~~Revisions show suggested changes from:~~
~~ftp://ftp.pwg.org/pub/pwg/ipp/new_PPE/ipp-prodPrintingExt-issues-000203.pdf~~
~~and improved PWG-DRAFT template~~

IEEE-ISTO Printer Working Group (PWG) ~~1 ISSUES are highlight like this~~ Kirk Ocke
PWG-DRAFT Tom Hastings
Xerox Corporation
~~February 7,~~May 9, 2000

Internet Printing Protocol (IPP): Production Printing Attributes - Set1

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Status of this Memo

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

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Abstract

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

This extension also defines the "current-page-order" Job Description ~~attribute and the 'none' out-of-band attribute value.~~attribute, the "user-defined-names-supported" Printer Description attribute, and the 'resources-are-not-supported' value for the "job-state-reasons" Job Description attribute.

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

The full set of IPP documents includes:

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

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

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

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

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

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

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1 Introduction

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

This extension also defines the "current-page-order" Job Description ~~attribute and the 'none' out-of-band attribute value.~~attribute, the "user-defined-names-supported" Printer Description attribute, and the 'resources-are-not-supported' value for the "job-state-reasons" Job Description attribute.

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

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

2 Terminology

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

2.1 Conformance Terminology

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

2.2 Other terminology

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 3.14.~~
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.~~
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].

2.3 Coordinate System

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

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

portrait, i.e., clockwise).

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

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

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

2.4 Enumeration and Ordering of print-stream pages

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

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

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

The enumeration of print-stream pages is affected by the "multiple-document-handling" attribute. When

the "multiple-document-handling" attribute is 'single-document' or 'single-document-new-sheet,' the enumeration is based on the concatenation of all the print-stream pages in the job. In the case of 'separate-documents-~~collated-copies'~~ collated-copies' and 'separate-documents-uncollated-copies,' the enumeration of print-stream pages applies to each document. For example, for a job with ~~8 document,~~eight documents, referring to ~~"print-stream page" number "1"~~print-stream page number '1' actually refers to ~~"print-stream page" number "1"~~print-stream page number '1' in each of the ~~8~~eight documents included with the job.

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

2.5 Collection Attributes

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

~~There are three general forms of "xxx" Job Template attribute definitions that include the 'collection' attribute syntax either (1) as the attribute syntax or (2) as one of the attribute syntaxes and the corresponding "xxx-supported" Printer attribute. As with other attribute syntaxes, the Printer uses the "xxx-supported" attribute to validate Job Creation requests that contain collections and that clients can use to discover the supported possible values of collections:~~

~~1. The "xxx-supported" attribute definition is of the form: (1setOf (... | collection) -- In this case, the Printer can be configured to contains multiple collection values. Each collection value contains one of the possible combinations of supported values for the "xxx" collection member attributes.~~

~~2. The "xxx-supported" attribute definition is only a 'boolean' -- In this case, the Printer is indicating whether or not the "xxx" attribute is supported.~~

~~3. The "xxx-supported" attribute definition is of the form: (1setOf (... | any-collection), where 'any-collection' is an out-of-band value -- In this case, the Printer will accept any combination of "xxx" member attribute values for which its "yyy" collection member attributes have values contained in corresponding "yyy-supported" Printer attributes.~~

2.6 Definition of 'none' values

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

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

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

There are a few Job Template attributes for which there is no none value defined, because of the inherent nature of the semantics associated with the attribute the Printer always supplies some value. Examples of such attributes (see [ipp-mod]) are: "media" (type3 keyword | name) and "sides" (keyword). There is no 'none' keyword value defined for use with the media and a zero-length string will not match any supported values. Similarly, there is no 'none keyword value defines for the "sides" attribute. All jobs that print use some media instance and either print on one side or on both sides. Thus this kind of attribute does not have a defined none value. Because some attributes do not have none values defined, while most do, the definition document MUST specify the distinguished none value in each attribute definition or explicitly state that there is no distinguished none value.

3 Job Template Attributes

This section defines Job Template Attribute extensions for production printing. Table 1 summarizes the Job and Printer Job Template attributes. ~~The "job-sheets" and "media" attributes are from IPP/1.1 [ipp-mod] with the addition of the 'collection' attribute syntax (indicated by * flag).~~

390 **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 (boolean)~~
cover-back (collection)	cover-back-default (collection)	cover-back-supported (1setOf type2 keyword)
~~cover-front (collection)~~	~~cover-front-default (collection)~~	~~cover-front-supported (boolean)~~
cover-front (collection)	cover-front-default (collection)	cover-front-supported (1setOf type2 keyword)
~~insert-sheet (collection)~~	~~No~~	~~insert-sheet-supported (boolean)~~
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 (boolean)~~
job-account-id(name(MAX))	job-account-id-default (name(MAX))	job-account-id-supported (integer(0:255))
~~job-accounting-sheets (type3 keyword | name(MAX) | collection)~~	~~job-accounting-sheets-default (type3 keyword | name(MAX) | collection)~~	~~job-accounting-sheets-supported (1setOf (type3 keyword | name(MAX) | any-collection))~~
~~job-error-sheets (type3 keyword | name(MAX) | collection)~~	~~job-error-sheets-default (type3 keyword | name(MAX) | collection)~~	~~job-error-sheets-supported (1setOf (type3 keyword | name(MAX) | any-collection))~~
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 (boolean)~~
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 (boolean)~~
~~job-sheets (type3 keyword | name(MAX) | collection) *~~	~~job-sheets-default (type3 keyword | name(MAX) | collection)~~	~~job-sheets-supported (1setOf (type3 keyword | name(MAX) | collection))~~
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 (boolean)~~

~~media (type3 keyword | name(MAX) | collection) *~~	~~media-default (type3 keyword | name(MAX) | collection)~~	~~media-supported (1setOf (type3 keyword | name(MAX) | any-collection))~~
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 (type3 keyword | name(MAX) | collection)~~	~~separator-sheets-default (type3 keyword | name(MAX) | collection)~~	~~separator-sheets-supported (1setOf (type3 keyword | name(MAX) | any-collection))~~
~~sheet-collate (boolean)~~	~~sheet-collate-default (boolean)~~	~~sheet-collate-supported (1setOf boolean)~~
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-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))~~
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-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))~~
y-side2-image-shift (integer (MIN:MAX))	y-side2-image-shift-default (integer (MIN:MAX))	y-side2-image-shift-supported (rangeOfInteger (MIN:MAX))

3.1 cover-front (collection) and cover-back (collection)

These two attributes specify how covers are to be applied to each copy of each printed document within a job. ~~For jobs with multiple documents, the "multiple-document-handling" attribute determines what constitutes a document copy for the purposes of applying cover sheets (see the end of section 3.1.2 for more details on theinteraction with the "multiple-document-handling" attribute).~~ Presence of the "cover-front" attribute indicates that a front cover is requested, and similarly, the presence of the "cover-back" attribute indicates that a back cover is requested. Each of the "cover-front" and "cover-back" attributes includes where printing should be applied on the cover (if any), and what media should be used for the cover.

Both the "cover-front" and "cover-back" attributes are affected by the "multiple-document-handling" attribute. In the case of the 'single-document' and 'single-document-new-sheet' values, the covers MUST be applied to each copy of the composite (single) document. When the value is either 'separate-documents-collated-copies' or 'separate-documents-uncollated-copies', then the covers MUST be applied to each document copy individually.

The sheets in the rendered output that represent the covers are treated like any other sheet in the document copy. For example, if the "finishings" attribute has a value of 'staple,' then the staple would bind the covers, along with all of the other sheets in the output.

Both the "cover-front" and "cover-back" attributes are defined by the following collection:

Table 2 - "cover-front" and "cover-back" member attributes

Attribute name	attribute syntax	request	Printer Support
~~media~~	~~type3 keyword | name(MAX) | collection~~	~~MAY~~	~~MUST~~
media	type3 keyword | name(MAX)		MUST
~~printed-sides~~	~~type2 keyword~~	~~MUST~~	~~MUST~~
media-col	collection		MAY
cover-type	type2 keyword	MUST	MUST

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

~~The"media" member attribute~~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.

~~MUST be used for the specified cover, and has the same semantics as the normal "media" attribute (see section 3.10). If the "media" attribute is omitted,~~If the client omits both the "media" and the "media-col" member attributes, then the media currently being used by the ~~printer~~Printer object for the document copy SHOULD also be used for the ~~cover.~~

cover. The client MUST NOT supply both the "media" and the "media-col" member attributes. If the client supplies such a mal-

~~3.1.2printed-sides (type2 keyword)~~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.

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

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 "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 ~~"printed-sides"~~"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 ~~"printed-sides"~~"cover-type" are:

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

~~'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-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.
~~'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-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.
~~'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.~~
'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.

When printing on the back side (side two) of a cover, the value of the "sides" attribute SHOULD be used to determine which edge is the reference edge (i.e., long or short edge). In the case where the "sides" attribute is 'one-sided,' then the reference edge SHOULD be the long edge.

NOTE: If referencing the "sides" attribute is insufficient for determining the reference edge printing on the back side of a cover, then an additional member attribute could be defined that indicates

which edge to reference. However, the predominate use cases are covered without this additional member attribute.

In cases where the document data does not contain enough print-stream pages to satisfy the "cover-front" or "cover-back" request, the behavior is implementation dependent.

~~The sheets in the rendered output that represent the covers are treated like any other sheet in the document copy. For example, if the "finishings" attribute has a value of 'staple,' then the staple would bind the covers, along with all of the other sheets in the output.~~

~~Both the "cover-front" and "cover-back" attributes are affected by the "multiple-document-handling" attribute. In the case of the 'single-document' and 'single-document-new-sheet' values, the covers MUST be applied to each copy of the composite (single) document. When the value is either 'separate-documents-collated-copies' or 'separate-documents-uncollated-copies', then the covers MUST be applied to each document copy individually.~~

3.1.3 ~~out-of-band value 'none'~~cover-front-default (collection) and cover-back-default (collection)

~~A client MAY use the out-of-band value 'none' for either the "cover-front" or "cover-back" attributes. If the out-of-band value 'none' is used in a create request, then the printer object MUST NOT apply the attribute to the job, including the~~The "cover-front-default" and "cover-back-default"~~attributes. If a printer supports either~~specify the cover that the Printer will provide, if any, if the client omits the "cover-front" or "cover-back" ~~attributes, it MUST also support the "out-of-band" value 'none,' including as a value for the associated default attributes, namely, "cover-front-default" and "cover-back-default."~~
Job Template attribute, respectively. The member attributes are defined in Table 2. A Printer MUST support the same member attributes and values for these default attributes as it supports for the corresponding "cover-front" and "cover-back" Job Template attributes.

3.1.4 cover-front-supported ~~(boolean),~~(1setOf type2 keyword), cover-back-supported ~~(boolean)~~(1setOf type2 keyword)

The "cover-front-supported" and "cover-back-supported" attributes ~~indicate whether or not~~identify the keyword names of the member attributes supported in the "cover-front" and "cover-back" ~~attributes are supported, respectively.~~collection Job Template attributes, respectively, i.e., the keyword names of the member attributes in Table 2 that the Printer supports.

3.2 insert-sheet (1setOf collection)

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

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

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

Table 3 - "insert-sheet" member attributes

Attribute name	attribute syntax	request	Printer Support
~~after-page-number~~	~~integer (0:MAX)~~	~~MUST~~	~~MUST~~
insert-after-page-number	integer (0:MAX)	MUST	MUST
~~count~~	~~integer (1:MAX)~~	~~MAY~~	~~MAY~~
insert-count	integer (0:MAX)	MAY	MUST
~~media~~	~~type3 keyword | name(MAX) | collection~~	~~MUST~~	~~MUST~~
media	type3 keyword | name(MAX)	MUST be one or the other, but NOT both	MUST
media-col	collection		MAY

3.2.1 insert-after-page-number (integer(0:MAX))

The ~~'after-page-number'~~"insert-after-page-number" member attribute specifies the page in the Input-Document (see sections 2.2 and 2.4) print-stream after which the sheet is to be placed. The inserted sheet(s) does not affect the number of print-stream pages. For example, to insert a single sheet after both pages 2 and 3 of a given document, the value of "input-after-page-number" would be 2 and 3 respectively (not 2 and 4, as it would be if the inserted sheet affected the Input-Document print-stream page count). For a complete description of the enumeration of print-stream pages see section 2.4.

If the ~~"after-page-number"~~value of the "insert-after-page-number" member attribute is 0, then the sheet is inserted before the first page. If the value is MAX, then the sheet is inserted after the last sheet in the document.

~~Since the "after-page-number" attribute refers to a specific print-stream page, it is possible to specify an insertion between sides one and two, of a two sided document, or between print-stream pages that are part of a single impression if the "number-up" attribute has a value other than '1.' In this case, the error 'client-error-conflicting-attributes' MUST be returned to the client.~~

If the ~~"after-page-number"~~"insert-after-page-number" member attribute is not a valid input document page reference in the print-stream, then the IPP Printer ~~should~~SHOULD ignore the

request. For example, (1) the page number is beyond the last page of the document AND is not MAX or (2) the "page-ranges" Job Template attribute does not include the specified page number (see section 2.4). There is no way to validate the "after-page-number" attribute with the Validate-Job operation, since the validation cannot occur until the pages of the documents have arrived at the printer.

~~3.2.2count (integer(1:MAX))~~Since the "insert-after-page-number" member attribute refers to a specific input-document print-stream page, it is possible to specify an insertion between sides one and two, of a two sided document, or between print-stream pages that are part of a single impression if the "number-up" attribute has a value other than '1.' In this case, the Printer MUST force a new Sheet after the specified page, insert the specified sheet, place the following pages on the first side of the next Sheet, and issue a warning by adding 'job-warnings-detected' to the "job-state-reasons" and by increasing the value of the "job-warnings-count" Job Description attribute by 1. See [ipp-except] for this error handling specification under "Common Behavior for Sheet Attributes".

The "insert-after-page-number-supported" (rangeOfInteger(0:MAX)) Printer attribute indicates the range of page numbers supported in the "insert-after-page-number" member attribute, i.e., the minimum (SHOULD be 0) and the maximum (SHOULD be MAX) page numbers supported.

3.2.2 insert-count (integer(0:MAX))

The "insert-count" attribute indicates how many sheets to insert. If the "insert-count" attribute is omitted, then the printer assumes a value of 1. The value 0 indicates that no inserts sheets are to be inserted.

The "insert-count-supported (rangeOfInteger(0:MAX)) Printer attribute specifies the range of values that the Printer supports, i.e., the minimum number (MUST be 0) and the maximum number of pages.

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

~~The "media"~~Either the "media" (defined in [ipp-mod] section 4.2.11) or the "media-col" member attribute is used to indicate the media ~~to be used for the "insert-sheet." This is the standard IPP/1.0 "media" attribute, with the extensions provided for in this document (see section 3.10).~~that the Printer MUST use for the insert sheet. The member attributes are the same as those for the "media-col" attribute shown in Table 7.

~~3.2.4insert-sheet-default attribute is not defined~~The client MUST supply either the "media" or the "media-col" member attribute, but NOT both. If the client supplies such a mal-formed request by supplying neither or both, the Printer MUST (depending on implementation) 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.

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

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 "media-col" Job Template attribute), i.e., the names of the member attributes in Table 7 that the Printer supports.

3.2.4 insert-sheet-default (collection)

There~~re is NO~~ "insert-sheet-default" ~~attribute. If the client does not supply~~Printer attributes specify the insert sheet(s) that the Printer MUST provide, if any, if the client omits the "insert-sheet" ~~attribute, then there is no defined effect.~~
Job Template attribute. The member attributes are defined in Table 3. A Printer MUST support the same member attributes for this default collection attribute as it supports for the corresponding "insert-sheet" Job Template attribute.

3.2.5 insert-sheet-supported ~~(boolean)~~(1setOf type2 keyword)

The "insert-sheet-supported" attribute ~~only indicates if the attribute is supported, and does not indicate the supported values of the member attributes.~~identifies the keyword names of the member attributes ~~It is assumed that if~~supported in the "insert-sheet" ~~attribute is supported, then all combinations of the member attributes are supported.~~
collection Job Template attribute, i.e., the keyword names of the member attributes in Table 3 that the Printer supports.

3.3 job-account-id (name (MAX))

The "job-account-id" attribute is a character string representing the account associated with the job. The "job-account-id" attribute could be a customer name, a sequence of digits referencing an internal billing number, or even a credit card number. How the printer uses the "job-account-id" is implementation ~~dependent.~~
dependent. A zero-

~~3.3.1out-of-band value 'none'~~

~~A client MAY use the out-of-band value 'none' with the "job-account-id" attribute. If the out-of-band value 'none' is used in a create request, then the printer object MUST NOT apply the attribute to the job, including the "job-account-id-default" attribute. If a printer implements the "job-account-id" attribute, it MUST also implement the "out-of-band" value 'none,' including as a value for the "job-account-id-default" attribute.~~

~~3.4job-accounting-sheets (type3 keyword | name(MAX) | collection)~~length value indicates that there is no account name.

3.3.1 job-account-id-supported (integer(1:255))

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

3.4 job-accounting-sheets (collection)

This attribute specifies which job accounting sheets MUST be printed with the job. Job accounting sheets typically contain information such as the value of the "job-account-id" attribute, and the number and type of media sheets used while printing the job. The exact information contained on a job accounting sheet is implementation dependent, but should always be a reflection of the account information associated with the job.

~~Standard keyword values for job accounting sheets are:~~

~~'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.~~

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

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) | collection~~	~~MUST~~	~~MUST~~
~~job-accounting-sheets~~	~~type3 keyword | name(MAX)~~	~~MUST~~	~~MUST~~

~~media (type3 keyword | name(MAX) | collection)~~

media	type3 keyword | name(MAX)	MAY be neither or one of, but NOT both	MUST
media-col	collection		MAY

~~The "media"member attribute is used to indicate the media that should be used for the job accounting sheet (see section 3.10).~~

~~3.4.2~~3.4.1 job-accounting-sheets-type (type3 keyword | name(MAX))

The "job-accounting-sheets-type" member attribute specifies which job accounting sheets format the Printer MUST use to print on the specified media. Standard keyword values are:

'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.

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

3.4.2 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 the media that the Printer SHOULD use for the job accounting sheet. The member attributes are the same as those for the "media-col" attribute shown in Table 7.

If both the "media" and the "media-col" member attributes are omitted, then the media currently being used by the Printer object for the document copy SHOULD also be used for the accounting sheet. The client MUST NOT supply both the "media" and the "media-col" member attribute. If the client supplies such a mal-formed request by supplying both, the Printer MUST (depending on implementation) 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.

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

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 "media-col" Job Template attribute), i.e., the names of the member attributes in Table 7 that the Printer supports.

3.4.3 job-accounting-sheets-default (collection)

The "job-accounting-default" Printer attributes specify the job accounting that the Printer MUST

provide, if any, if the client omits the "job-accounting" Job Template attribute. The member attributes are defined in Table 4. A Printer MUST support the same member attributes and value for this default collection attribute as it supports for the corresponding "job-accounting-sheets" Job Template attribute.

3.4.4 job-accounting-sheets-supported (1setOf type2 keyword)

~~are identical to the keyword and name values for~~The "job-accounting-supported" attribute identifies the keyword names of the member attributes supported in the "job-accounting-sheets" ~~attribute itself, and convey the same semantics.~~Job Template collection attribute, i.e., the keyword names of the member attributes in Table 4 that the Printer supports.

3.5 ~~job-error-sheets (type3 keyword | name(MAX) | collection)~~job-error-sheet (collection)

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

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

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

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

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

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

The "job-error-sheet-type" member attribute specifies which job error sheets format that the Printer

SHOULD to print error information. Standard keyword values are:

~~'none'~~	~~No error sheets are to be printed. (i.e., printing of error sheets is totally suppressed – even if errors or warnings occurred during job processing).~~
'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 MUST be printed with the job if and only if errors or warning occurred.~~
'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.

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

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

The "job-error-sheet-when" member attribute specifies the conditions under which the error sheet information is to be produced. The standard keyword values are:

'on-error'	Print the error sheet information if and only if errors or warnings occurred during the life of the job.
~~'always'~~	~~The standard or vendor defined error sheet MUST always be printed with the job. (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 detected during the processing of the job.~~

~~If the "job-sheets" Job Template attribute is also specified, then the printer object may choose to print any error and warning messages on that same job sheet. This use of the job sheet for error only applies if the "job-error-sheet" attribute is supplied with the 'keyword' or 'name' attribute syntax; in cases where the 'collection' attribute syntax is used, a separate error sheet MUST always be used to print errors and warnings.~~

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

~~Attribute name~~	~~attribute syntax~~	~~request~~	~~Printer Support~~
~~media~~	~~type3 keyword | name(MAX) | collection~~	~~MUST~~	~~MUST~~
~~job-error-sheets~~	~~type3 keyword | name(MAX)~~	~~MUST~~	~~MUST~~

~~**media (type3 keyword | name(MAX) | collection)**~~

~~The "media" member attribute is used to indicate the media that should be used for the job error sheet (see section 3.10).~~

~~**job-error-sheets (type3 keyword | name(MAX))**~~

~~The "job-error-sheets" member attribute specifies which job error sheets to print on the specified media. The values for this member attribute are identical to the keyword and name values for the "job-error-sheets" attribute itself, and convey the same semantics.~~

~~**media (type3 keyword | name(MAX) | collection)**~~

~~The "media" member attribute is used to indicate the media that MUST be used for the job error sheet (see section 3.10).~~

~~**sheets (type3 keyword | name(MAX))**~~

~~The "sheets" member attribute specifies which job error sheets to print on the specified media. The values for this member attribute are identical to the keyword and name values for the "job-error-sheets" attribute itself, and convey the same semantics.~~

~~job-error-sheets-default (type3 keyword | name(MAX) | collection)~~

'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.

The "job-error-sheet-when-supported" (1setOf type2 keyword) Printer attribute identifies the values of this "job-error-sheet-when" member attribute that the Printer supports, i.e., the possible conditions under which the job error sheet will be printer.

3.5.3 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 the media that the Printer SHOULD be use for the job error sheets. The member attributes are the same as those for the "media-col" attribute shown in Table 7.

If the client omits both of the "media" or the "media-col" member attributes, the Printer prints any job sheet error information on either the job sheet, if it is being produced, or a separate sheet using the media of the document, depending on implementation.

The client MUST NOT supply both the "media" and the "media-col" member attribute. If the client supplies such a mal-formed request by supplying both, the Printer MUST (depending on

implementation) 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.

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

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 "media-col" Job Template attribute), i.e., the names of the member attributes in Table 7 that the Printer supports.

3.5.4 job-error-sheet-default (collection)

The "job-error-sheet-default" Printer attributes specify the job error sheets that the Printer MUST provide, if any, if the client omits the "job-error-sheet" Job Template attribute. The member attributes are defined in Table 5. A Printer MUST support the same member attributes and values for this default attribute as it supports for the corresponding "job-error-sheet" Job Template attribute.

An implementation SHOULD be configured out-of-the-box so that the "job-error-sheet-default" Printer Attribute has the ~~value: 'standard' or 'always'~~collection value consisting of the "job-error-sheet-type" with a value of: 'standard' rather than 'none'. Then the Administrator and End Users have to explicitly turn off error information.

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

The "job-error-sheet-supported" attribute identifies the names of the member attributes supported in the "job-error-sheet" Job Template collection attribute, i.e., the keyword names of the member attributes in Table 5 that the Printer supports.

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

This attribute carries a message from the user to the operator to indicate something about the processing of the print job. ~~The printer object MUST make this message available to the operator once the job has been successfully received and before the job is moved to the 'processing' state.~~A zero length text value indicates no message.

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

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

The "job-message-to-operator-supported" attribute indicates

~~3.6.1out-of-band value 'none'~~

~~A client MAY use the out-of-band value 'none' with~~the maximum length that the Printer will accept for the "job-message-to-operator" ~~attribute. If the out-of-band value 'none' is used in a create request, then the printer object MUST NOT apply the attribute to the job, including the "job-message-to-operator-default" attribute. If a printer implements the "job-message-to-~~Job Template attribute without truncation. A conforming Printer MUST be able to accept 1023 octets without truncation. However, an IPP Printer MAY be implemented as a ~~operator" attribute, it MUST also implement the "out-of-band" value 'none,' including as a value for the "job-message-to-operator-default" attribute.~~

~~3.6.2job-message-to-operator-supported (boolean)~~

~~The "job-message-to-operator-supported" attribute indicates only whether or not the attribute is supported.~~

~~3.6.2~~gateway to another print system that cannot accept the full 1023 octet range, in which case the value will be truncated to the maximum length specified by the "job-message-to-operator-supported" attribute..

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

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

If the client omits this attribute in a create request, the printer MAY use the "job-recipient-name-default" attribute value, unless it has not been configured by the administrator ~~(i.e., it is not present, or has the "out-of-band" value 'no-value')~~, or MAY use the "authenticated user" name (see [IPP-MOD] section 8.3), depending on implementation.

~~3.7.1out-of-band value 'none'~~

~~A client MAY use the out-of-band value 'none' with the "job-recipient-name" attribute. If the out-of-band value 'none' is used in a create request, then the printer object MUST NOT apply the attribute to the job, including the "job-recipient-name-default" attribute. If a printer implements the "job-recipient-name" attribute, then it MUST also implement the "out-of-band" value 'none,' including as a value for the "job-recipient-name-default" attribute.~~

~~3.7.2~~3.7.1 ~~job-recipient-name-supported (boolean)~~job-recipient-name-supported (integer(0:255))

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

3.8 ~~job-sheets (type3 keyword | name(MAX) | collection) - extension to~~job-sheets-col (collection) - augments IPP/1.1 "job-sheets"

This attribute ~~is an extension to~~augments the IPP/1.1~~[ipp-mod] "job-sheets" attribute. The two differences are that the 'collection' attribute syntax defined in this description is added as an OPTIONAL choice for the "job-sheets" attribute, and that the following additional values are defined for the "job-sheets" attribute.~~

~~The additional standard keyword values for the~~ "job-sheets" attribute~~are:~~

~~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.~~

(define in [ipp-mod] section 4.2.3). The 'collection' attribute syntax ~~stems from the need~~allows a client to specify media for job sheets that is different than the current media being used for the print stream images. An example of where this is useful is for separator sheets, which may allow easier distinction of document copies.

~~The~~Table 6 lists the member attributes of the "job-sheets-col" collection ~~consists of:~~attribute:

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) | collection~~	~~MUST~~	~~MUST~~
~~job-sheets~~	~~type3 keyword | name(MAX)~~	~~MUST~~	~~MUST~~

~~**media (type3 keyword | name(MAX) | collection)**~~

~~The "media" member attribute is used to indicate the media that should be used for the job sheet~~

~~(see section 3.10).~~

media	type3 keyword | name(MAX)	MUST be one or the other, but NOT both	MUST
media-col	collection		MAY

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

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

~~3.8.3media (type3 keyword | name(MAX) | collection)~~

~~The 'media' attribute is used to indicate the media that should be used for the job sheet (see section 3.10).~~

~~3.8.4sheets (type3 keyword | name(MAX))~~

The ~~"sheets" member~~"job-sheets-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute specifies which ~~job sheet to print on the specified media. The values for this~~are the values of this "job-sheets" member attribute ~~are identical to the keyword and name values for the "job-sheets" attribute itself, and convey the same semantics.~~(as well as the IPP/1.1 "job-sheets" Job Template attribute) that the Printer supports.

~~3.9job-sheet-message(text(MAX))~~

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

~~3.9.1out-of-band value 'none'~~

~~A client MAY use the out-of-band value 'none' with the "job-delivery-message" attribute. If the out-of-band value 'none' is used in a create request, then the printer object MUST NOT apply the attribute to the job, including the "job-delivery-message-default" attribute. If a printer implements the "job-delivery-message" attribute, then is MUST also implement the "out-of-band" value none, including as a value for the "job-delivery-message-default" attribute.~~

~~3.9.2job-sheet-message-supported (boolean)~~

~~The "job-delivery-message-supported" attribute indicates only whether or not the attribute is supported.~~

~~3.10~~3.8.2 media (type3 keyword | name(MAX)) or media-col (collection)

~~name (MAX) | collection) - extension to~~

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

The client MUST supply either the "media" or the "media-col" member attribute, but NOT both. If the client supplies such a mal-formed request by supplying neither or both, the Printer MUST (depending on implementation) 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.

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

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 "media-col" Job Template attribute), i.e., the names of the member attributes in Table 7 that the Printer supports.

3.8.3 job-sheets-col-default (collection)

The "job-sheets-default (see [ipp-mod] section 4.2.3) attribute and the "job-sheets-col-default" Printer attribute specify the job sheets that the Printer MUST provide, if the client omits both the "job-sheets" and the "job-sheets-col" Job Template attribute in the Job Creation operation (and the PDL doesn't include a job sheets specification). The member attributes are defined in Table 6. A Printer MUST support the same member attributes for this default collection attribute as it supports for the corresponding "job-sheets-col" Job Template attribute.

~~3.10~~The "job-sheets-default" and "job-sheets-col-default" Printer attributes SHOULD both be configured to specify job-sheet instances and they SHOULD specify the same job sheet instance. If the administrator sets one of them to a value (either locally or with the Set-Printer-Attributes operation - see [ipp-set]), the Printer SHOULD set the other attribute's value to specify the same job sheet instance. The reason to have both default attributes configured, is so that clients that only know about the "job-sheets" attribute will see the "job-sheets-default" attribute, while clients that know about the "job-sheets-col" attribute will be able to ~~IPP/1.1 "media"~~

~~This attribute is an extension to the IPP/1.1 [ipp-mod] "media" attribute. The 'collection'~~ attribute

~~syntax is added as an OPTIONAL choice for the "media" attribute and is used to enable a client end user to submit a list of media attributes to the printer as a way to more completely specify the~~determine the characteristics of the ~~media for the~~ job sheet default. ~~printer. The 'collection' attribute syntax is:~~

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

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

3.9 job-sheet-message (text(MAX))

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

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

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

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

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

Each value of the "media" (type2 keyword | name) attribute uniquely identifies an instance of media. Each combination of values of the "media-col" collection attribute also uniquely identify an instance of media. Depending on implementation and site policy, not all media instances need have media names. Such media instances that do not have media names associated with them are accessible using the "media-col" attribute only. In other words, when a media data base is created by an implementation and/or an administrator, each media name is associated with a media instance, but each media instance NEED NOT have a media name associated with it. Thus the standard name 'iso-a4-white' is associated with a particular instance of media, say, a 20 pound, 210 mm x 297 mm size, and white color media instance. If there are other media instances

of the same size and color, but differ in some other characteristic, such as weight, then they MUST each have different names or not have a name at all. A Printer MUST NOT have two instances of media that have all of the same characteristics. The "media-description" member attribute (see section 3.10.1) MUST be used to distinguish two or more media instances that would otherwise have the same characteristics.

When associating standard media keywords with media instances to be used with the "media" attribute, the implementation and/or the administrator SHOULD associate them with media instances whose characteristics are what users would normally expect. For example, the 'iso-a4-white' keyword SHOULD be associated with a media instance that is A4 in size, 20 pound or 24 pound in weight, white in color, with an opaque opacity, no holes, no tabs, etc.

The standard media keywords that identify media sizes, such as 'iso-a4' and 'na-letter', are associated with any media in an input tray that is configured for that media size. Thus specifying media size keywords with the "media" attribute does not guarantee reproducible results from one job submission to another, since different media of the same size may be present from one time to the next. If none of the input trays are configured for that size, the association with a media instance is implementation dependent.

The client MUST NOT supply both the "media" and the "media-col" Job Template attributes in a Job Creation request. If the client supplies such a mal-formed request by supplying both, the Printer MUST (depending on implementation) 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" attribute, independent of the value of the "ipp-attribute-fidelity" attribute supplied by the client.

A number of collection Job Template attributes defined in this document have both the "media" and "media-col" member attributes. The same rule against supplying both in a request holds for these collection attributes. Those Job Template attributes whose sole purpose is to specify the media are defined so that the Printer MUST use the requested media, while those that have additional purposes as well are defined so that the Printer SHOULD use the requested media.

Table 7 lists the member attributes of the "media-col" collection attribute:

Table 7 - "media-col" member attributes

Attribute name	attribute syntax	request	Printer Support
~~media-name~~	~~type3 keyword | name (MAX)~~	~~MAY~~	~~MAY~~
media-description	type3 keyword | name(MAX)	MAY	MAY
~~media-color~~	~~type3 keyword | name (MAX)~~	~~MAY~~	~~MAY~~
media-color	type3 keyword | name(MAX)	MAY	MAY
media-opacity	type3 keyword	MAY	MAY
media-pre-printed	boolean	MAY	MAY
media-tabs	type3 keyword	MAY	MAY
media-hole-count	integer	MAY	MAY
media-order-count	integer	MAY	MAY
media-label-type	type3 keyword | name(MAX)	MAY	MAY

~~media-size~~	~~type3 keyword | collection~~	~~MAY~~	~~MUST~~
media-size	collection	MAY	MUST
~~media-weight~~	~~integer~~	~~MAY~~	~~MAY~~
~~media-weight-units~~	~~type3 keyword~~	~~MAY~~	~~MAY~~
media-weight-metric	integer(0:MAX)	MAY	MAY
media-weight-english	integer(0:MAX)	MAY	MAY
media-back-coating	type3 keyword | name(MAX)	MAY	MAY
media-front-coating	type3 keyword | name(MAX)	MAY	MAY
media-recycled	type3 keyword | name(MAX)	MAY	MAY

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

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

The ~~"media-name"~~"media-description" member attribute is used to specify a media ~~name, similar to the standard IPP/1.0 'keyword | name' attribute syntaxes of the media attribute. The difference is that the "media-name"~~description. The "media-description" member attribute is treated as just another characteristic of the media that the printer must match to select the correct media. Furthermore, more than one medium instance can have the same 'keyword' or 'name' ~~media.~~

~~For example, if the "media-name" member attribute is "iso-a4" and the "hole-count" member attribute is 3, then the requested media is "three hole punched A4." Since many of the standard keyword values are under specified, this allows for further refinement of the specification of the desired media.~~

~~The standard type3 keyword values for media-name are the same as those defined for the "media" attribute in IPP/1.1. Typical values include "iso-a4-white", "na-letter-colored" and so forth.~~

~~The 'name' attribute syntax for "media-name" is used to enable a client to submit a site-defined name as a reference for a specific media. This attribute syntax can be used to enable a System Administrator to extend the list of IPP media names. Examples might include "1040 Tax Form", "Acme Letter Head", "Hammermill", and "U.S. Government 3R712".~~

~~Note: some printers may require that media with different characteristics be allowed to have the same name. If a printer does allow the ambiguous case of different media with the same name, then it is implementation dependent how the resolution to a single media occurs.~~value. As with any 'keyword | name' value, the client SHOULD localize the 'keyword' value, but not the 'name' value.

The value of the "media-description" member attribute can be any of the keyword or name values defined for the "media" Job Template attribute (see [ipp-mod] section 4.2.11 and section 6.3 in this

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

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

As another example of the use of the "media-description" member attribute to distinguish two media instances that otherwise would have identical characteristics, there are a number of IPP/1.1 media keywords that a user would expect to have the same characteristics. For example, 'na-letter' and 'a' are both 8.5 by 11 inches. If they would be associated with media instances that have the same characteristics, the administrator MUST put two different values in their "media-description" member attributes, say, 'na-letter' and 'a'.

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

3.10.2 media-color (type3 keyword | name(MAX))

The "media-color" attribute indicates the desired color of the media being specified.

Standard keyword values for "media-color" are:

'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.

Note: The standard keyword values for the "media-color" attribute are derived primarily from the Printer MIB [RFC1759] prtInputMediaColor standard values with the addition of ~~'red' and 'blue~~'blue', 'red', 'gray', 'ivory', 'orange', and 'clear' (instead of 'transparent' - see section 3.10.3).

Custom paper colors can be specified using the 'name' (MAX) attribute syntax of the color attribute.

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

3.10.3 media-opacity (type3 keyword)

The "media-opacity" attribute indicates the desired opaqueness of the media being specified.

Standard keyword values for "opacity" are:

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

~~3.10.4media-pre-printed (boolean)~~The "media-opacity-supported" (1setOf type3 keyword) Printer attribute identifies the values of this "media-opacity" member attribute that the Printer supports, i.e., the opacities supported.

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

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

'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.

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

3.10.5 media-tabs (type3 keyword)

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

Standard keyword values for "media-tabs" are:

'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 along the entire length of a given edge.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3.10.9 media-size (collection)

The "media-size" member attribute ~~can either be a named media size, or~~is a collection that explicitly specifies the ~~media dimensions. The standard keywords for named media sizes are defined in section 15 (Appendix C) of the IPP Model and Semantics document. Only keyword and name values that specify size alone~~ numerical media width and height dimensions. ~~SHOULD be used with the "media-size" member attribute. Customized names that represent media sizes can be created using the 'name' attribute syntax.~~

~~Implementers Note: The "media-name" member attribute and the "media-size" member attribute can both implicitly specify media size. The resolution of such a conflict is implementation dependent; however, clients/users SHOULD NOT request media that have such a conflict.~~

It is RECOMMENDED that a client localize the collection values to the size names that users are familiar with, possibly also including the exact dimensions as well (and in the units appropriate for the user's locale). If a client does not recognize a pair of numbers as a named size, it can simply display the two numbers instead. Thus the pair of size dimensions serve the same function as keyword values, except that the client has an obvious fallback display for an unrecognized pair, namely, the actual dimension numbers.

The "media-size" collection member attributes are:

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

1269
1270 3.10.9.1 x-dimension (integer(0:MAX))
1271
1272 Indicates the size of the media in hundredths of a millimeter along the bottom edge of the
1273 media. See section 2.3 regarding the coordinate system. This unit is equivalent to 1/2540 th
1274 of an inch resolution.
1275
1276 3.10.9.2 y-dimension (integer(0:MAX))
1277
1278 Indicates the size of the media in hundredths of a millimeter along the ~~bottom~~left edge of the
1279 media. See section 2.3 regarding the coordinate system. This is equivalent to 1/2540 th of
1280 an inch resolution.
1281
1282 3.10.9.3 media-size-supported (1setOf collection)
1283
1284 Indicates the sizes supported by the Printer. A requested media size dimension matches a
1285 supported media dimension if it is within an implementation-defined tolerance. For
1286 example, PostScript [redbook] specifies a tolerance of 5 points (5/72 of an inch = 1.7 mm) of
1287 a supported dimension, i.e., within 176 units of the value of the dimension.
1288
1289 The "media-size-supported " collection member attributes are:
1290
1291 **Table 9 - "media-size-supported" member attributes**

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

1292
1293
1294 **~~3.10.8.3.1~~3.10.9.3.1 x-dimension (integer(0:MAX) | rangeOfInteger~~-~~(0:MAX))**
1295
1296 Indicates the size of the media in hundredths of a millimeter along the bottom edge
1297 of the media. The rangeOfInteger attribute syntax accommodated variable size
1298 implementations, including web printers. See section 2.3 regarding the coordinate
1299 system. This is equivalent to 1/2540 th of an inch resolution.
1300
1301 **~~3.10.8.3.2~~3.10.9.3.2 y-dimension (integer(0:MAX) | rangeOfInteger~~-~~(0:MAX))**
1302
1303 Indicates the size of the media in hundredths of a millimeter along the ~~bottom~~left
1304 edge of the media. The rangeOfInteger attribute syntax accommodated variable size

implementations, including web printers. See section 2.3 regarding the coordinate system. This is equivalent to 1/2540 th of an inch resolution.

~~3.10.9~~3.10.10 media-weight-metric (integer(0:MAX))

The "media-weight" member attribute indicates the weight of the desired media rounded to the nearest whole ~~number. The units of measure for the "media-weight" attribute are specified using the "media-weight-units" member attribute.~~
number of grams per square meter. The "media-weight-supported" (1setOf integer(MAX)) Printer attribute identifies the values of this "media-weight" member attribute that the Printer supports, i.e., the weights
~~The "media-weight" member attribute is an optional. However, if the client supplies the "media-weight" member attribute, then the client MUST also supply the "media-weight-units" member. If a client supplies the "media-weight" attribute without also supplying the "media-weight-units" member attribute, then the~~ supported in metric units.

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

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

~~printer MUST reject the job and return the "client-error-bad-request" status code. Similarly, if the Printer supports the "media-weight"~~If a Printer supports the "media-weight-english" member attribute, it MUST also support the ~~"media-weight-units" member attribute.~~
"media-weight-metric" member attribute (but vice-versa is OPTIONAL). If the Printer supports both weight member attributes, the values SHOULD be available in both units for each medium. Then users can request media with

~~**media-weight-units (type3 keyword)**~~

~~The "weight-units" attribute indicates the units of measure used for the "weight" attribute.~~

~~Standard keyword values for "weight-units" are:~~

~~'pounds'~~	~~Can be used to describe media using the conventional practices, e.g. "20 pound", "24 pound", "60 pound", etc.~~
~~'grams-per-meter-squared'~~	~~Can be used to specify the exact weight per unit area, e.g. "75 gm/m2", etc.~~

either units.

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

.

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

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

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

The "media-front-coating" and "media-back-coating" member attributes indicate what pre-process coating has been applied to the front and back of the desired media, respectively.

Standard keyword values for "media-front-coating" and "media-back-coating" are:

'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.

~~3.10.12media-supported~~The "media-front-coating-supported" (1setOf (type3 keyword | ~~name(MAX) | any-collection))~~name(MAX))) and "media-back-coating-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute identifies the values of these "media-front-coating" and "media-back-coating" member attributes that the Printer supports.

3.10.13 media-recycled (type3 keyword | name(MAX))

The "media-recycled" member attribute indicates the recycled characteristics of the media. The standard keyword values are:

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

~~When the 'collection' attribute syntax of the "media"~~If this member attribute is supported, ~~then the "media-supported" attribute MUST have an attribute syntax of '1setOf type3 keyword | name(MAX) | any-collection'. The out-of-band 'any-collection' value indicates that any collection value is possible with any combination of supported~~ the Printer MUST support at least the 'none' and 'standard' values.

~~member attributes indicated by the corresponding "xxx-supported" Printer attributes.~~

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

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

The "media-default" (see [ipp-mod] section 4.2.11) or the "media-col-default" Printer attribute specifies the media that the Printer uses, if the client omits both the "media" and the "media-col" Job Template attributes in the Job Creation operation (and the PDL doesn't include a media specification). The member attributes are defined in Table 7. A Printer MUST support the same member attributes for this default collection attribute as it supports for the corresponding "media-col" Job Template attribute.

The "media-default" and "media-col-default" Printer attributes SHOULD both be configured to specify media instances and they SHOULD specify the same media instance. If the administrator sets one of them to a value (either locally or with the Set-Printer-Attributes operation - see [ipp-set]), the Printer SHOULD set the other attribute's value to specify the same media instance. The reason to have both default attributes configured, is so that clients that only know about the "media" attribute will see the "media-default" attribute, while clients that know about the "media-col" attribute will be able to determine the characteristics of the media default.

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

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

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

The "media-col-supported" Printer attribute identifies the keyword names of the member attributes supported in the "media-col" collection Job Template attribute, i.e., the keyword names of the

member attributes in Table 7 that the Printer supports.

3.11 page-delivery (type2 keyword)

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

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

The "page-delivery" attribute is often used in conjunction with on-line and off-line finishing devices. The intent is to be able to deliver the media sheets in either the order of the page-stream pages as defined in the "original document" or in the reverse of that order.

3.11.1 Interaction with the "page-order-received" attribute

The "page-order-delivery" attribute is dependent on the value of the "page-order-received" attribute (defined in section 3.12 below):

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

3.12 page-order-received (type2 keyword)

This attribute specifies the page order of the print-stream pages defined in the document data. The "page-order-received" attribute does not provide any direct processing instructions, it only provides information about the page order so that the client can specify ordinal page numbers with respect to the original source document, ~~other~~rather than having to take into account whether the print stream pages are being sent "one

to N" or "N to one". For example, consider such Job Template attributes ~~can process pages in a consistent manner.~~as "insert-sheet" (section 3.2) and "page-exceptions" (see [ipp-except]). See section 2.4 for a complete discussion of print-stream page order.

~~[explain why this is needed to do page programming].~~

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

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

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

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

3.13 separator-sheets (~~type3 keyword |~~ collection)

This attribute specifies which separator sheets MUST be printed with the job. Separator sheets are used to separate individual copies of a multiple copy job (i.e., when the "copies" attribute is greater than 1). The "separator-sheets" attribute is dependent both on the value of "multiple-document-handling" and on the value of "sheet-collate" (see ~~section 3.14~~[ipp-prog]). See sections 2.2 and 3.13.1 for a detailed description and examples of what constitutes a "set."~~)~~

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

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

Table 10 - "separator-sheets" member attributes

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

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

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

'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.

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

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

~~Attribute name~~	~~attribute syntax~~	~~request~~	~~Printer Support~~
~~media~~	~~type3 keyword | name(MAX) | collection~~	~~MUST~~	~~MUST~~
~~separator-sheets~~	~~type3 keyword | name(MAX)~~	~~MUST~~	~~MUST~~

~~3.13.1media (type3 keyword | name(MAX) | collection)~~

~~The "media" member attribute is used to indicate the media that MUST be used for the job separator sheet (see section 3.10).~~

~~3.13.2separator-sheets (type3 keyword | name(MAX))~~

~~The "separator-sheets" member attribute specifies which separator sheets to print on the specified media. The values for this member attribute are identical to the keyword and name values for the "separator-sheets" attribute itself, and convey the same semantics.~~

~~3.14sheet-collate (boolean)~~

~~This attribute specifies whether or not the media sheets of each copy of each printed document in a job are to be in sequence, when multiple copies of the document are specified by the 'copies' attribute. When "sheet-collate" is 'true', each copy of each document is printed with the print-stream sheets in sequence.~~

When 'sheet-collate' is 'false', each print-stream sheet is printed a number of times equal to the value of the 'copies' attribute in succession. For example, suppose a document which produces two media sheets as output, and "copies" is equal to '6', in this case six copies of the first media sheet are printed followed by six copies of the second media sheet.

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

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

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

"sheet-collate"	**"multiple-document-handling"**	**Semantics**
'true'	'single-document'	Each copy of the concatenated documents, with their pages in sequence, represents a "set."
'true'	'single-document-new-sheet'	Each copy of the concatenated documents, with their pages in sequence, represents a "set."
'true'	'separate-documents-collated-copies'	Each copy of each separate document, with its pages in sequence, represents a "set."
'true'	'separate-documents-uncollated-copies	Each copy of each separate document, with its pages in sequence, represents a "set."
'false'	'single-document'	Each media sheet of the document is printed a number of times equal to the "copies" attribute; which constitutes a "set."
'false'	'single-document-new-sheet'	Each media sheet of the concatenated documents is printed a number of times equal to the "copies" attribute; which constitutes a "set."
'false'	'separate-documents-collated-copies'	This is a degenerate case, and the printer object MUST reject the job and return the status, "client-error-conflicting-attributes."
'false'	'separate-documents-uncollated-copies	This is a degenerate case, and the printer object MUST reject the job and return the status "client-error-conflicting-attributes."

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

~~otherwise nonsensical in the case of separate documents.~~

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

~~3.14.1sheet-collate-supported (1setOf boolean)~~

~~This attribute specifies the values of "sheet-collate" supported by the Printer.~~

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

~~ISSUE 01 – Should we change the name from "collate-sheets" to "uncollated-sheets", since the absence of the attribute (and non-support of this attribute) is more likely to indicate collated sheets and so should be the 'false' value of the attribute, rather than the 'true' value?~~
"separator-sheets-type-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute identifies the values of this "separator-sheet-type" member attribute that the Printer supports, i.e., the type names of the separator sheets.

3.13.2 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 the media that the Printer MUST use for the job separator sheet. 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 implementation selects a media instance (by means outside the scope of this document) that is appropriate for separator sheets. The client MUST NOT supply both the "media" and the "media-col" member attribute. If client supplies such a mal-formed request by supplying both, the Printer MUST (depending on implementation) 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.

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

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

"media-col" Job Template attribute), i.e., the names of the member attributes in Table 7 that the Printer supports.

3.13.3 separator-sheets-default (collection)

The "separator-sheets-default" Printer attributes specify the separator sheets that the Printer MUST provide, if any, if the client omits the "separator-sheets" Job Template attribute. The member attributes are defined in Table 10. A Printer MUST support the same member attributes for this default collection attribute as it supports for the corresponding "separator-sheets" Job Template attribute.

3.13.4 separator-sheets-supported (1setOf type2 keyword)

The "separator-sheets-supported" attribute identifies the keyword names of the member attributes supported in the "separator-sheets" collection Job Template attribute, i.e., the names of the member attributes in Table 10 that the Printer supports.

3.14 Impression Image Shifting Attributes

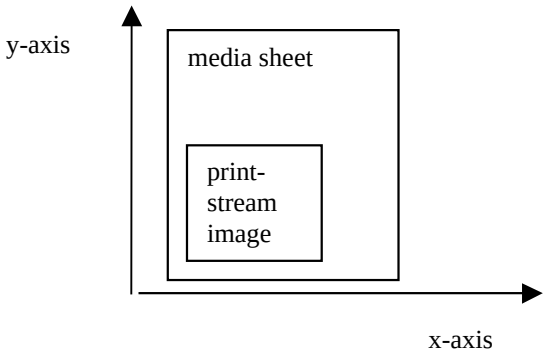
The attributes defined in this sub-section shift the impression images specified. In other words, these attributes affect the impression, not individual page images. The Printer MUST apply this shifting to the resulting impression after creating a single impression from a number of page images as specified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

3.14.1 x-image-auto-center (boolean)

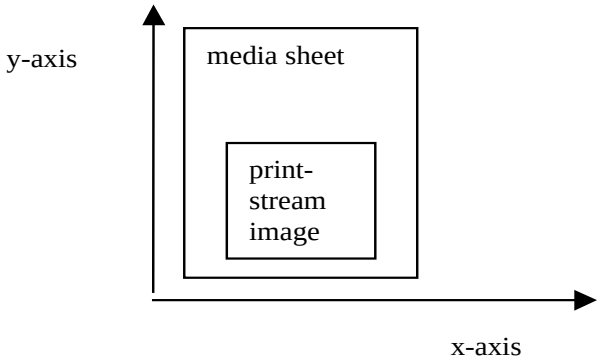
This attribute causes the ~~page images~~impression to be centered along the x-axis on the media to which ~~they are~~it is applied.

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

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



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



~~3.16~~3.14.2 x-image-shift (integer (MIN:MAX))

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

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

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

~~3.17~~3.14.3 x-side1-image-shift (integer (MIN:MAX))

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

value indicates the direction of the shift.

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

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

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

~~3.18~~3.14.4 x-side2-image-shift (integer ~~(~~MIN:MAX))

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

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

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

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

3.14.5 y-image-auto-center (boolean)

This attribute causes the ~~page images~~impression to be centered along the y-axis on the media to which ~~they are~~it is applied.

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

~~3.20~~3.14.6 y-image-shift (integer ~~(~~MIN:MAX))

This attribute causes the ~~page images~~impression on both sides of each sheet, to be shifted in position with

respect to the media on which the ~~page images are~~impression is to be rendered. The direction of shift MUST be along the y-axis of the Coordinate System (see section 2.3) with respect to the medium. The sign of the value indicates the direction of the shift.

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

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

~~3.21~~3.14.7 y-side1-image-shift (integer ~~(~~MIN:MAX))

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

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

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

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

~~3.22~~3.14.8 y-side2-image-shift (integer ~~(~~MIN:MAX))

This attribute causes the ~~page images,~~impression, on the back of each sheet, to be shifted in position with respect to the media on which the ~~page images are~~impression is to be rendered. The direction of shift MUST be along the y-axis of the reference coordinate system with respect to the medium. The sign of the value indicates the direction of the shift.

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

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

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

3.15 Usage in Document-Exceptions and Page-Exceptions

Most of the Job Template attributes defined in this document are defined for use in the "document-exceptions" (collection) and/or "page-exceptions" (collection) Job Template attributes (see [ipp-except]). According to that document, any Job Template attribute document MUST indicate the syntax and semantics for applying each Job Template attribute in any Document and/or Page exceptions.

Table 12 augments the definitions of each Job Template attribute defined in this document by indicating with which parts of a job, the attribute "associates with" and "affects" (see [ipp-except]). All Job Template attributes associate with the Job, so that is not indicated in Table 12. A subset of the Job Template attributes are defined to be used in Document-Exceptions to affect Input-Document and are associated with Input-Documents only via the "document-exceptions" attribute. Another subset affect Output-Documents and are associated with either Input-Documents or Output-Document via the "document-exceptions" attribute. A final subset of Job Template attributes affects Sheets, Pages, or Impressions and are associated with Pages of an Input-Document or an Output-Document by the "pages-exceptions" attribute or associated with Input-Document or Output-Document via a "document-exceptions" attribute. See [ipp-except] for the syntax of the "document-exceptions" (1setOf collection), "page-exceptions" (1setOf collection) and "page-per-subset" (1setOf integer(1:MAX)) and semantics of association with Document-Exceptions, Page-Exceptions, Sheets, and Pages. The "pages-per-subset" attribute defines Output-Document to be subsets of pages within Input-Documents.

Table 11 lists the possible attribute exception semantics for Job Template attributes and shows what clients can supply in Job Creation operations.

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"

A client MUST NOT submit and a Printer MUST NOT support a Job Creation request with "document-exceptions" (collection) or "page-exceptions" (collection) containing member attributes indicated with "No"

in the Document-Exceptions or Page-Exceptions columns in Table 12, respectively. If a client submits a Job Creation request with such a member attribute and "ipp-attribute-fidelity" = 'true', the Printer MUST reject the request and return the 'client-error-bad-request' status code. If a client submits a Job Creation request with such a member attribute and "ipp-attribute-fidelity" = 'false' or omitted, the Printer MUST accept the request and return the 'successful-ok-ignored-or-substituted-attributes' status code, along with the collection and only those member attributes.

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
0 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

4 Job Description Attributes

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

4.1 current-page-order (type2 keyword)

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

~~Out of Band Values~~

~~This section defines out-of-band values (see [ipp-mod] section 4.1) for use with attributes defined in this and other documents.~~

~~'none'~~

~~This "out-of-band" value allows a client, in a request, to specify that the value of a Job Template attribute MUST be semantically equivalent to 'none.' This out-of-band value is needed since attributes that are of the 'collection', 'name' or 'text' syntax can be problematic when a client wishes to specify that an xxx-default attribute MUST NOT be applied to the job. Unlike the 'keyword' syntax, where the value of 'none' (or its equivalent) can be a standard value, other attribute syntaxes have no such mechanism.~~

~~A Printer MUST support the use of the "out-of-band" value for any attribute that calls for its use, such as any Job Template attribute that has the 'collection' attribute syntax, if the Printer supports the use of the 'collection' attribute syntax for that attribute.~~

~~When a client sends a request to the printer object, the "out-of-band" value 'none' MUST only be used for Job Template attributes whose definitions explicitly indicate that the use of "out-of-band" value 'none' is allowed. A client MUST NOT use the "out-of-band" 'none' value for attributes whose definition does not explicitly call out its use.~~

~~'none'~~	~~The specified Job Template attribute in the request MUST NOT be applied to the job. Specifically, this value overrides the Printer's "xxx-default" attribute value for the Job Template attribute, if one exists.~~

~~ISSUE 04 - Should we move the definition of the 'none' out-of-band value to the 'collection' specification (ipp-coll), since that document is IETF standards track, while this one is PWG?~~

~~5 At the New Orleans meeting, we agreed to move the out-of-band 'none' to the 'collection' document.~~Printer Description Attributes

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

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

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

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

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

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

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

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

6 Additional Values for Existing Attributes

This section defines additional values for existing attributes.

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

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

'resources-are-not-supported': At least one of the resources needed by the job, such as media, fonts, resource objects, etc., is not supported on any of the physical printer's for which the job is a candidate. This condition MAY be detected when the job is accepted, or subsequently while the job is pending or processing, depending on implementation. The job may (1) remain in its current state, (2) be moved to the 'pending-held' state, depending on implementation and/or job

scheduling policy, or (3) scheduled normally, but the Printer is put into the 'stopped' state when the job is attempted to be processed on the Printer. This value is intended for use with an implementation that supports the "user-defined-names-supported" Printer attribute (see section 5.1) which allows a job to be accepted with an unsupported 'name' value.

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

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

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.

6.3 Additional values for the IPP/1.1 "media" Job Template attribute

This section defines additional values for the "media" (type3 keyword | name(MAX)) Job Template attribute (see [ipp-mod] section 4.2.11):

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

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

If a Printer allows the media to be specified by tray name keyword, the Printer implementation MUST NOT

use the 'name(MAX)' attribute syntax to create custom tray names, but rather MUST use the most appropriate tray name keyword value. This ensures interoperability among clients that submit jobs to multiple types of printers.

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

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

~~document.~~

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"

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

If a Printer supports the 'collection' attribute syntax of a Job Template attribute ~~that has 'type3 keyword | name(MAX) | collection' attribute syntax, then it MUST also support some values of the standard 'keyword' attribute syntax~~, then it MUST support the distinguished none value defined for that collection. See section 0.

~~attribute.~~

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

~~If a Printer supports the 'collection' attribute syntax of a Job Template attribute, then it MUST support the "out-of-band" 'none' value (see section 5.1) in a client Job Creation and Document Creation request.~~

7.2 Conformance Requirements for clients

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

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

8 IANA Considerations

IANA will be called on to register the attributes defined in this document, using the procedures outlined in

[ipp-mod] section 6.

9 Internationalization Considerations

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

10 Security Considerations

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

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

Phone: 716 422-4832
e-mail: Kirk.Ocke@usa.xerox.com

Tom Hastings
Xerox Corporation
737 Hawaii St. ESAE 231
El Segundo, CA 90245

Phone: 310-333-6413
Fax: 310-333-5514
e-mail: hastings@cp10.es.xerox.com

13 Appendix A: Change History

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

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

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

1. Clarified that both the "job-sheets-default" and "job-sheets-col-default" Printer attributes SHOULD both be configured to specify the same job-sheet instance.
2. Changed the "media-description" member attribute back to 'type3 keyword | name(MAX)' from 'text' so that clients can localize the value and the "media-description-supported" back to '1setOf (type3 keyword | name(MAX) from 'integer(0:255)'.

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

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

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

1. Added discussion about distinguished none values for all but a few Job Template attributes.
2. Clarified the table and language for collections that have both "media" and "media-col" around the client sending neither (error for some collection attributes, not for others), one or the other, or both (error).
3. Removed the use of the 'none' out-of-band value and defined distinguished values for keywords (usually 'none', or 'no-xxx'), strings (zero-length), and integers (usually 0) instead. Existing clients and Printers might get confused with the (new) 'none' out-of-band value.
4. Broke "job-error-sheet-type" into two member attributes: "job-error-sheet-type" and "job-error-sheet-when".
5. Removed the "s" from "job-error-sheet".
6. Banned "media-default" and "media-col-default" from both having a value, even if one is the name of the other. Required the Printer to set the other to 'no-value' out-of-band value.
7. Added "media-label-type" (type3 keyword | name(MAX)), and "media-recycled" (type3 keyword | name(MAX)) member attributes to "media-col".
8. Changed the "xxx-supported" (boolean) to "xxx-supported" (integer(0:X) so that the maximum length of the string could be queried by the client.
9. Added 'gray', 'ivory', and 'orange' colors
10. Changed media-pre-printed (boolean) to media-pre-printed (type3 keyword | name(MAX)) and defined 'blank', 'pre-printed', and 'letter-head'.
11. Removed -supported from the member attributes of the "media-col-supported" (1setOf collection).
12. Added 'none' keyword value to media-front-coating (type3 keyword | name(MAX)) and media-back-coating (type3 keyword | name(MAX))
13. Replaced the 'user-define' and 'user-define-supported' out-of-band values with the "user-defined-names-supported" Printer attribute. This will help existing clients that query the Printer.
14. Added some "media" keyword values.

15. Enhanced the Conformance Section with client requirements.

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

The following changes were made to the February 7, 2000 version to create the April 11, 2000 version:

1. Clarified that the "page-ranges" Job Template attribute does not affect the print-stream page numbering.
2. Aligned the collection attribute definitions to agree with the updated Collection [ipp-coll] document:
   a) Changed "xxx-supported"(boolean) to "xxx-supported" (1setOf type2 keyword) to return the keyword names of the member attributes.
   b) Removed the 'type3 keyword | name' attribute syntaxes from "xxx" (type3 keyword | name | collection) attributes and moved those values into a new "xxx-type" member attribute in the collection for new attributes. For the existing IPP/1.1 "job-sheets" (type3 keyword | name) and "media" (type3 keyword | name) attributes created new "xxx-col" (collection) companion attributes.
   c) For each collection attribute that had a "media" (type3 keyword | name(MAX) | collection) member attribute, removed the 'collection' and added a new OPTIONAL "media-col" (collection) member attribute to carry the media characteristics.
   d) Clarified that a client MUST NOT supply both "media" and a "media-col" Job Template attributes or member attributes. If a Printer receives such a bad request, it MUST either reject it or use one or the other attributes depending on implementation.
   e) Add prefix names to member attributes when they are intended to be unique, such as "cover-" to "cover-printed-sided" so that the "xxx-supported" would not be ambiguous. Same for "insert-" to insert-after-page-number" and "insert-count".
   f) Added "xxx-default" (collection) for all collection attributes for consistency as required by [ipp-coll].
   g) Added "xxx-supported" Printer attributes for all member attributes for consistency as required by [ipp-coll].
3. Removed the prefix from the "media" and the "media-col" member attributes, so that they are the same as the IPP/1.1 Job Template attributes.
4. Added the insert-after-page-number-supported" (1setOf type2 keyword) Printer attribute for consistency.
5. Added that a value of MAX for "insert-after-page-number" inserts a page after the last page in the document no matter how many pages are in the document.
6. Changed "insert-sheet" to agree with the Exceptions document [ipp-except], so that if a page number is not the first on a sheet, the insert happens after that sheet, and the page is forced to the next sheet and a warning given using the "job-warnings-count" Job Description attribute and the Job's 'job-warnings-detected' job-state-reasons.
7. Add the "insert-count-supported (integer(1:MAX)) Printer attribute for consistency.
8. Clarified that the "media" attribute maps a name or keyword to a media instance, but that not all media instances need have an associated media name or keyword. Also that no two media instances can have the same "media" attribute name or keyword.
9. Clarified that that the "media-col" collection attribute maps a set of characteristics to a media instance and that all media instances must have a distinct set of characteristics, not counting their names. The

"media-description" member attribute can be used as a characteristics to distinguish two otherwise identical media instances.

10. Changed the name of the "media-name" member attribute to "media-description" and its attribute syntax from 'type3 keyword | name(MAX)' to 'text(255)' to make sure that the value is just an arbitrary string with no semantic content, such as a tray name or size.
11. Clarified that several media instances can have the same "media-description" member attribute value.
12. Specified the tolerance for media size matching of 5 points, same as PostScript.
13. Removed the type3 keyword from the "media-size" (collection) member attribute, so as to have only one way to specify size, namely a pair of integers. The client can use these integers to map to a media size name in the locale of the user, similar to keywords.
14. Added a rangeOfInteger to the "media-size-supported" (1setOf collection) member attributes and so added a "-supported" suffix to "x-dimension" and "y-dimension" member attributes since they now have different attribute syntaxes to the member attributes of the "media-size" member attribute.
15. Added "media-col-ready" (1setOf collection) Job Template Printer attribute to show the characteristics of the ready media.
16. Clarified that the IPP/1.1 "media-ready" (1setOf (type3 keyword | name(MAX))) Printer attribute MUST also be supported, and that the values correspond, so that the client can determine the mapping of the media names/keywords to the media characteristics for the ready media at least.
17. Deleted "sheet-collate", since it is already defined in the "Job Progress Attributes" document [ipp-prog].
18. Added the section on Document and Page Exceptions to indicate the semantics of each Job Template attribute as required by [ipp-except].
19. Deleted the definition of the 'none' out-of-band attribute value, since it is defined in the [ipp-coll] document.
20. Added the 'user-define' out-of-band attribute value for use as one of the values of the Printer's "xxx-supported" attributes to indicate that a client can supply a name that is not in the Printer's supported list, i.e., can supply custom names.
21. Added the 'user-define-supported' out-of-band value so that an implementation can indicate in the "xxx-supported" returned by the Get-Printer-Supported-Values operation whether or not it will allow the administrator to set the 'user-define' out-of-band value in the corresponding Printer's "xxx-supported" attribute.
22. Added the 'resources-are-not-supported' value for use with the "job-state-reasons" Job Description attribute to indicate that a user has supplied a custom name.
23. Clarified that if a Printer supports "job-sheets-col", it MUST also support the IPP/1.1 "job-sheets" Job Template attribute.
24. Clarified that if a Printer supports "media-col", it MUST also support the IPP/1.1 "media" Job Template attribute.
25. Clarified that if a Printer supports "media-col-ready", it MUST also support the IPP/1.1 "media-ready" Printer attribute.
26. Changed the attribute syntax for "job-account-id-supported", "job-message-to-operator-supported", "job-recipient-name-supported", and "job-sheet-message-supported" from 'boolean' to 'integer(1:255)' to indicate the maximum string length supported, since IPP is often a gateway to another system that can't store the string length required for conforming IPP Printers.
27. Added notes about the conversion between English and metric for different types of media.

13.4 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.

13.5 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)).

13.6 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

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

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

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

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http://www.ieee-isto.org.

~~14~~16 Appendix ~~C:~~D: Description of the IEEE-ISTO PWG

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

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

For additional information regarding the Printer Working Group visit:

http://www.pwg.org

~~15~~17 Appendix ~~D:~~E: IEEE Industry Standards and Technology Organization Copyright Statement

Title: Internet Printing Protocol: Production Printing Attributes - Set1

ieee-isto@ieee.org.

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