" Printer attributes SHOULD MUST both be configured

1160   to specify ~~media instances and they SHOULD specify~~ the same media instance. If the administrator
1161   sets one of them to a value (either locally or with the Set-Printer-Attributes operation - see [ipp-
1162   set]), the Printer ~~SHOULD~~ MUST set the other attribute's value to specify the same media instance
1163   or to the 'unknown' out-of-band value, if there isn't a corresponding value to be set for the other
1164   attribute. If a client attempts to set both attributes, but their values specify different media instances,
1165   the Printer MUST reject the Set-Printer-Attributes operation and return the 'client-error-conflicting-
1166   attributes' status code. The reason to have both default attributes configured, is so that clients that
1167   only know about the "media" attribute will see the "media-default" attribute, while clients that know
1168   about the "media-col" attribute will be able to determine the characteristics of the media default.
1169
1170   **3.10.15   media-ready (1setOf (type3 keyword | name(MAX))) and media-col-ready**
1171   **(1setOf collection)**
1172
1173   The "media-ready" (see [ipp-mod] section 4.2.11) and "media-col-ready" Printer attribute identifies
1174   the media that are available for use without human intervention, i.e., the media that are ready to be
1175   used without human intervention. The collection value MUST have all of the member attributes
1176   that are supported in Table 7. If this attribute is supported, the Printer MUST support the IPP/1.1
1177   "media-ready" (1setOf (type3 keyword | name(MAX))) Printer attribute also. The i th value of the
1178   "media-ready" corresponds to the i th value of the "media-col-ready" attribute, so that the client can
1179   correlate the media name or keywords with the collection values, i.e., determine the characteristics
1180   of each ready media instance.
1181
1182   **3.10.16   media-col-supported (1setOf type2 keyword)**
1183
1184   The "media-col-supported" Printer attribute identifies the keyword names of the member attributes
1185   supported in the "media-col" collection Job Template attribute, i.e., the keyword names of the
1186   member attributes in Table 7 that the Printer supports.
1187
1188

1189 # 3.11 page-delivery (type2 keyword)
1190
1191   This attribute indicates whether print-stream pages of the job are to be delivered to the output bin or finisher
1192   in the same page order as the original document, or, in reverse of that order, and, whether the print-stream
1193   pages are delivered face up or face down. The "page-delivery" attribute specifies the intent based on the
1194   "original document" page order. See section 2.4 for a complete discussion on the ordering of print-stream
1195   pages.
1196
1197   Standard keyword values for page delivery are:
1198

'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".

1199
1200 The "page-delivery" attribute is often used in conjunction with on-line and off-line finishing devices. The
1201 intent is to be able to deliver the media sheets in either the order of the page-stream pages as defined in the
1202 "original document" or in the reverse of that order.
1203
1204 **3.11.1 Interaction with the "page-order-received" attribute**
1205
1206 The "page-order-delivery" attribute is dependent on the value of the "page-order-received" attribute
1207 (defined in section 3.12 below):
1208

"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.

3.12 page-order-received (type2 keyword)

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.

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

| '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. |

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.

1227
1228   If the "page-order-received" attribute is not present in a Job Creation or Document Creation request, then
1229   the printer SHOULD assume a value of '1-to-n-order.'
1230
1231

3.13 separator-sheets (collection)

1233
1234   This attribute specifies which separator sheets MUST be printed with the job. Separator sheets are used to
1235   separate individual copies of a multiple copy job (i.e., when the "copies" attribute is greater than 1). The
1236   "separator-sheets" attribute is dependent both on the value of "multiple-document-handling" and on the
1237   value of "sheet-collate" (see [ipp-prog]). See sections 2.2 and 3.13.1 for a detailed description and
1238   examples of what constitutes a "set."
1239
1240   Separator sheets may either be non-imaged sheets, or may contain Printer generated information.
1241
1242   The 'collection' attribute syntax allows a client to specify media for job separator sheets that is different than
1243   the current media being used for the print-stream page impressions. The collection consists of:
1244

1245   **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

1246
1247

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

1249
1250   The "separator-sheets-type" member attribute specifies which separator sheets type the Printer
1251   MUST use for the separator sheets. Standard keyword values are:
1252

'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.

1253
1254   Example: A job is created consisting of a single document, with the job template attribute "copies"
1255   equal to '10' and "separator-sheets-type" equal to 'slip-sheets'. If each of the 10 "sets" is denoted by
1256   (J1), (J2) ... (J10), and a separator sheet is denoted by S, then the delivered output would be: (J1) S
1257   (J2) S ... S (J9) S (J10).

1258
1259   The "separator-sheets-type-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute
1260   identifies the values of this "separator-sheet-type" member attribute that the Printer supports, i.e.,
1261   the type names of the separator sheets.
1262
1263   ### 3.13.2 media (type3 keyword | name(MAX)) or media-col (collection)
1264
1265   Either the "media" (defined in [ipp-mod] section 4.2.11) or the "media-col" member attribute is used
1266   to indicate the media that the Printer MUST use for the job separator sheet. The member attributes
1267   are the same as those for the "media-col" attribute shown in Table 7.
1268
1269   If the client omits both the "media" and the "media-col" member attributes, then the implementation
1270   selects a media instance (by means outside the scope of this document) that is appropriate for
1271   separator sheets. The client MUST NOT supply both the "media" and the "media-col" member
1272   attribute. If client supplies such a mal-formed request by supplying both, the Printer MUST
1273   (depending on implementation) either (1) reject the request and return the 'client-error-bad-request'
1274   status code (see [ipp-mod] section 13.1.4.1) or (2) use either the "media" or the "media-col" member
1275   attribute, independent of the value of the "ipp-attribute-fidelity" attribute supplied by the client.
1276
1277   Since this "media" member attribute has the same name as the "media" Job Template attribute
1278   defined in [ipp-mod] section 4.2.11), the "media-supported" (1setOf (type3 keyword | name(MAX)))
1279   Printer attribute (also defined in [ipp-mod] section 4.2.11) identifies the values of this "media"
1280   member attribute (as well as the values of the "media" Job Template attribute) that the Printer
1281   supports, i.e., the names of the supported media.
1282
1283   Since this "media-col" member attribute has the same name as the "media-col" Job Template
1284   attribute defined in section 3.10), the "media-col-supported" Printer attribute (defined in section
1285   3.10.16) identifies the keyword names of the member attributes supported in this "media-col"
1286   member attribute (as well as the keyword names of the "media-col" Job Template attribute), i.e., the
1287   names of the member attributes in Table 7 that the Printer supports.
1288
1289
1290   ### 3.13.3 separator-sheets-default (collection)
1291
1292   The "separator-sheets-default" Printer attributes specify the separator sheets that the Printer MUST
1293   provide, if any, if the client omits the "separator-sheets" Job Template attribute. The member
1294   attributes are defined in Table 10. A Printer MUST support the same member attributes for this
1295   default collection attribute as it supports for the corresponding "separator-sheets" Job Template
1296   attribute.
1297
1298   ### 3.13.4 separator-sheets-supported (1setOf type2 keyword)
1299
1300   The "separator-sheets-supported" attribute identifies the keyword names of the member attributes
1301   supported in the "separator-sheets" collection Job Template attribute, i.e., the names of the member
1302   attributes in Table 10 that the Printer supports.

1303
1304   ## 3.14 Impression Image Shifting Attributes
1305
1306   The attributes defined in this sub-section shift the impression images ~~specified~~as specified in the attribute
1307   definition. ~~In other words, these attributes affect the impression, not individual page images.~~ The Printer
1308   MUST apply this shifting to the resulting impression after creating a single impression from a number of
1309   page images as specified by either (1) the "number-up" attribute (see [ipp-mod] sections 4.2.9 and 15.3) or
1310   any other attribute that specifies imposition. In other words, these attributes affect the impression, not
1311   individual page images.
1312
1313   ### 3.14.1 x-image-auto-center (boolean)
1314
1315   This attribute causes the impression to be centered along the x-axis on the media to which it is applied.
1316
1317   If the "x-image-shift," "x-side1-image-shift" or "x-side2-image-shift" attributes are specified, then the
1318   printer MUST apply the "x-image-auto-center" attribute first, followed by the "x-image-shift" attribute, and
1319   finally the "x-side1-image-shift" and "x-side2-image-shift" attributes.
1320
1321   For example, if the print-stream image normally is placed on the media sheet as follows:
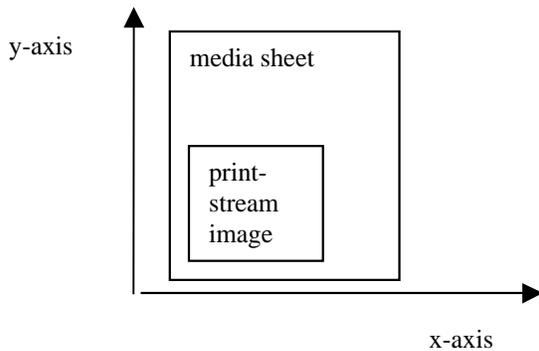
1322
1323
1324   with "x-image-auto-center" = 'true' (1), the result would be:
1325
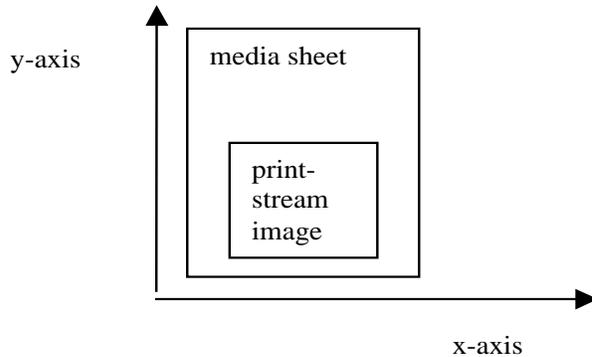
1326
1327

3.14.2 x-image-shift (integer(MIN:MAX))

This attribute causes the impression on both sides of each sheet, to be shifted in position with respect to the media on which the impression is to be rendered. The direction of shift MUST be along the x-axis of the Coordinate System (see section 2.3) with respect to the medium. The sign of the value indicates the direction of the shift.

If the client supplies the "x-image-auto-center," "x-side1-image-shift" or "x-side2-image-shift" attributes, then the Printer MUST apply the "x-image-auto-center" attribute first, followed by the "x-image-shift" attribute, and finally the "x-side1-image-shift" and "x-side2-image-shift" attributes.

The unit of measure for this attribute is hundredths of a millimeter. This is equivalent to $1/2540^{th}$ of an inch resolution.

3.14.3 x-side1-image-shift (integer(MIN:MAX))

This attribute causes the impression, on the front of each sheet, to be shifted in position with respect to the media on which the impression is to be rendered. The direction MUST be along the x-axis of the Coordinate System (see section 2.3) with respect to the medium. The sign of the value indicates the direction of the shift.

If the bind edge is along the y-axis, then a bind edge image shift can be accomplished by applying impression shifts of equal magnitude, and opposite sign, to the "x-side1-image-shift" and "x-side2-image-shift" attributes, respectively (assuming that the "sides" attribute is 'two-sided-long-edge').

If the client supplies the "x-image-auto-center" or "x-image-shift" attributes, then the Printer MUST apply the "x-image-auto-center" attribute first, followed by the "x-image-shift" attribute, and finally the "x-side1-image-shift" and "x-side2-image-shift" attributes.

The unit of measure for this attribute is hundredths of a millimeter. This is equivalent to $1/2540^{th}$ of an inch resolution.

3.14.4 x-side2-image-shift (integer(MIN:MAX))

This attribute causes the impression, on the back of each sheet, to be shifted in position with respect to the media on which the impression is to be rendered. The direction of shift MUST be along the x-axis of the Coordinate System (see section 2.3) with respect to the medium. The sign of the value indicates the direction of the shift.

If the bind edge is along the y-axis, then a bind edge image shift can be accomplished by applying impression shifts of equal magnitude, and opposite sign, to the "x-side1-image-shift" and "x-side2-image-shift" attributes, respectively (assuming that the "sides" attribute is 'two-sided-long-edge').

If the client supplies the "x-image-auto-center" or "x-image-shift" attributes, then the Printer MUST apply

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

1418
1419   The unit of measure for this attribute is hundredths of a millimeter. This is equivalent to 1/2540th of an inch
1420   resolution.
1421
1422
1423   **3.14.8 y-side2-image-shift (integer(MIN:MAX))**
1424
1425   This attribute causes the impression, on the back of each sheet, to be shifted in position with respect to the
1426   media on which the impression is to be rendered. The direction of shift MUST be along the y-axis of the
1427   reference coordinate system with respect to the medium. The sign of the value indicates the direction of the
1428   shift.
1429
1430   If the bind edge is along the x-axis, then bind edge image shift can be accomplished by applying impression
1431   shifts of equal magnitude, and opposite sign, to the "y-side1-image-shift" and "y-side2-image-shift"
1432   attributes, respectively (assuming that the "sides" attribute is 'two-sided-short-edge').
1433
1434   If the client supplies the "y-image-auto-center" or "y-image-shift" attributes, then the Printer MUST apply
1435   the "y-image-auto-center" attribute first, followed by the "y-image-shift" attribute, and finally the "y-side1-
1436   image-shift" and "y-side2-image-shift" attributes.
1437
1438   The unit of measure for this attribute is hundredths of a millimeter. This is equivalent to 1/2540th of an inch
1439   resolution.
1440
1441   ## 3.15 Usage in Document-Exceptions and Page-Exceptions
1442
1443   Most of the Job Template attributes defined in this document are defined for use in the "document-
1444   exceptions" (collection) and/or "page-exceptions" (collection) Job Template attributes (see [ipp-except]).
1445   According to that document, any Job Template attribute document MUST indicate the syntax and semantics
1446   for applying each Job Template attribute in any Document and/or Page exceptions.
1447
1448   Table 12 augments the definitions of each Job Template attribute defined in this document by indicating
1449   with which parts of a job, the attribute "associates with" and "affects" (see [ipp-except]). All Job Template
1450   attributes associate with the Job, so that is not indicated in Table 12. A subset of the Job Template
1451   attributes are defined to be used in Document-Exceptions to affect Input-Document and are associated with
1452   Input-Documents only via the "document-exceptions" attribute. Another subset affect Output-Documents
1453   and are associated with either Input-Documents or Output-Document via the "document-exceptions"
1454   attribute. A final subset of Job Template attributes affects Sheets, Pages, or Impressions and are associated
1455   with Pages of an Input-Document or an Output-Document by the "pages-exceptions" attribute or associated
1456   with Input-Document or Output-Document via a "document-exceptions" attribute. See [ipp-except] for the
1457   syntax of the "document-exceptions" (1setOf collection), "page-exceptions" (1setOf collection) and "page-
1458   per-subset" (1setOf integer(1:MAX)) and semantics of association with Document-Exceptions, Page-
1459   Exceptions, Sheets, and Pages. The "pages-per-subset" attribute defines Output-Document to be subsets of
1460   pages within Input-Documents.
1461
1462   Table 11 lists the possible attribute exception semantics for Job Template attributes and shows what clients

1463   can supply in Job Creation operations.

1464   **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"

1465
1466   A client MUST NOT submit and a Printer MUST NOT support a Job Creation request with "document-
1467   exceptions" (collection), ~~or~~ "page-exceptions" (collection), or "pages-per-subset" containing member
1468   attributes not indicated in Table 11 depending on what the Job Template attribute is defined to affect as
1469   indicated in Table 12 ~~indicated with "No" in the Document Exceptions or Page Exceptions columns in~~
1470   ~~Table 12, respectively~~. If a client submits a Job Creation request with such a member attribute and "ipp-
1471   attribute-fidelity" = 'true', the Printer MUST reject the request and return the 'client-error-bad-request' status
1472   code. If a client submits a Job Creation request with such a member attribute and "ipp-attribute-fidelity" =
1473   'false' or omitted, the Printer MUST accept the request and return the 'successful-ok-ignored-or-substituted-
1474   attributes' status code, along with the collection and only those member attributes.
1475

1476   **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

Section or Attribute	Affects:
3.14.1 x-image-auto-center (boolean) through 3.14.8 y-side2-image-shift (integer(MIN:MAX))	Impressions

1477

4   Job Description Attributes

1479

1480   This section defines Job Description attributes for use with IPP/1.0 [RFC 2566] and IPP/1.1 [ipp-mod].

1481

4.1   current-page-order (type2 keyword)

1483

1484   This attribute represents the current page order of the document data supplied with the job. Initially
1485   "current-page-order" is set to the value of the Job Template attribute "page-order-received." The value of
1486   "current-page-order" may change based on processing and the value of the "page-order-delivery" attribute.
1487   If the Printer changes the value of a Job's "current-page-order" Job Description attribute, then it is assumed
1488   that the associated document data has been transformed in some way to reflect this change. It should be
1489   noted that the document data that "current-page-order" refers to is not always the document data sent with
1490   the create request, but may also refer to the processed images that are to be delivered to the printer. The
1491   standard values for this attribute are the same as for of the "page-order-received" attribute (see section
1492   3.12), namely '1-to-n-order' and 'n-to-1-order'.

1493
1494

5   Printer Description Attributes

1496

1497   This section defines Printer Description attributes for use with IPP/1.0 [RFC 2566] and IPP/1.1 [ipp-mod].

1498

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

1500

1501   This Printer attribute identifies the "xxx" Job Template attributes that the Printer will accept user-defined
1502   name in a Job Creation request, i.e., a name that a client supplies that is not in the corresponding "xxx-
1503   supported" Printer attribute. In effect, the presence of the 'xxx' keyword value in this attribute suspends
1504   validation of the "xxx" attribute for any 'name' values supplied by the client. Thus a user can supply a
1505   custom name for this "xxx" attribute. If there are no Job Template attributes that will accept any name
1506   value, the value of this attribute MUST be the keyword 'none'.

1507

1508   For any "xxx" Job Template attributes identified by this attribute, the Printer suspends validation for values
1509   of type 'name' and the job is created containing the user-defined value, even when the client supplied the
1510   "ipp-attribute-fidelity" with a 'true' value (which would otherwise, have caused the Printer to reject the
1511   request, if the "xxx" value had not been among those of the Printer's "xxx-supported" attribute).

1512

1513   For example, the system administrator could add the 'media' keyword attribute name value to the "user-
1514   defined-names-supported" Printer attribute in order to allow the user to supply any media name value for
1515   the "media" attribute even if that name wasn't one of the media names in the Printer's "media-supported"
1516   attribute.

1517
1518 When the client supplies a 'yyy' value for the "xxx" attribute that is not in the "xxx-supported" Printer
1519 attribute , the Printer does not return the "xxx" value in the Unsupported Attributes group in the response.
1520 Instead, the Printer stores the requested attribute and value unmodified on the Job object for subsequent
1521 queries as with any supported value. Subsequently, a user or operator can query the Job using the Get-Job-
1522 Attributes or Get-Jobs operations to see what user-defined value was requested. Depending on
1523 implementation and/or site policy, the Printer schedules the job following one of the following options:
1524

1525   1. Add the 'resources-are-not-supported' value (see section 6.1) to the Job's "job-state-reasons"
1526   attribute and move the job to the 'pending-held' state until either the operator adds the requested
1527   value to the Printer's "xxx-supported" attribute or the user or operator modifies the job to contain
1528   a value that is in the Printer's "xxx-supported" attribute; then releases the job using the Release-
1529   Job operation (see [ipp-mod] section 3.3.6).
1530

1531   2. Add the 'resources-are-not-supported' value to the Job's "job-state-reasons" attribute but keep the
1532   job in the 'pending' state and start to process the job as if the requested media were ready, but
1533   stop the job ("job-state" = 'processing-stopped') and the Printer ("printer-state" = 'stopped') and
1534   request immediate operator intervention. The operator loads the requested media and continues
1535   the Printer, using the Resume-Printer operation (see [ipp-mod] section 3.2.8).
1536

1537

1538 6 Additional Values for Existing Attributes

1539
1540 This section defines additional values for existing attributes.
1541

1542 6.1 Additional values for the "job-state-reasons" Job attribute

1543
1544 This section defines additional values for the "job-state-reasons" (1setOf type2 keyword) Job Description
1545 attribute (see [ipp-mod] section 4.3.8):
1546
1547 'resources-are-not-supported': At least one of the resources needed by the job, such as media, fonts,
1548   resource objects, etc., is not supported on any of the physical printer's for which the job is a
1549   candidate. This condition MAY be detected when the job is accepted, or subsequently while
1550   the job is pending or processing, depending on implementation. The job may (1) remain in its
1551   current state, (2) be moved to the 'pending-held' state, depending on implementation and/or job
1552   scheduling policy, or (3) scheduled normally, but the Printer is put into the 'stopped' state when
1553   the job is attempted to be processed on the Printer. This value is intended for use with an
1554   implementation that supports the "user-defined-names-supported" Printer attribute (see section
1555   5.1) which allows a job to be accepted with an unsupported 'name' value.

1556

1557 6.2 Additional values for the IPP/1.1 "job-sheets" Job Template Attribute

1558
1559 The following additional values are defined for the IPP/1.1 "job-sheets" Job Template attribute:

1560

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.

1561
1562

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

1565

1566 This section defines additional values for the "media" (type3 keyword | name(MAX)) Job Template
1567 attribute (see [ipp-mod] section 4.2.11), the "media" member attribute defined in this document in a number
1568 of the collection attributes, and the "media-description" member attribute defined in section 3.10.1:

1569
1570

1571 The following are additional semantics to the existing attribute "media".

1572

1573 If the Printer implementation supports the use of tray name keywords to identify media, there SHOULD be
1574 one and only one keyword assigned for each input tray on the printer. If multiple keywords for the same
1575 tray exist in "media-supported", the client UI could potentially become very confusing to the user because
1576 the Printer would appear to have more input trays than it actually has. However, see the discussion in the
1577 Printer MIB [RFC1759] about a manual input tray that uses the same input slot as a regular input tray.
1578 Also, if using tray names, it is RECOMMENDED that the printer implementation use the most descriptive
1579 keyword for a logical tray in order to assist the user or operator to recognize the matching physical tray at
1580 the printer. There are three methods to choose the keyword: 1) If the printer trays aren't physically labeled,
1581 the keyword SHOULD best match the physical location of the tray (e.g. 'top', 'bottom'). 2) If the printer
1582 trays are physically labeled, the keyword SHOULD best match the label of the tray (e.g. 'tray-1', tray-2'),   3)
1583 If more than one keyword matches the label of the tray, the keyword SHOULD be used that best
1584 distinguishes the tray from the Printer's other trays.

1585

1586 If a Printer allows the media to be specified by tray name keyword, the Printer implementation MUST NOT
1587 use the 'name(MAX)' attribute syntax to create custom tray names, but rather MUST use the most
1588 appropriate tray name keyword value. This ensures interoperability among clients that submit jobs to
1589 multiple types of printers.

1590

1591 These are additional standard keyword values defined for input-trays.

1592

'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 ~~attribute~~ the "insert-sheet~~s~~" 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.

1593
1594
1595
1596 These are additional standard keyword values which are used by the implementation for specifying a pre-
1597 defined media size:
1598

'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

1599
1600

7   Conformance Requirements

1602
1603 This section summarizes the Conformance Requirements detailed in the definitions in this document for
1604 clients and Printer objects (servers or devices).
1605

7.1   Conformance Requirements for Printer objects

1607
1608 In general each of the attributes defined in this document are OPTIONAL for a Printer to support, so that
1609 Printer implementers MAY implement any combination of attributes. Only the following conditional
1610 conformance requirements are defined:
1611

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"

1612
1613   Each of the collection attribute definitions indicate which member attributes are REQUIRED and which are
1614   OPTIONAL for a Printer to support and is not repeated here.
1615
1616   If a Printer supports the 'collection' attribute syntax of a Job Template attribute , then it MUST support the
1617   distinguished none value defined for that collection. See section 2.6.
1618
1619   Support of the 'name' attribute syntax for Job Template attributes and collection member attributes is
1620   OPTIONAL, as in IPP/1.1.
1621
1622

1623   ## 7.2   Conformance Requirements for clients

1624
1625   Clients that support two Job Template attributes that control the same aspect, such as "media" and "media-
1626   col", MUST NOT supply both in a Job Creation request as indicated in the definitions of these attributes.
1627
1628   Clients that support a "xxx" collection Job Template attribute SHOULD use the Get-Printer-Attributes
1629   request to obtain the "xxx-default" collection and display that to the user, so that the user can make any
1630   changes before submitting the Job. Then the client submits values for all member attributes, rather than
1631   depending on the Printer's defaulting for omitted member attributes, since such defaulting is
1632   implementation dependent and will vary from Printer to Printer.
1633

1634   # 8   IANA Considerations

1635
1636   IANA will be called on to register the attributes defined in this document, using the procedures outlined in
1637   [ipp-mod] section 6.
1638
1639

1640   # 9   Internationalization Considerations

1641
1642   The IPP extensions defined in this document require the same internationalization considerations as any of
1643   the Job Template attributes defined in IPP/1.1 [ipp-mod].
1644

1645

10 Security Considerations

1647

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

1650
1651

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1653

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1680

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

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

The following changes were made to the April 11, 2000 version to create the April 26, 2000 version:

1. Added discussion about distinguished none values for all but a few Job Template attributes.
2. Clarified the table and language for collections that have both "media" and "media-col" around the client sending neither (error for some collection attributes, not for others), one or the other, or both (error).
3. Removed the use of the 'none' out-of-band value and defined distinguished values for keywords (usually 'none', or 'no-xxx'), strings (zero-length), and integers (usually 0) instead. Existing clients and Printers might get confused with the (new) 'none' out-of-band value.
4. Broke "job-error-sheet-type" into two member attributes: "job-error-sheet-type" and "job-error-sheet-when".
5. Removed the "s" from "job-error-sheet".
6. Banned "media-default" and "media-col-default" from both having a value, even if one is the name of the other. Required the Printer to set the other to 'no-value' out-of-band value.
7. Added "media-label-type" (type3 keyword | name(MAX)), and "media-recycled" (type3 keyword | name(MAX)) member attributes to "media-col".
8. Changed the "xxx-supported" (boolean) to "xxx-supported" (integer(0:X) so that the maximum length

1768   of the string could be queried by the client.
1769   9. Added 'gray', 'ivory', and 'orange' colors
1770   10. Changed media-pre-printed (boolean) to media-pre-printed (type3 keyword | name(MAX)) and defined
1771   'blank', 'pre-printed', and 'letter-head'.
1772   11. Removed -supported from the member attributes of the "media-col-supported" (1setOf collection).
1773   12. Added 'none' keyword value to media-front-coating (type3 keyword | name(MAX)) and media-back-
1774   coating (type3 keyword | name(MAX))
1775   13. Replaced the 'user-define' and 'user-define-supported' out-of-band values with the "user-defined-names-
1776   supported" Printer attribute. This will help existing clients that query the Printer.
1777   14. Added some "media" keyword values.
1778   15. Enhanced the Conformance Section with client requirements.
1779

1780 13.4 Changes to the February 7, 2000 to create the April 11, 2000 version

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

1813 6.   Changed "insert-sheet" to agree with the Exceptions document [ipp-except], so that if a page number
1814   is not the first on a sheet, the insert happens after that sheet, and the page is forced to the next sheet
1815   and a warning given using the "job-warnings-count" Job Description attribute and the Job's 'job-
1816   warnings-detected' job-state-reasons.
1817 7.   Add the "insert-count-supported (integer(1:MAX))" Printer attribute for consistency.
1818 8.   Clarified that the "media" attribute maps a name or keyword to a media instance, but that not all
1819   media instances need have an associated media name or keyword. Also that no two media instances
1820   can have the same "media" attribute name or keyword.
1821 9.   Clarified that that the "media-col" collection attribute maps a set of characteristics to a media instance
1822   and that all media instances must have a distinct set of characteristics, not counting their names. The
1823   "media-description" member attribute can be used as a characteristics to distinguish two otherwise
1824   identical media instances.
1825 10.   Changed the name of the "media-name" member attribute to "media-description" and its attribute
1826   syntax from 'type3 keyword | name(MAX)' to 'text(255)' to make sure that the value is just an
1827   arbitrary string with no semantic content, such as a tray name or size.
1828 11.   Clarified that several media instances can have the same "media-description" member attribute value.
1829 12.   Specified the tolerance for media size matching of 5 points, same as PostScript.
1830 13.   Removed the type3 keyword from the "media-size" (collection) member attribute, so as to have only
1831   one way to specify size, namely a pair of integers. The client can use these integers to map to a media
1832   size name in the locale of the user, similar to keywords.
1833 14.   Added a rangeOfInteger to the "media-size-supported" (1setOf collection) member attributes and so
1834   added a "-supported" suffix to "x-dimension" and "y-dimension" member attributes since they now
1835   have different attribute syntaxes to the member attributes of the "media-size" member attribute.
1836 15.   Added "media-col-ready" (1setOf collection) Job Template Printer attribute to show the
1837   characteristics of the ready media.
1838 16.   Clarified that the IPP/1.1 "media-ready" (1setOf (type3 keyword | name(MAX))) Printer attribute
1839   MUST also be supported, and that the values correspond, so that the client can determine the
1840   mapping of the media names/keywords to the media characteristics for the ready media at least.
1841 17.   Deleted "sheet-collate", since it is already defined in the "Job Progress Attributes" document [ipp-
1842   prog].
1843 18.   Added the section on Document and Page Exceptions to indicate the semantics of each Job Template
1844   attribute as required by [ipp-except].
1845 19.   Deleted the definition of the 'none' out-of-band attribute value, since it is defined in the [ipp-coll]
1846   document.
1847 20.   Added the 'user-define' out-of-band attribute value for use as one of the values of the Printer's "xxx-
1848   supported" attributes to indicate that a client can supply a name that is not in the Printer's supported
1849   list, i.e., can supply custom names.
1850 21.   Added the 'user-define-supported' out-of-band value so that an implementation can indicate in the
1851   "xxx-supported" returned by the Get-Printer-Supported-Values operation whether or not it will allow
1852   the administrator to set the 'user-define' out-of-band value in the corresponding Printer's "xxx-
1853   supported" attribute.
1854 22.   Added the 'resources-are-not-supported' value for use with the "job-state-reasons" Job Description
1855   attribute to indicate that a user has supplied a custom name.
1856 23.   Clarified that if a Printer supports "job-sheets-col", it MUST also support the IPP/1.1 "job-sheets" Job
1857   Template attribute.

1858   24.   Clarified that if a Printer supports "media-col", it MUST also support the IPP/1.1 "media" Job
1859   Template attribute.
1860   25.   Clarified that if a Printer supports "media-col-ready", it MUST also support the IPP/1.1 "media-
1861   ready" Printer attribute.
1862   26.   Changed the attribute syntax for "job-account-id-supported", "job-message-to-operator-supported",
1863   "job-recipient-name-supported", and "job-sheet-message-supported" from 'boolean' to 'integer(1:255)'
1864   to indicate the maximum string length supported, since IPP is often a gateway to another system that
1865   can't store the string length required for conforming IPP Printers.
1866   27.   Added notes about the conversion between English and metric for different types of media.
1867
1868

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

1870
1871   The following changes were made to the January 30, 2000 version to create the February 7, 2000 version:
1872
1873   1.   Changed the attribute syntax of "cover-front-supported" and "cover-back-supported" from 'collection' to
1874   'boolean', since a Printer MUST support all (both) member attributes and any combinations of values.
1875   2.   Changed the 'sheet' member attribute in each of the following collections to give them distinct names so
1876   that the "xxx-supported" Printer attribute can indicate their respective (potentially different) values:
1877   "job-accounting-sheets", "job-error-sheets", "job-sheets", and "separator-sheets".
1878   3.   Added "media-" to the beginning of each member attribute of the "media" collection, so that ordinary
1879   "media-xxx-supported" could be used to represent their individual supported values.
1880   4.   Removed the 'name(MAX)" choice from the "media-size" member attribute. If the properties of a
1881   medium are being given, either the keyword name or the exact numerical dimensions known to the
1882   implementation, not a name made up by the administrator.
1883   5.   Added "media-size-supported (1setOf collection) which contains the combinations of numerical sizes
1884   supported (x-dimension and y-dimension) by the Printer. This "xxx-supported" attribute is the only one
1885   that has a value of '1setOf collection' in order to list the pairs of x and y dimensions supported. The
1886   attribute syntax of the "x-dimension" and "y-dimension" is a choice of 'integer(0:MAX)' or
1887   'rangeOfInteger(0:MAX)' to cover the case of continuous media and cut sheet printers that can cut the
1888   medium to any size within the specified range.
1889   6.   Changed the "media-supported" from containing a collection whose member attributes listed the
1890   supported values that the client could supply as member attributes to just containing a new out-of-band
1891   'any-collection' value that indicates that the implementation allows any combination of member
1892   attributes that are indicated by the corresponding "xxx-supported" Printer attributes.
1893

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

1895
1896   The following changes were made to the January 28, 2000 version to create the January 30, 2000 version:
1897
1898   1.   Ordered the Job Template attributes alphabetically.
1899   2.   Add 'name(MAX)' to Job Template attributes that had (type3 keyword | collection) to be consistent with
1900   IPP/1.1 that has (type3 keyword | name(MAX)).
1901

1902 **13.7 Changes to create the January 28, 2000 version**
1903
1904 Initial version.
1905
1906

1907 # 14 Appendix B: Possible future additions
1908
1909 This appendix lists possible future additions.
1910

1911 ## 14.1 Possible future keyword additions for "media" and "media-col" attributes
1912
1913 These are additional standard keyword values which are used by the implementation as a
1914 simple method for media selection. When combinations of these values are needed for
1915 media selection, it is RECOMMENDED that the attribute "media-col" collection be used to
1916 prevent proliferation of complex keywords and names.
1917

'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

1918
1919

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

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

"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

Should we add a new member attribute, called "media-kind" (type3 keyword | name) with value like: labels, envelope, envelope-plain, envelope-window, continuous-long, continuous-short, multi-layer, and multi-part-form from the Printer MIB?

Should the values: 'bond', 'Index-Bristol-tab-stock', 'cover-stock', 'rank-paper' and 'newsprint' (see "media-weight" member attribute description) be added to this new "media-kind" member attribute?

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

The IEEE-ISTO is a not-for-profit corporation offering industry groups an innovative and flexible operational forum and support services. The IEEE-ISTO provides a forum not only to develop standards, but also to facilitate activities that support the implementation and acceptance of standards in the marketplace. The organization is affiliated with the IEEE (http://www.ieee.org/) and the IEEE Standards Association (http://standards.ieee.org/).

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16 Appendix D: Description of the IEEE-ISTO PWG

1953 The Printer Working Group (or PWG) is a Program of the IEEE Industry Standards and Technology
1954 Organization (ISTO) with member organizations including printer manufacturers, print server developers,
1955 operating system providers, network operating systems providers, network connectivity vendors, and print
1956 management application developers. The group is chartered to make printers and the applications and
1957 operating systems supporting them work together better. All references to the PWG in this document
1958 implicitly mean "The Printer Working Group, a Program of the IEEE ISTO." In order to meet this
1959 objective, the PWG will document the results of their work as open standards that define print related
1960 protocols, interfaces, procedures and conventions. Printer manufacturers and vendors of printer related
1961 software will benefit from the interoperability provided by voluntary conformance to these standards.
1962
1963 In general, a PWG standard is a specification that is stable, well understood, and is technically competent,
1964 has multiple, independent and interoperable implementations with substantial operational experience, and
1965 enjoys significant public support.
1966
1967 For additional information regarding the Printer Working Group visit:
1968
1969   http://www.pwg.org
1970
1971
1972

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2015   scope.
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