IEEE-ISTO Printer Working Group (PWG) Kirk Ocke
PWG-DRAFT Tom Hastings
Xerox Corporation
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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, 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, 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 3.13.1.
original document	The document composed by a user that is eventually submitted in the for of Document Data as part of a create request.
original document order	The orders of the pages, typically reading order, as defined in the Original Document.
print-stream pages	The sequence of pages according to the definition of pages in the language used to express the document data defined relative to the Input Document.
Input-Document	The sequence of input pages that the client sends as document data to the IPP Printer (see [ipp-except]).
Output-Document	The sequence of output pages that the Printer renders onto output media (see [ipp-except]).
rendered output	Media sheets that are delivered as part of the output of a print request, typically containing impressions.
collection	An attribute syntax consisting of a set of attributes. Such a collection attribute has a value that is a set of attributes, similar to a Java Map or a PostScript dictionary. See [ipp-coll].

2.3 Coordinate System

Some of the attribute extensions proposed in this document refer to specific edges of a sheet of printed media. 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* 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 to mean the typical PDL representation sent with an IPP request (e.g., a PostScript File), and the term *original document* to mean the document composed by the user (e.g., a Word97 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 is either the same as the order of the 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, other than it is ordered.

The enumeration of print-stream pages begins with 1 and increments by 1 for each additional print-stream page. The enumeration is based on the order of the original document, not the document data supplied with the IPP request. In other words, if the document data is supplied in N-1 order (reverse of the original document order), then print-stream page number '1' in the enumeration is actually the N th print-stream page defined in the document data (see the "page-order-received" attribute in section 3.12). Similarly, print-stream page number '2' is defined by the (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 order), then print-stream page number '1' in the enumeration is the 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' and 'separate-documents-uncollated-copies,' the enumeration of print-stream pages applies to each document. For example, for a job with eight documents, referring to print-stream page number '1' actually refers to print-stream page number '1' in each of the 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* 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 for the member attributes. In other words, the 'collection' attribute type serves the same purpose as the 'map' data type in the Java programming language and the dictionary mechanism in PostScript. See [ipp-coll] for a complete definition and encoding of the 'collection' attribute syntax with examples.

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.

Table 1 - Summary of Job Template Attributes

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

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

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. 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)	MAY be neither or one of, but NOT both	MUST

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

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

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

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

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

Standard keyword values for "cover-type" are:

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

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

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.

3.1.3 cover-front-default (collection) and cover-back-default (collection)

The "cover-front-default" and "cover-back-default" specify the cover that the Printer will provide, if any, if the client omits the "cover-front" or "cover-back" 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 (1setOf type2 keyword), cover-back-supported (1setOf type2 keyword)

The "cover-front-supported" and "cover-back-supported" attributes identify the keyword names of the member attributes supported in the "cover-front" and "cover-back" 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
insert-after-page-number	integer (0:MAX)	MUST	MUST
insert-count	integer (0:MAX)	MAY	MUST
media	type3 keyword | name(MAX)	MUST be one or the other, but NOT both	MUST

media-col	collection		MAY

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

The "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 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.

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

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)) 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 insert 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.

3.2.4 insert-sheet-default (collection)

The "insert-sheet-default" Printer attributes specify the insert sheet(s) that the Printer MUST provide, if any, if the client omits the "insert-sheet" 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 (1setOf type2 keyword)

The "insert-sheet-supported" attribute identifies the keyword names of the member attributes supported in the "insert-sheet" 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. A zero-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.

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)	MAY be neither or one of, but NOT both	MUST
media-col	collection		MAY

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 "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)

The "job-accounting-supported" attribute identifies the keyword names of the member attributes supported in the "job-accounting-sheets" Job Template collection attribute, i.e., the keyword names of the member attributes in Table 4 that the Printer supports.

3.5 job-error-sheet (collection)

This attribute specifies which job error sheet 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.

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 sheet information is to be printed. (i.e., printing of error sheets is totally suppressed – even if errors or warnings occurred during job processing).
'standard'	The standard site or vendor defined error sheet information MUST be printed with the job depending on the conditions specified by the "job-error-sheet-when" attribute.

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'	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 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. 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 the maximum length that the Printer will accept for the "job-message-to-operator" 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-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, or MAY use the "authenticated user" name (see [IPP-MOD] section 8.3), depending on implementation.

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

The "job-recipient-name-supported" attribute indicates the maximum length that the Printer will accept for the "job-recipient-name" Job Template attribute without truncation. A conforming Printer MUST be able to accept 255 octets 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-col (collection) - augments IPP/1.1 "job-sheets"

This attribute augments the IPP/1.1 "job-sheets" attribute (define in [ipp-mod] section 4.2.3). The 'collection' attribute syntax 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.

Table 6 lists the member attributes of the "job-sheets-col" collection 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)	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.

The "job-sheets-supported" (1setOf (type3 keyword | name(MAX))) Printer attribute specifies which are the values of this "job-sheets" member attribute (as well as the IPP/1.1 "job-sheets" Job Template attribute) that the Printer supports.

3.8.2 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 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.

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 determine the characteristics of the job sheet default.

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-description	type3 keyword | name(MAX)	MAY	MAY
media-color	type3 keyword | name(MAX)	MAY	MAY
media-opacity	type3 keyword	MAY	MAY
media-pre-printed	boolean	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	collection	MAY	MUST
media-weight-metric	integer(0:MAX)	MAY	MAY
media-weight-english	integer(0:MAX)	MAY	MAY
media-back-coating	type3 keyword | name(MAX)	MAY	MAY
media-front-coating	type3 keyword | name(MAX)	MAY	MAY
media-recycled	type3 keyword | name(MAX)	MAY	MAY

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

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

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

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

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

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

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 pre-printed characteristics of the desired media. Examples of pre-printed media include forms and company letterhead. If the value is 'blank', the Printer MAY use an electronic representation of a form, if the medium has some imaged information already associated with 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-label-type (type3 keyword | 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 is a collection that explicitly specifies the numerical media width and height dimensions.

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

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

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

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

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

3.10.9.3 media-size-supported (1setOf collection)

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

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

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

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

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

Indicates the size of the media in hundredths of a millimeter along the bottom 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.

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

Indicates the size of the media in hundredths of a millimeter along the left 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.

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

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

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

The "media-front-coating-supported" (1setOf (type3 keyword | 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.

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

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, rather than having to take into account whether the print stream pages are being sent "one to N" or "N to one". For example, consider such Job Template attributes as "insert-sheet" (section 3.2) and "page-exceptions" (see [ipp-except]). See section 2.4 for a complete discussion of print-stream page order.

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

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

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

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 (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 [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.

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-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 "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

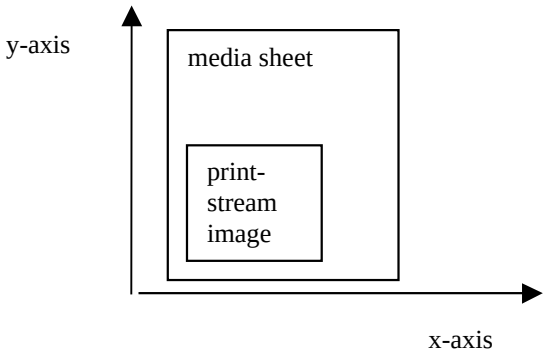
The attributes defined in this sub-section shift the impression images specified. In other words, these attributes affect the impression, not individual page images. The Printer MUST apply this shifting to the resulting impression after creating a single impression from a number of page images as specified 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)

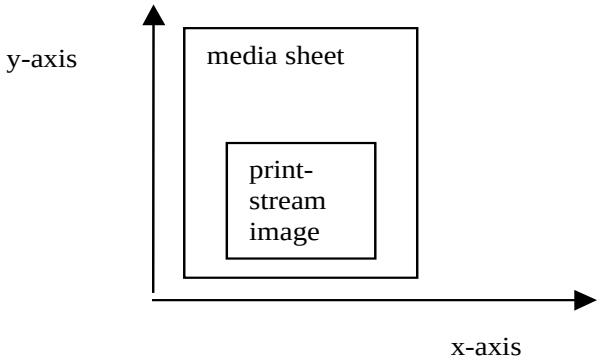
This attribute causes the impression to be centered along the x-axis on the media to which it is applied.

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:



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

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

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

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

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

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

direction of the shift.

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

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

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

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

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

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

If the client supplies the "x-image-auto-center" or "x-image-shift" attributes, then the Printer MUST apply 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 impression to be centered along the y-axis on the media to which 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.

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

This attribute causes the impression on both sides of each sheet, to be shifted in position with respect to the media on which the impression is to be rendered. The direction of shift MUST be along the 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.

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

This attribute causes the impression, on the front of each sheet, to be shifted in position with respect to the media on which the impression is to be rendered. The direction 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 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.

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

This attribute causes the impression, on the back of each sheet, to be shifted in position with respect to the media on which the impression is to be rendered. The direction of shift MUST be along the 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 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
3.5 job-error-sheet (collection)	Job
3.6 job-message-to-operator (text(MAX))	Job
3.7 job-recipient-name (name(MAX))	Job
3.8 job-sheets-col (collection) - augments IPP/1.1 "job-sheets"	Job
3.9 job-sheet-message (text(MAX))	Job
3.10 media-col (collection) - augments IPP/1.1 "media"	Sheets
3.11 page-delivery (type2 keyword)	Output-Documents
3.12 page-order-received (type2 keyword)	Input-Documents
3.13 separator-sheets (collection)	Job
3.14.1 x-image-auto-center (boolean) through 3.14.8 y-side2-image-shift (integer(MIN:MAX))	Impressions

4 Job Description Attributes

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

4.1 current-page-order (type2 keyword)

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

5 Printer Description Attributes

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

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

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

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

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

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

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 , then it MUST support the distinguished none value defined for that collection. See section 2.6.

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

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

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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

1850 IPP/1.1 that has (type3 keyword | name(MAX)).
1851
1852 ### 13.6 Changes to create the January 28, 2000 version
1853
1854 Initial version.
1855
1856
1857 # 14 Appendix B: Possible future additions
1858
1859 This appendix lists possible future additions.
1860
1861 ### 14.1 Possible future keyword additions for "media" and "media-col" attributes
1862
1863 These are additional standard keyword values which are used by the implementation as a
1864 simple method for media selection. When combinations of these values are needed for
1865 media selection, it is RECOMMENDED that the attribute "media-col" collection be used to
1866 prevent proliferation of complex keywords and names.
1867

'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)

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

For additional information regarding the IEEE-ISTO and its industry programs visit:

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16 Appendix 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

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

Title: Internet Printing Protocol: Production Printing Attributes - Set1

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