5
6   Internet Printing Protocol (IPP): Production Printing Attributes - Set1
7   <pwg-ipp-prod-print-set1-000605.rtf, .pdf>
8
9   Status of this Memo
10

16
17
18   Abstract
19

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

34   The full set of IPP documents includes:

35

36   Design Goals for an Internet Printing Protocol [RFC2567]
37   Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
38   Internet Printing Protocol/1.1: Model and Semantics (this document)
39   Internet Printing Protocol/1.1: Encoding and Transport [IPP-PRO]
40   Internet Printing Protocol/1.1: Implementer's Guide [IPP-IIG]
41   Mapping between LPD and IPP Protocols [RFC2569]

42

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

48

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

53

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

59

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

65

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

68

Table of Contents

181

Table of Tables

183

196

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

266
267   A *print-stream page* is a page according to the definition of pages in the language used to express the
268   document data" (see section of 13.2.4 of the IPP Model and Semantics Document). The *document data*
269   included in an IPP request is typically a PDL representation of a document composed by a user. For the
270   remainder of this description we will use the term document data to mean the typical PDL representation
271   sent with an IPP request (e.g., a PostScript File), and the term *original document* to mean the document
272   composed by the user (e.g., a Word97 document). The print-stream page numbering is with respect to the
273   Input-Document, not the Output-Document (see [ipp-except]). Furthermore, the page numbers are ordinal
274   numbers starting at 1 and are independent of the page numbers that may be printed on the pages.
275
276   The order of the print-stream pages in the document data is either the same as the order of the original
277   document, known as 1-N (read "one to N"), or the reverse of that order, known as N-1. There are no
278   assumptions on the order of the original document, other than it is ordered.
279
280   The enumeration of print-stream pages begins with 1 and increments by 1 for each additional print-stream
281   page. The enumeration is based on the order of the original document, not the document data supplied with
282   the IPP request. In other words, if the document data is supplied in N-1 order (reverse of the original
283   document order), then print-stream page number '1' in the enumeration is actually the N th print-stream
284   page defined in the document data (see the "page-order-received" attribute in section 3.12). Similarly,
285   print-stream page number '2' is defined by the (N-1) th print-stream page defined in the document data.
286   Suppose the document data is supplied in the 1-N order (same as the original document order), then print-
287   stream page number '1' in the enumeration is the 1 st print-stream page defined in the document data.
288   Similarly, print-stream page number '2' is defined by the 2 nd print-stream page defined in the document
289   data. The enumeration of print-stream pages is only relevant when applying attributes or operations that act
290   on a page, or range of page basis (e.g., the "insert-sheet" attribute in section 3.2).
291
292   The enumeration of print-stream pages is affected by the "multiple-document-handling" attribute. When
293   the "multiple-document-handling" attribute is 'single-document' or 'single-document-new-sheet,' the
294   enumeration is based on the concatenation of all the print-stream pages in the job. In the case of 'separate-
295   documents-collated-copies' and 'separate-documents-uncollated-copies,' the enumeration of print-stream
296   pages applies to each document. For example, for a job with eight documents, referring to print-stream
297   page number '1' actually refers to print-stream page number '1' in each of the eight documents included with
298   the job.
299
300   The enumeration of print-stream pages is NOT affected by the "page-ranges" Job Template attribute, if
301   supplied. The "page-ranges" attribute merely affects which Input-Document pages are actually printed. For
302   example, if an insert sheet is to be inserted after print-stream page number is 5 of a 10-page document, the
303   insert page will be inserted after page 5 with respect to the Input-Document as long as page 5 is included in
304   the "page-ranges" attribute. If the "page-ranges" attribute does not include Input-Document page 5, then the
305   insert sheet will not be inserted. Thus a user can supply the "page-ranges" attribute without having to

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

2.5   Collection Attributes

310

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

2.6   Definition of 'none' values

321

322 For most Job Template attributes, the client needs a way to indicate that the Printer MUST NOT perform
323 the feature associated with the attribute, including not performing the default action indicated by the
324 Printer's "xxx-default" attribute. If the client omits the "xxx" Job Template attribute, a corresponding value
325 is used from the PDL data, if present. Otherwise, the Printer's "xxx-default" attribute value is used.
326

327 For each attribute definition, the representation of none is specified or is explicitly disallowed. For string
328 attribute syntax types, such as 'text', 'name', 'uri', 'uriScheme', 'charset', 'naturalLanguage', 'mimeMediaType',
329 and 'octetString', the client supplies a zero-length value to indicate an explicit none. For 'enum', 'keyword',
330 or 'keyword | name' a specific 'none' enum or keyword value is defined. For 'integer' or 'rangeOfInteger'
331 values, a particular distinguished value, such as 0 or -1' is defined to mean none. The client can supply the
332 defined none value in order to override a Printer's "xxx-default" value. The Printer MUST return the 'no-
333 value' out-of-band value for Printer Description attributes that have 'dateTime' or 'integer' time values that
334 do not yet have a value (see [ipp-mod] sections 4.3.14 and 4.4.30).
335

336 Similarly, for the corresponding Printer's "xxx-default", the Printer MUST use the same none value to
337 indicate that there is no default value that will be applied. Thus the defined values for the "xxx-default"
338 attribute are the same as those that a client can supply, including the none case. Consequently, no special
339 mention is made of the none case in each "xxx-default" attribute definition. However, a Printer
340 implementation MUST support the defined none value for each Job Template attribute in job submission,
341 as a value of the "xxx-default" Printer attribute, and as one of the values of the "xxx-supported" Printer
342 attribute, if the Printer supports the "xxx" Job Template attribute. Also the administrator SHOULD be able
343 to remove the 'none' value from the list of supported values if the site policy is to disallow the none case.
344 See [ipp-set-ops] for means to set the values of the "xxx-supported" and "xxx-default" Printer attributes
345 using the Set-Printer-Attributes operation.
346

347 There are a few Job Template attributes for which there is no none value defined, because of the inherent
348 nature of the semantics associated with the attribute the Printer always supplies some value. Examples of
349 such attributes (see [ipp-mod]) are: "media" (type3 keyword | name) and "sides" (keyword). There is no

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

357   ## 3   Job Template Attributes

358

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

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

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

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

362
363
3.1   cover-front (collection) and cover-back (collection)
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	MUST
media-col	collection	the other, but NOT both	MAY

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

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

553   ## 3.3   job-account-id (name (MAX))
554

555   The "job-account-id" attribute is a character string representing the account associated with the job. The
556   "job-account-id" attribute could be a customer name, a sequence of digits referencing an internal billing
557   number, or even a credit card number. How the printer uses the "job-account-id" is implementation
558   dependent. A zero-length value indicates that there is no account name.
559
560
561   **3.3.1   job-account-id-supported (integer(1:255))**
562
563   The "job-account-id-supported" attribute indicates the maximum length that the Printer will accept
564   for the "job-account-id" Job Template attribute without truncation. A conforming Printer MUST be
565   able to accept 255 octets without truncation. However, an IPP Printer MAY be implemented as a
566   gateway to another print system that cannot accept the full 255-octet range, in which case the value
567   will be truncated to the maximum length specified by the "job-account-id-supported" attribute.
568
569

570   3.4   job-accounting-sheets (collection)

571
572   This attribute specifies which job accounting sheets MUST be printed with the job. Job accounting sheets
573   typically contain information such as the value of the "job-account-id" attribute, and the number and type of
574   media sheets used while printing the job. The exact information contained on a job accounting sheet is
575   implementation dependent, but should always be a reflection of the account information associated with the
576   job.
577
578   The 'collection' syntax allows a client to specify media for job accounting sheets that is different than the
579   current media being used for the print-stream page impressions. The collection consists of:
580

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

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

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

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

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

634 **3.5 job-error-sheet (collection)**
635

636 This attribute specifies which job error sheet MUST be printed with the job. This is a printer specific sheet
637 enumerating any known errors or warnings that occurred during processing. For example: a printer could
638 put the text 'warning: image off page 2," on the error sheet to indicate a possible image processing defect.
639 The printer vendor defines the content of the error sheet. If necessary the error sheet can consist of more
640 than one page of output.
641

642 If the Printer is producing a job sheet for this job (see section 3.8 and [ipp-mod] section 4.2.3), then the
643 Printer object MAY print any error and warning information on that same job sheet, i.e., merge the error
644 sheet with the job sheet. This use of the job sheet for errors only applies if the "job-error-sheet" attribute is
645 supplied without either a "media" or "media-col" member attribute. If the "media" or "media-col" member
646 attribute is supplied, a separate error sheet MUST always be used to print errors and warnings.
647

648 The 'collection' syntax allows a client to specify media for job error sheets that is different than the current
649 media being used for the print-stream page impressions. The collection consists of:
650

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

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

673
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)

701
702
703   The "job-error-sheet-default" Printer attributes specify the job error sheets that the Printer MUST

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

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

722
723   This attribute carries a message from the user to the operator to indicate something about the processing of
724   the print job. A zero length text value indicates no message.
725
726   Note: this attribute may be used in conjunction with the IPP 1.0 "job-hold-until" Job Template attribute
727   (see [ipp-mod] section 4.2.2); specifically with the 'indefinite' value. This combination allows a client to
728   specify instructions to the operator, while simultaneously preventing the job from being processed until
729   some operator intervention occurs. This combination is particularly useful in production printing
730   environments, where printer configuration may be required to properly print the job.
731
732   ### 3.6.1   job-message-to-operator-supported (integer(0:1023))
733
734   The "job-message-to-operator-supported" Printer attribute indicates the maximum length that the
735   Printer will accept for the "job-message-to-operator" Job Template attribute without truncation. A
736   conforming Printer MUST be able to accept 1023 octets without truncation. However, an IPP
737   Printer MAY be implemented as a gateway to another print system that cannot accept the full 1023
738   octet range, in which case the value will be truncated to the maximum length specified by the "job-
739   message-to-operator-supported" attribute.
740
741

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

743
744   This attribute contains the name of the person that is to receive the output of the job. The value of the "job-
745   recipient-name" attribute is commonly printed on job sheets printed with the job. An example of another
746   use of the "job-recipient-name" attribute is if the printer accesses a database to get job delivery instructions
747   for the recipient of a job. A zero-length value indicates that there is no job recipient name.

748

749 If the client omits this attribute in a create request, the printer MAY use the "job-recipient-name-default"
750 attribute value, unless it has not been configured by the administrator, or MAY use the "authenticated user"
751 name (see [IPP-MOD] section 8.3), depending on implementation.

752

753   3.7.1   job-recipient-name-supported (integer(0:255))

754

755   The "job-recipient-name-supported" Printer attribute indicates the maximum length that the Printer
756   will accept for the "job-recipient-name" Job Template attribute without truncation. A conforming
757   Printer MUST be able to accept 255 octets without truncation. However, an IPP Printer MAY be
758   implemented as a gateway to another print system that cannot accept the full 255 octet range, in
759   which case the value will be truncated to the maximum length specified by the "job-recipient-name-
760   supported" attribute.

761
762

763   3.8   job-sheets-col (collection) - augments IPP/1.1 "job-sheets"

764

765 This attribute augments the IPP/1.1 "job-sheets" attribute (define in [ipp-mod] section 4.2.3). The
766 'collection' attribute syntax allows a client to specify media for job sheets that is different than the current
767 media being used for the print stream images. An example of where this is useful is for separator sheets,
768 which may allow easier distinction of document copies.

769

770 Table 6 lists the member attributes of the "job-sheets-col" collection attribute:

771

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

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

773

774   3.8.1   job-sheets (type3 keyword | name(MAX))

775

776   The "job-sheets" member attribute specifies which job sheets to print on the specified media. The
777   values for this member attribute are identical to the keyword and name values for the "job-sheets"
778   Job Template attribute itself, including the 'none' value, and convey the same semantics.

779

780   Since this "job-sheets" member attribute has the same name as the "job-sheets" Job Template
781   attribute defined in [ipp-mod] section 4.2.3), the "job-sheets-supported" (1setOf (type3 keyword |
782   name(MAX))) Printer attribute specifies which are the values of this "job-sheets" member attribute
783   (as well as the values of the IPP/1.1 "job-sheets" Job Template attribute) that the Printer supports.

784

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

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

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

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

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

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

media-recycled	type3 keyword	name(MAX)	MAY	MAY

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

906 **3.10.1 media-description (type3 keyword | name(MAX))**

907
908 The "media-description" member attribute is used to specify a media description. The "media-
909 description" member attribute is treated as just another characteristic of the media that the printer
910 must match to select the correct media. Furthermore, more than one medium instance can have the
911 same 'keyword' or 'name' value. As with any 'keyword | name' value, the client SHOULD localize
912 the 'keyword' value, but not the 'name' value.

913
914 The value of the "media-description" member attribute can be any of the keyword or name values
915 defined for the "media" Job Template attribute (see [ipp-mod] section 4.2.11 and section 6.3 in this
916 document) or any other name value defined by the implementation or administrator that is a
917 description. But, unlike the "media" attribute 'keyword' values, the 'keyword' value of the "media-
918 description" member attribute MUST have no specific semantic meaning to the Printer. For
919 example, if the keyword value is one of the input tray keywords, the Printer MUST NOT use that
920 value to pull the media from that tray. If the client wants to select the media in a particular tray, no
921 matter what it is, then the client MUST supply that tray keyword name, say, 'top', in the "media" Job
922 Template attribute, instead of using the "media-description" member attribute. Similarly, if the text
923 string happens to be the same as one of the media size names, the Printer MUST NOT use that value
924 to select a media of that size. When supplying the "media-col" attribute, the client MUST use the
925 "media-size" member attribute to specify the size. If the client wants to select the media of a
926 particular size, no matter what it is, then the client MUST supply that size keyword name, say 'iso-
927 a4', in the "media" Job Template attribute, instead of using the "media-description" member
928 attribute.

929
930 For example, suppose that a Printer supports two A4 media that are identical, except that one has
931 three punched holes and the other does not. If the "media-hole-count" member attribute (see section
932 3.10.6) is supported, then one will have the value, say, '3' and the other '0'. In such a case, the
933 "media-description" attribute is not needed to distinguish between the two media instances.
934 However, if the "media-hole-count" member attribute is not supported, the "media-description"
935 MUST have different values for the two media, say, 'punched' and 'un-punched' (or a zero length
936 'name' string), respectively. The "media-description" member attribute could contain any additional
937 information, such as the size, weight, color, etc. However, the client cannot localize any 'name'
938 values (only pre-defined standard 'keyword' values) to the locale of the user. In order to allow the
939 users to access these two media instances most simply using the "media" attribute, they SHOULD
940 each have names associated with them, such as the 'iso-a4-punched' name (defined by the
941 administrator) and the 'iso-a4-white' keyword (defined in IPP/1.1 - see [ipp-mod] Appendix C).

942
943 As another example of the use of the "media-description" member attribute to distinguish two media
944 instances that otherwise would have identical characteristics, there are a number of IPP/1.1 media

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

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

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

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

'transparent'	The specified media should be transparent.

976
977   The "media-opacity-supported" (1setOf type3 keyword) Printer attribute identifies the values of this
978   "media-opacity" member attribute that the Printer supports, i.e., the opacities supported.
979
980   **3.10.4 media-pre-printed (type3 keyword | name(MAX))**
981
982   The "media-pre-printed" attribute indicates that the pre-printed characteristics of the desired media.
983   Examples of pre-printed media include forms and company letterhead. If the value is 'blank', the
984   Printer MAY use an electronic representation of a form, if the medium has some imaged
985   information already associated with it. The standard keyword values for "media-pre-printed" are:
986

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

987
988   The "media-pre-printed-supported" (1setOf (type3 keyword | name(MAX)) Printer attribute
989   identifies the values of this "media-pre-printed" member attribute that the Printer supports.
990
991   **3.10.5 media-tabs (type3 keyword)**
992
993   The "media-tabs" member attribute indicates that the desired media should have tabs.
994
995   Standard keyword values for "media-tabs" are:
996

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

997
998   The "media-tabs" member attribute does not imply that media is ordered in any way. Ordered media
999   is specified only using the "media-order-count" member attribute (see section 3.10.7). If the tabbed
1000   media is ordered, then the order MUST be indicated using the "media-order-count" member
1001   attribute.
1002
1003   The "media-tabs-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute identifies the
1004   values of this "media-tabs" member attribute that the Printer supports, i.e., the tabs supported.
1005
1006   **3.10.6 media-hole-count (integer(0:MAX))**
1007
1008   The "media-hole-count" attribute indicates the number of pre-drilled holes in the desired media. A
1009   value of 0 (zero) indicates that no holes should be present in the media.

1010

1011   The "media-hole-count-supported" (1setOf rangeOfInteger(0:MAX)) Printer attribute identifies the

1012   ranges of values of this "media-hold-count" member attribute that the Printer supports.

1013

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

1015

1016   The "media-order-count" attribute indicates the number of sheets, within an ordered sequence of

1017   sheets; after which the sequence begins to repeat. For example, third cut tab stock has an order

1018   count of 3 (this is also sometimes called the modulus of the ordered media).

1019

1020   If the "media-order-count" is 1, then the media is not ordered.

1021

1022   The "media-order-count-supported" (rangeOfInteger(1:MAX)) Printer attribute identifies the range

1023   of values of this "media-order-count" member attribute that the Printer supports.

1024

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

1026

1027   The "media-label-type" member attribute identifies the label characteristics of the media. The

1028   standard keyword values are:

1029

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

1030

1031   If this member attribute is supported, the Printer MUST support at least the 'none' and 'standard'

1032   values.

1033

1034   The "media-label-type-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute

1035   identifies the values of this "media-label-type" member attribute that the Printer supports, i.e., the

1036   label characteristics supported, which MUST include the 'none' keyword value so that validation

1037   follows the normal rules.

1038

3.10.9 media-size (collection)

1040

1041   The "media-size" member attribute is a collection that explicitly specifies the numerical media

1042   width and height dimensions.

1043

1044   It is RECOMMENDED that a client localize the collection values to the size names that users are

1045   familiar with, such as 'letter' and 'A4', possibly also including the exact dimensions as well (and in

1046   the units appropriate for the user's locale). If a client does not recognize a pair of numbers as a

1047   named size, it can simply display the two numbers instead. Thus the pair of size dimensions serve

1048   the same function as keyword values, except that the client has an obvious fallback display for an

1049   unrecognized pair, namely, the actual dimension numbers.

1050   The "media-size" collection member attributes are:

1051

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

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

1053
1054

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

1056

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

1060

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

1062

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

1066

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

1068

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

1073

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

1075

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

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

1077
1078

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

1080

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

1085

1086   **3.10.9.3.2 y-dimension (integer(0:MAX) | rangeOfInteger(0:MAX))**

1087

1088   Indicates the size of the media in hundredths of a millimeter along the left edge of the

1089   media. The rangeOfInteger attribute syntax accommodated variable size

1090   implementations, including web printers. See section 2.3 regarding the coordinate

1091   system. This is equivalent to 1/2540 th of an inch resolution.

1092

1093

1094   **3.10.10**   **media-weight-metric (integer(0:MAX))**

1095

1096 The "media-weight" member attribute indicates the weight of the desired media rounded to the

1097 nearest whole number of grams per square meter. The "media-weight-supported" (1setOf

1098 integer(MAX)) Printer attribute identifies the values of this "media-weight" member attribute that

1099 the Printer supports, i.e., the weights supported in metric units.

1100

1101   **3.10.11**   **media-weight-english (integer(0:MAX))**

1102

1103 The "media-weight-english" member attribute indicates the weight of the desired media rounded to

1104 the nearest whole number of pounds.

1105

1106 If a Printer supports the "media-weight-english" member attribute, it MUST also support the

1107 "media-weight-metric" member attribute (but vice-versa is OPTIONAL). If the Printer supports

1108 both weight member attributes, the values SHOULD be available in both units for each medium.

1109 Then users can request media with either units.

1110

1111 Note: The use of pounds is actually pounds per ream. However, the size of a ream depends on the

1112 type of media. For example:

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

1113   .

1114

1115 Note: Even for bond paper, the conversion between the two units of measure is approximate in

1116 order to give integer values in both system of units.

1117

1118 The "media-weight-english-supported" (1setOf integer(0:MAX)) Printer attribute identifies the

1119 values of this "media-weight-english" member attribute that the Printer supports, i.e., the weights

1120 supported in English units.

1121

1122   **3.10.12**   **media-front-coating (type3 keyword | name(MAX)) and media-back-coating**

1123   **(type3 keyword | name(MAX))**

1124

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

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

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

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

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

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

3.10.15 media-ready (1setOf (type3 keyword | name(MAX))) and media-col-ready (1setOf collection)

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

3.10.16 media-col-supported (1setOf type2 keyword)

1183   The "media-col-supported" Printer attribute identifies the keyword names of the member attributes
1184   supported in the "media-col" collection Job Template attribute, i.e., the keyword names of the
1185   member attributes in Table 7 that the Printer supports.

3.11 page-delivery (type2 keyword)

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

1196 Standard keyword values for page delivery are:

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

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

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

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

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

1208
1209

3.12 page-order-received (type2 keyword)

1211

1212 This attribute specifies the page order of the print-stream pages defined in the document data. The "page-
1213 order-received" attribute does not provide any direct processing instructions, it only provides information
1214 about the page order so that the client can specify ordinal page numbers with respect to the original source
1215 document, rather than having to take into account whether the print stream pages are being sent "one to N"
1216 or "N to one". For example, consider such Job Template attributes as "insert-sheet" (section 3.2) and "page-
1217 exceptions" (see [ipp-except]). See section 2.4 for a complete discussion of print-stream page order.

1218

1219 Standard keyword values for "page-order-received" are:

1220

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

1221

1222 The "page-order-received" attribute applies to all documents in a Job Creation or Document Creation
1223 request. If a job consists of multiple documents, and all of the documents are not in the same page order,
1224 either '1-to-n-order' or 'reverse,' then inconsistent processing of other Job Template attributes that depend on
1225 "page-order-received" may occur.

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

1229
1230

1231 3.13 separator-sheets (collection)

1232

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

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

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

1243

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

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

1245
1246

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

1248

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

1251

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

1252
1253   Example: A job is created consisting of a single document, with the job template attribute "copies"
1254   equal to '10' and "separator-sheets-type" equal to 'slip-sheets'. If each of the 10 "sets" is denoted by
1255   (J1), (J2) ... (J10), and a separator sheet is denoted by S, then the delivered output would be: (J1) S
1256   (J2) S ... S (J9) S (J10).

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

1302
1303   3.14 Impression Image Shifting Attributes
1304

1305   The attributes defined in this sub-section shift the impression images as specified in the attribute definition.
1306   The Printer MUST apply this shifting to the resulting impression after creating a single impression from a
1307   number of page images as specified by either (1) the "number-up" attribute (see [ipp-mod] sections 4.2.9
1308   and 15.3) or any other attribute that specifies imposition. In other words, these attributes affect the
1309   impression, not individual page images.
1310

### 1311   3.14.1 x-image-auto-center (boolean)
1312

1313   This attribute causes the impression to be centered along the x-axis on the media to which it is applied.
1314

1315   If the "x-image-shift," "x-side1-image-shift" or "x-side2-image-shift" attributes are specified, then the
1316   printer MUST apply the "x-image-auto-center" attribute first, followed by the "x-image-shift" attribute, and
1317   finally the "x-side1-image-shift" and "x-side2-image-shift" attributes.
1318

1319   For example, if the print-stream image normally is placed on the media sheet as follows:
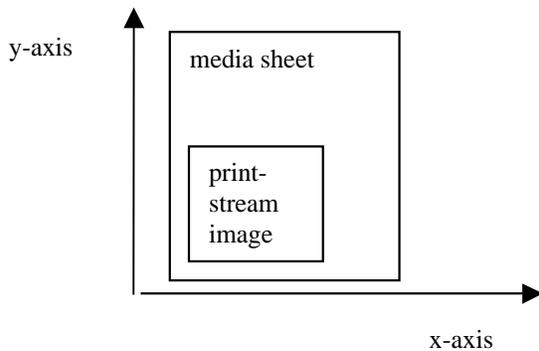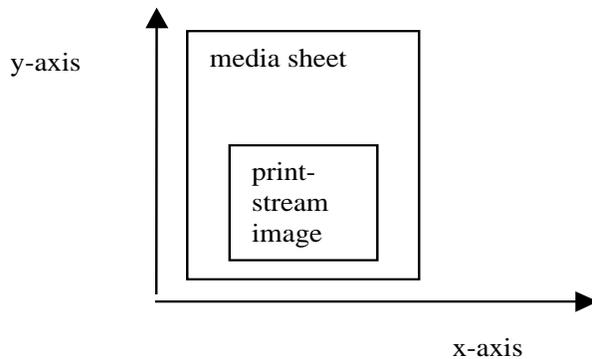

1320
1321
1322   with "x-image-auto-center" = 'true' (1), the result would be:
1323

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

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

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

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

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

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

1463

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

1472

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

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

1474

1475 **4   Job Description Attributes**

1476
1477 This section defines Job Description attributes for use with IPP/1.0 [RFC 2566] and IPP/1.1 [ipp-mod].

1478
1479 **4.1   current-page-order (type2 keyword)**

1480
1481 This attribute represents the current page order of the document data supplied with the job. Initially
1482 "current-page-order" is set to the value of the Job Template attribute "page-order-received." The value of
1483 "current-page-order" may change based on processing and the value of the "page-order-delivery" attribute.
1484 If the Printer changes the value of a Job's "current-page-order" Job Description attribute, then it is assumed
1485 that the associated document data has been transformed in some way to reflect this change. It should be
1486 noted that the document data that "current-page-order" refers to is not always the document data sent with
1487 the create request, but may also refer to the processed images that are to be delivered to the printer. The
1488 standard values for this attribute are the same as for of the "page-order-received" attribute (see section
1489 3.12), namely '1-to-n-order' and 'n-to-1-order'.

1490
1491

1492 **5   Printer Description Attributes**

1493
1494 This section defines Printer Description attributes for use with IPP/1.0 [RFC 2566] and IPP/1.1 [ipp-mod].

1495
1496 **5.1   user-defined-names-supported (1setOf type2 keyword)**

1497
1498 This Printer attribute identifies the "xxx" Job Template attributes that the Printer will accept user-defined
1499 name in a Job Creation request, i.e., a name that a client supplies that is not in the corresponding "xxx-
1500 supported" Printer attribute. In effect, the presence of the 'xxx' keyword value in this attribute suspends
1501 validation of the "xxx" attribute for any 'name' values supplied by the client. Thus a user can supply a
1502 custom name for this "xxx" attribute. If there are no Job Template attributes that will accept any name
1503 value, the value of this attribute MUST be the keyword 'none'.

1504
1505 For any "xxx" Job Template attributes identified by this attribute, the Printer suspends validation for values
1506 of type 'name' and the job is created containing the user-defined value, even when the client supplied the
1507 "ipp-attribute-fidelity" with a 'true' value (which would otherwise, have caused the Printer to reject the
1508 request, if the "xxx" value had not been among those of the Printer's "xxx-supported" attribute).

1509
1510 For example, the system administrator could add the 'media' keyword attribute name value to the "user-
1511 defined-names-supported" Printer attribute in order to allow the user to supply any media name value for
1512 the "media" attribute even if that name wasn't one of the media names in the Printer's "media-supported"
1513 attribute.

1514
1515 When the client supplies a 'yyy' value for the "xxx" attribute that is not in the "xxx-supported" Printer
1516 attribute , the Printer does not return the "xxx" value in the Unsupported Attributes group in the response.
1517 Instead, the Printer stores the requested attribute and value unmodified on the Job object for subsequent
1518 queries as with any supported value. Subsequently, a user or operator can query the Job using the Get-Job-

1519 Attributes or Get-Jobs operations to see what user-defined value was requested. Depending on
1520 implementation and/or site policy, the Printer schedules the job following one of the following options:
1521

> 1522   1. Add the 'resources-are-not-supported' value (see section 6.1) to the Job's "job-state-reasons"
> 1523   attribute and move the job to the 'pending-held' state until either the operator adds the requested
> 1524   value to the Printer's "xxx-supported" attribute or the user or operator modifies the job to contain
> 1525   a value that is in the Printer's "xxx-supported" attribute; then releases the job using the Release-
> 1526   Job operation (see [ipp-mod] section 3.3.6).

1527

> 1528   2. Add the 'resources-are-not-supported' value to the Job's "job-state-reasons" attribute but keep the
> 1529   job in the 'pending' state and start to process the job as if the requested media were ready, but
> 1530   stop the job ("job-state" = 'processing-stopped') and the Printer ("printer-state" = 'stopped') and
> 1531   request immediate operator intervention. The operator loads the requested media and continues
> 1532   the Printer, using the Resume-Printer operation (see [ipp-mod] section 3.2.8).

1533
1534

1535 6 Additional Values for Existing Attributes

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

1539 6.1 Additional values for the "job-state-reasons" Job attribute

1540
1541 This section defines additional values for the "job-state-reasons" (1setOf type2 keyword) Job Description
1542 attribute (see [ipp-mod] section 4.3.8):
1543

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

1553

1554 6.2 Additional values for the IPP/1.1 "job-sheets" Job Template Attribute

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

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

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

1558
1559

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

1561

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

1565

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

1578

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

1583

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

1585

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

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

These are additional standard keyword values which are used by the implementation for specifying a pre-defined media size:

'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

7 Conformance Requirements

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

7.1 Conformance Requirements for Printer objects

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

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

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

1605

1606 Each of the collection attribute definitions indicate which member attributes are REQUIRED and which are
1607 OPTIONAL for a Printer to support and is not repeated here.

1608

1609 If a Printer supports the 'collection' attribute syntax of a Job Template attribute , then it MUST support the
1610 distinguished none value defined for that collection. See section 2.6.

1611

1612 Support of the 'name' attribute syntax for Job Template attributes and collection member attributes is
1613 OPTIONAL, as in IPP/1.1.

1614
1615

7.2   Conformance Requirements for clients

1617

1618 Clients that support two Job Template attributes that control the same aspect, such as "media" and "media-
1619 col", MUST NOT supply both in a Job Creation request as indicated in the definitions of these attributes.

1620

1621 Clients that support a "xxx" collection Job Template attribute SHOULD use the Get-Printer-Attributes
1622 request to obtain the "xxx-default" collection and display that to the user, so that the user can make any
1623 changes before submitting the Job. Then the client submits values for all member attributes, rather than
1624 depending on the Printer's defaulting for omitted member attributes, since such defaulting is
1625 implementation dependent and will vary from Printer to Printer.

1626

8   IANA Considerations

1628

1629 IANA will be called on to register the attributes defined in this document, using the procedures outlined in
1630 [ipp-mod] section 6.

1631
1632

9   Internationalization Considerations

1634

1635 The IPP extensions defined in this document require the same internationalization considerations as any of
1636 the Job Template attributes defined in IPP/1.1 [ipp-mod].

1637
1638

10 Security Considerations

1640

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

1643
1644

11 References

[ipp-coll]
    deBry, R., , Hastings, T., Herriot, R., "Internet Printing Protocol/1.0 & 1.1: collection attribute syntax", <draft-ietf-ipp-collection-00.doc>, work in progress, September 9, 1999.

[ipp-except]
    Ocke, K., Herriot, R., "Internet Printing Protocol (IPP): Exception Attributes for Documents and Pages", <pwg-ipp-exceptions-model-000131.doc>, work in progress, January 31, 2000.

[ipp-prog]
    Hastings, T., Bergman, R., Lewis, H., "Proposed Job Progress Attributes for IPP", <draft-ietf-ipp-job-prog.txt> work in progress, February 2, 2000.

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

[ipp-pro]
    Herriot, R., Butler, S., Moore, P., Tuner, R., "Internet Printing Protocol/1.1: Encoding and Transport", <draft-ietf-ipp-protocol-v11-03.txt>, work in progress, June, 1999.

[redbook]
    "PostScript(R) LANGUAGE REFERENCE, third edition", Adobe Systems Incorporated, February 1999.

[RFC1759]
    Smith, R., Wright, F., Hastings, T., Zilles, S., and Gyllenskog, J., "Printer MIB", RFC 1759, March 1995.

[RFC2119]
    S. Bradner, "Key words for use in RFCs to Indicate Requirement Levels", RFC 2119 , March 1997

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

12 Author's Addresses

Kirk Ocke
Xerox Corporation
800 Phillips Road
Webster, NY 14580

1681   Phone: 716 422-4832
1682   e-mail: Kirk.Ocke@usa.xerox.com
1683
1684   Tom Hastings
1685   Xerox Corporation
1686   737 Hawaii St. ESAE 231
1687   El Segundo, CA 90245
1688
1689   Phone: 310-333-6413
1690   Fax: 310-333-5514
1691   e-mail: hastings@cp10.es.xerox.com
1692
1693

13 Appendix A: Change History

1695
1696   This section summarizes the changes to the document. Each sub-section is in reverse chronological order.
1697   Adding or removing ISSUES that don't change the document are not listed here.
1698
1699

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

1701
1702   The following changes were made to the May 9, 2000 version to create the June 5, 2000 version:
1703
1704   1. Added the "cover-type-supported" Printer attribute.
1705
1706   2. REQUIRED (rather than RECOMMENDED) the Printer to make the "job-sheets-default" and "job-
1707   sheets-col-default" Printer attributes identify the same job sheet instance or have one of them set to the
1708   'unknown' out-of-band value.
1709
1710   3. REQUIRED (rather than RECOMMENDED) the Printer to make the "media-default" and "media-col-
1711   default" Printer attributes identify the same media instance or have one of them set to the 'unknown' out-
1712   of-band value.
1713
1714   4. Added the 'system-specified' keyword value to the "page-delivery" Job Template attribute.
1715
1716

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

1718
1719   The following changes were made to the April 26, 2000 version to create the May 9, 2000 version:
1720
1721   1. Clarified that both the "job-sheets-default" and "job-sheets-col-default" Printer attributes SHOULD both
1722   be configured to specify the same job-sheet instance.
1723   2. Changed the "media-description" member attribute back to 'type3 keyword | name(MAX)' from 'text' so
1724   that clients can localize the value and the "media-description-supported" back to '1setOf (type3 keyword

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

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

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

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

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

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

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

1860
1861
13.5 Changes to the January 30, 2000 to create the February 7, 2000 version

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

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

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

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

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

13.7 Changes to create the January 28, 2000 version

Initial version.

14 Appendix B: Possible future additions

This appendix lists possible future additions.

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

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

'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

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

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

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

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

16 Appendix D: Description of the IEEE-ISTO PWG

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

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

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

1968
1999

2000   ieee-isto@ieee.org.
2001
2002   The Printer Working Group acknowledges that the IEEE-ISTO (acting itself or through its designees) is,
2003   and shall at all times, be the sole entity that may authorize the use of certification marks, trademarks, or
2004   other special designations to indicate compliance with these materials.
2005
2006   Use of this document is wholly voluntary. The existence of this document does not imply that there are no
2007   other ways to produce, test, measure, purchase, market, or provide other goods and services related to its
2008   scope.
2009