



The Printer Working Group

January 31, 2023  
Candidate Standard 5100.3-2023

## IPP Production Printing Extensions v2.0 (PPX)

Status: Approved

Abstract: This specification defines attributes used for imposition, layout, and printing of covers, insert sheets, separator sheets, and different kinds of job sheets in high-volume "production" environments.

This specification was previously titled the "IPP Production Printing Attributes - Set 1".

This is a PWG Candidate Standard. For a definition of a "PWG Candidate Standard", see:

<https://ftp.pwg.org/pub/pwg/general/pwg-process30.pdf>

This specification is available electronically at:

<https://ftp.pwg.org/pub/pwg/candidates/cs-ippppx20-20230131-5100.3.docx>  
<https://ftp.pwg.org/pub/pwg/candidates/cs-ippppx20-20230131-5100.3.pdf>

Copyright © 2001-2023 The Printer Working Group. All rights reserved.

This document may be copied and furnished to others, and derivative works that comment on, or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice, this paragraph and the title of the Document as referenced below are included on all such copies and derivative works. However, this document itself may not be modified in any way, such as by removing the copyright notice or references to the IEEE-ISTO and the Printer Working Group, a program of the IEEE-ISTO.

Title: IPP Production Printing Extensions v2.0 (PPX)

The IEEE-ISTO and the Printer Working Group DISCLAIM ANY AND ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED INCLUDING (WITHOUT LIMITATION) ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

The Printer Working Group, a program of the IEEE-ISTO, reserves the right to make changes to the document without further notice. The document may be updated, replaced or made obsolete by other documents at any time.

The IEEE-ISTO takes no position regarding the validity or scope of any intellectual property or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; neither does it represent that it has made any effort to identify any such rights.

The IEEE-ISTO invites any interested party to bring to its attention any copyrights, patents, or patent applications, or other proprietary rights which may cover technology that may be required to implement the contents of this document. The IEEE-ISTO and its programs shall not be responsible for identifying patents for which a license may be required by a document and/or IEEE-ISTO Industry Group Standard or for conducting inquiries into the legal validity or scope of those patents that are brought to its attention. Inquiries may be submitted to the IEEE-ISTO by e-mail at: [ieee-isto@ieee.org](mailto:ieee-isto@ieee.org).

The Printer Working Group acknowledges that the IEEE-ISTO (acting itself or through its designees) is, and shall at all times be the sole entity that may authorize the use of certification marks, trademarks, or other special designations to indicate compliance with these materials.

Use of this document is wholly voluntary. The existence of this document does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to its scope.

## About the IEEE-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 (<https://www.ieee.org/>) and the IEEE Standards Association (<https://standards.ieee.org/>).

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

<https://www.ieee-isto.org/>

## About 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 system providers, network connectivity vendors, and print management application developers. The PWG 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.”

To meet this objective, the PWG documents the results of their work as open standards that define print related protocols, interfaces, procedures, and conventions. A PWG standard is a stable, well understood, and technically competent specification that is widely used with multiple independent and interoperable implementations. Printer manufacturers and vendors of printer related software benefit from the interoperability provided by voluntary conformance to these standards.

For additional information regarding the Printer Working Group visit:

<https://www.pwg.org/>

Contact information:

The Printer Working Group  
c/o The IEEE Industry Standards and Technology Organization  
445 Hoes Lane  
Piscataway, NJ 08854  
USA

## Table of Contents

1. Introduction.....	8
2. Terminology.....	8
2.1 Conformance Terminology.....	8
2.2 Printing Terminology .....	8
2.3 Protocol Role Terminology.....	9
2.4 Other Terminology.....	9
2.5 Acronyms and Organizations .....	11
3. Requirements .....	12
3.1 Rationale.....	12
3.2 Use Cases .....	12
3.2.1 Printing Bound Books with Printed Covers .....	12
3.2.2 Printing Folded Booklets.....	12
3.2.3 Separating Copies with Colored Paper.....	13
3.2.4 Scheduling Print Deadlines .....	13
3.2.5 Imposing and Shifting Print Output .....	13
3.3 Exceptions .....	13
3.3.1 Printing a Report on Error .....	13
3.4 Out of Scope.....	13
3.5 Design Requirements .....	13
4. Model.....	15
4.1 Imaging Coordinate System and Units .....	15
4.2 Number Up, Imposition, Shifting, and Rotation .....	16
4.3 Separator Sheets.....	18
4.4 Error Sheets.....	19
4.5 Job Scheduling .....	19
5. New Attributes .....	20
5.1 Job Status Attributes .....	20
5.1.1 date-time-at-completed-estimated (dateTime   unknown).....	20
5.1.2 date-time-at-processing-estimated (dateTime   unknown).....	20
5.1.3 time-at-completed-estimated (integer(MIN:MAX)   unknown).....	20
5.1.4 time-at-processing-estimated (integer(MIN:MAX)   unknown) .....	20
5.2 Job Template Attributes .....	21
5.2.1 cover-back (collection) and cover-front (collection).....	21
5.2.2 force-front-side (1setOf integer(1:MAX)) .....	23
5.2.3 image-orientation (type2 enum) .....	23
5.2.4 imposition-template (type2 keyword   name(MAX)) .....	23
5.2.5 insert-sheet (1setOf collection) .....	26
5.2.6 job-accounting-sheets (collection).....	27
5.2.7 job-complete-before (type2 keyword   name(MAX)).....	28
5.2.8 job-complete-before-time (dateTime).....	29
5.2.9 job-error-sheet (collection) .....	29
5.2.10 job-message-to-operator (text(MAX)) .....	30
5.2.11 job-phone-number (uri).....	30
5.2.12 job-recipient-name (name(MAX)).....	30
5.2.13 media-input-tray-check (type2 keyword   name(MAX)).....	30

- 5.2.14 page-delivery (type2 keyword) ..... 31
- 5.2.15 presentation-direction-number-up (type2 keyword)..... 32
- 5.2.16 separator-sheets (collection) ..... 34
- 5.2.17 x-image-position (type2 keyword) ..... 35
- 5.2.18 x-image-shift (integer(MIN:MAX)) ..... 36
- 5.2.19 x-side1-image-shift (integer(MIN:MAX)) ..... 36
- 5.2.20 x-side2-image-shift (integer(MIN:MAX)) ..... 36
- 5.2.21 y-image-position (type2 keyword) ..... 37
- 5.2.22 y-image-shift (integer(MIN:MAX)) ..... 38
- 5.2.23 y-side1-image-shift (integer(MIN:MAX)) ..... 38
- 5.2.24 y-side2-image-shift (integer(MIN:MAX)) ..... 38
- 5.3 Printer Description Attributes ..... 39
  - 5.3.1 cover-back-default (collection | no-value) ..... 40
  - 5.3.2 cover-back-supported (1setOf keyword)..... 40
  - 5.3.3 cover-front-default (collection | no-value)..... 40
  - 5.3.4 cover-front-supported (1setOf keyword) ..... 41
  - 5.3.5 cover-type-supported (1setOf type2 keyword) ..... 41
  - 5.3.6 force-front-side-supported (rangeOfInteger(1:MAX)) ..... 41
  - 5.3.7 image-orientation-default (type2 enum) ..... 41
  - 5.3.8 image-orientation-supported (1setOf type2 enum)..... 41
  - 5.3.9 imposition-template-default (type2 keyword | name(MAX) | no-value) ..... 41
  - 5.3.10 imposition-template-supported (1setOf (type2 keyword | name(MAX))) ..... 41
  - 5.3.11 insert-count-supported (rangeOfInteger(0:MAX))..... 41
  - 5.3.12 insert-sheet-default (1setOf collection | no-value)..... 42
  - 5.3.13 insert-sheet-supported (1setOf keyword) ..... 42
  - 5.3.14 job-accounting-output-bin-supported (1setOf (type2 keyword | name(MAX))) . 42
  - 5.3.15 job-accounting-sheets-default (collection | no-value) ..... 42
  - 5.3.16 job-accounting-sheets-supported (1setOf keyword)..... 42
  - 5.3.17 job-accounting-sheets-type-supported (1setOf (type2 keyword | name(MAX)))  
..... 42
  - 5.3.18 job-complete-before-supported (1setOf (type2 keyword | name(MAX)))..... 42
  - 5.3.19 job-complete-before-time-supported (boolean) ..... 42
  - 5.3.20 job-error-sheet-default (collection | no-value) ..... 43
  - 5.3.21 job-error-sheet-supported (1setOf keyword) ..... 43
  - 5.3.22 job-error-sheet-type-supported (1setOf (type2 keyword | name(MAX))) ..... 43
  - 5.3.23 job-error-sheet-when-supported (1setOf type2 keyword) ..... 43
  - 5.3.24 job-message-to-operator-supported (boolean)..... 43
  - 5.3.25 job-phone-number-default (uri | no-value) ..... 43
  - 5.3.26 job-phone-number-scheme-supported (1setOf uriScheme) ..... 43
  - 5.3.27 job-phone-number-supported (boolean) ..... 43
  - 5.3.28 job-recipient-name-supported (boolean)..... 44
  - 5.3.29 presentation-direction-number-up-default (type2 keyword | no-value) ..... 44
  - 5.3.30 presentation-direction-number-up-supported (1setOf type2 keyword) ..... 44
  - 5.3.31 separator-sheets-default (collection | no-value) ..... 44
  - 5.3.32 separator-sheets-supported (1setOf keyword) ..... 44
  - 5.3.33 separator-sheets-type-supported (1setOf (type2 keyword | name(MAX)))..... 44

- 5.3.34 x-image-position-default (type2 keyword | no-value)..... 44
- 5.3.35 x-image-position-supported (1setOf type2 keyword)..... 44
- 5.3.36 x-image-shift-default (integer(MIN:MAX) | no-value)..... 44
- 5.3.37 x-image-shift-supported (rangeOfInteger(MIN:MAX)) ..... 45
- 5.3.38 x-side1-image-shift-default (integer(MIN:MAX) | no-value)..... 45
- 5.3.39 x-side2-image-shift-default (integer(MIN:MAX) | no-value)..... 45
- 5.3.40 y-image-position-default (type2 keyword | no-value)..... 45
- 5.3.41 y-image-position-supported (1setOf type2 keyword)..... 45
- 5.3.42 y-image-shift-default (integer(MIN:MAX) | no-value)..... 45
- 5.3.43 y-image-shift-supported (rangeOfInteger(MIN:MAX)) ..... 45
- 5.3.44 y-side1-image-shift-default (integer(MIN:MAX) | no-value)..... 45
- 5.3.45 y-side2-image-shift-default (integer(MIN:MAX) | no-value)..... 45
- 6. New Values for Existing Attributes ..... 46
  - 6.1 job-state-reasons (1setOf type2 keyword)..... 46
- 7. Obsolete Attributes..... 46
  - 7.1 Obsolete Job and Document Template Attributes ..... 46
  - 7.2 Obsolete Job Status Attributes ..... 46
  - 7.3 Obsolete Printer Description Attributes..... 46
- 8. Conformance Requirements..... 47
  - 8.1 Printer Conformance Requirements ..... 47
  - 8.2 Client Conformance Requirements..... 47
- 9. Internationalization Considerations ..... 47
- 10. Security Considerations ..... 48
- 11. IANA Considerations..... 49
  - 11.1 Attribute Registrations..... 49
  - 11.2 Type2 enum Registrations ..... 51
  - 11.3 Type2 keyword Registrations..... 52
- 12. Overview of Changes..... 54
  - 12.1 IPP Production Printing Extensions v2.0 ..... 54
- 13. References ..... 55
  - 13.1 Normative References..... 55
  - 13.2 Informative References ..... 57
- 14. Author ..... 57

**List of Figures**

- Figure 1 - IPP Media Sheet Coordinate System ..... 15
- Figure 2 - Relationship Between Number Up and Imposition..... 16
- Figure 3 - Imposition, Offset, and Rotation for Roll Media ..... 17
- Figure 4 - Separator Sheets between Sets ..... 18
- Figure 5 - "imposition-template" Examples ..... 25
- Figure 6 - ABNF for "imposition-template" Keyword Values..... 25
- Figure 7 - "x-image-position" Values ..... 36
- Figure 8 - "y-image-position" Values ..... 37

**List of Tables**

Table 1 - Number Up, Imposition, Offset, and Rotation Attributes ..... 17  
Table 2 - Separator Sheet Attributes ..... 19  
Table 3 - Error Sheet Attributes ..... 19  
Table 4 - Job Template Attributes..... 21  
Table 5 - "cover-front" and "cover-back" Member Attributes ..... 22  
Table 6 - "insert-sheet" Member Attributes ..... 26  
Table 7 - "job-accounting-sheets" Member Attributes..... 27  
Table 8 - "job-error-sheet" Member Attributes..... 29  
Table 9 - Standard Values for the "presentation direction" Attribute ..... 33  
Table 10 - "separator-sheets" Member Attributes ..... 34  
Table 11 - Printer Description Attributes..... 39  
Table 12 - OBSOLETE Printer Description Attributes..... 46

## 1. Introduction

High-volume "production" printing environments make use of covers, insert and separator sheets, special media, and Input Page transformations to deliver finished print products such as books, magazines, business cards, and so forth. Such environments also often use dedicated human operators and job tracking processes. This specification defines attributes to support printing in such high-volume "production" environments.

This specification obsoletes portions of the previous version of this specification [PWG5100.3-2001] and was previously titled the "IPP Production Printing Attributes - Set 1". The title and conformance requirements of this version have been updated to better reflect its focus. Finishing-specific attributes have been moved to the IPP Finishings 2.1 (FIN) specification [PWG5100.1]. The "media-col" Job Template and related attributes have been moved to the IPP Job Extensions v2.0 (JOBEXT) specification [PWG5100.7]. A list of changes can be found in section 12.

## 2. Terminology

### 2.1 Conformance Terminology

Capitalized terms, such as MUST, MUST NOT, RECOMMENDED, REQUIRED, SHOULD, SHOULD NOT, MAY, and OPTIONAL, have special meaning relating to conformance as defined in Key words for use in RFCs to Indicate Requirement Levels [BCP14]. The term CONDITIONALLY REQUIRED is additionally defined for a conformance requirement that applies when a specified condition is true.

The term DEPRECATED is used for previously defined and approved protocol elements that SHOULD NOT be used or implemented. The term OBSOLETE is used for previously defined and approved protocol elements that MUST NOT be used or implemented.

### 2.2 Printing Terminology

Normative definitions and semantics of printing terms are imported from the Internet Printing Protocol/1.1 [STD92].

*Document*: An object created and managed by a Printer that contains the description, processing, and status information. A Document object may have attached data and is bound to a single Job.

*Finished Document*: The output from printing, folding, cutting, finishing, etc. Lay terms include 'book', 'booklet' and 'document'.

*Finished Page*: One side of a Media Sheet in a Finished Document, i.e., one side of a Media Sheet as perceived by a person after any cutting, folding, and/or booklet making.



*Finished Page Image:* The single image on a Finished Page, i.e., all the marks imaged on a Finished Page.

*Job:* An object created and managed by a Printer that contains description, processing, and status information. A Job also contains zero or more Document objects.

*Logical Device:* A print server, software service, or gateway that processes Jobs and either forwards or stores the processed Job or uses one or more Physical Devices to render output [STD92].

*Output Device:* a single Logical or Physical Device [STD92].

*Physical Device:* A hardware implementation of an endpoint device, e.g., a marking engine, a fax modem, etc. [STD92]

## 2.3 Protocol Role Terminology

The following protocol roles are defined to specify unambiguous conformance requirements:

*Client:* Initiator of outgoing connections and sender of outgoing operation requests (Hypertext Transfer Protocol -- HTTP/1.1 [STD99] User Agent).

*Printer:* Listener for incoming connections and receiver of incoming operation requests (Hypertext Transfer Protocol -- HTTP/1.1 [STD99] Server) that represents one or more Physical Devices or a Logical Device.

## 2.4 Other Terminology

*Administrator:* An End User who is also authorized to manage all aspects of an Output Device or Printer, including creating the printer instances and controlling the authorization of other End Users and Operators [STD92].

*Cover Sheet:* A Media Sheet that the Printer adds to the beginning or end of a Set. Cover Sheets may have zero, one, or two Input Pages imaged on them.

*Document Data:* The data that represent an "original document" supplied with a Job Creation request. Typically Document Data is in the form of a Page Description Language (PDL).

*End User:* A person or software process that is authorized to perform basic printing functions, including finding/locating a Printer, creating a local instance of a Printer, viewing Printer status, viewing Printer capabilities, submitting a Print Job, viewing Print Job status, and altering the attributes of a Print Job [STD92].

*Error Sheets:* One or more Media Sheets that the Printer adds to the end of a Job providing information about the processing status of the Job including any errors that occurred.

*Imposition:* The process of laying out Impressions on the sides of one or more larger Media Sheets. The Media Sheets can be folded and/or cut in order to produce a series of Finished Pages.

*Impression:* Content imposed upon one side of a Media Sheet by a marking engine, independent of the number of times that the sheet side passes any marker. An Impression contains one or more Input Pages that are imposed (scaled, translated, and/or rotated) during processing of the Document Data [STD92].

*Input Page:* A page according to the definition of "pages" in the language used to express the Document Data [STD92].

*Insert Sheet:* A Media Sheet that the Printer inserts into an output document, on which no Input Pages are imaged.

*i<sup>th</sup>:* Referring to a specific IPP '1setOf' value - the first value, the second value, and so forth.

*Job Creation Operation:* Any operation that causes the creation of a Job, e.g., Create-Job, Print-Job, and Print-URI [STD92].

*Media Sheet:* A single instance of a medium, whether printing on one or both sides of the medium. Media Sheets also include sections of roll media [STD92].

*Number Up:* The process of laying out multiple consecutive Input Pages to produce an Impression.

*Operator:* An End User that also has special rights on the Output Device or Printer. The Operator typically monitors the status of the Printer and manages and controls the Jobs at the Output Device. The Operator is allowed to query and control the Printer, Jobs, and Documents based on site policy [STD92].

*Separator Sheet:* A Media Sheet that the Printer inserts between Sets in a Job, on which no Input Pages are imaged.

*Set:* A logical boundary between the delivered Media Sheets of a printed Job. For example, in the case of a ten-page single Document with collated pages and a request for 50 copies, each of the 50 printed copies of the Document constitute a Set. If the pages were uncollated, then 50 copies of each of the individual pages within the Document would each constitute a Set. Finishing processes operate on Sets [STD92].

## **2.5 Acronyms and Organizations**

*IANA*: Internet Assigned Numbers Authority, <http://www.iana.org/>

*IETF*: Internet Engineering Task Force, <http://www.ietf.org/>

*ISO*: International Organization for Standardization, <http://www.iso.org/>

*PDL*: Page Description Language

*PWG*: Printer Working Group, <http://www.pwg.org/>

## 3. Requirements

### 3.1 Rationale

Given the following existing specifications:

1. Internet Printing Protocol/1.1 [STD92]
2. IPP Finishings v3.0 (FIN) [PWG5100.1]

And given the desire for specifying printing intent in high-volume "production" printing environments, the IPP Production Printing Extensions v1.1 (PPX) should:

1. Define attributes and values for specifying printed covers;
2. Define attributes and values for specifying how Input Pages are mapped to the front side of a Media Sheet;
3. Define attributes and values for specifying how Input Pages are imposed on Impressions;
4. Define attributes and values for specifying insert sheets;
5. Define attributes and values for specifying Job accounting, error handling, operator, and summary information;
6. Define attributes and values for specifying the ordering and layout of Input Pages; and
7. Define attributes and values for specifying how Input Pages are offset when imposed on Impressions.

### 3.2 Use Cases

#### 3.2.1 Printing Bound Books with Printed Covers

Jane wants to print a small run of 100 books from a document that contains pages for the front and back covers. She opens the document in her client software and initiates a print action, specifying the number of copies (100), desired output media, two-sided printing intent, binding of output media pages, and the cover media with content from the input document. The printer uses the first and last pages from the document for the covers of each copy of the book that is printed.

#### 3.2.2 Printing Folded Booklets

Bill wants to print a booklet from his word processing software, which does not know how to layout pages for booklet printing. He initiates the print action from the software and specifies that the printer should reorder and position the input pages so they appear in the correct locations for a folded booklet.

### 3.2.3 Separating Copies with Colored Paper

David is printing multiple copies of a test and wants to separate each copy with a piece of colored paper. He initiates the print action from his test software and specifies that each copy should be separated by a yellow sheet.

### 3.2.4 Scheduling Print Deadlines

Alex is printing a large run of 10,000 books and needs them printed by the end of the week. They open the document in their client software and initiate a print action, specifying the due-by date along with the other print intent. The printer uses the due date to schedule the job in a timely fashion.

### 3.2.5 Imposing and Shifting Print Output

Connie is printing a series of posters on roll-fed media. She initiates the print action and specifies an imposition template, orientation, and shift offsets to output the posters across the roll in preparation for cutting.

## 3.3 Exceptions

The following subsection defines one exception in addition to those defined in the Internet Printing Protocol/1.1 [STD92].

### 3.3.1 Printing a Report on Error

Bob manages a small printing shop and needs to know when a job fails to print correctly. He uses his printer management software to always print an error summary on pink sheets.

## 3.4 Out of Scope

The following are considered out of scope for this specification:

1. Definition of new file formats; and
2. Definition of new protocol bindings.

## 3.5 Design Requirements

The design requirements for this specification are:

1. Define attributes and values for specifying how Input Pages are mapped to the front side of a Media Sheet;
2. Define attributes and values for specifying how Input Pages are imposed on Impressions;
3. Define attributes and values for specifying Job accounting, error reporting, messages to the operator, job scheduling, and summary information;

4. Define attributes and values for specifying the ordering and layout of Input Pages;
5. Define attributes and values for specifying how Input Pages are offset when imposed on Impressions; and
6. Define sections to register all attributes, values, and operations with IANA.

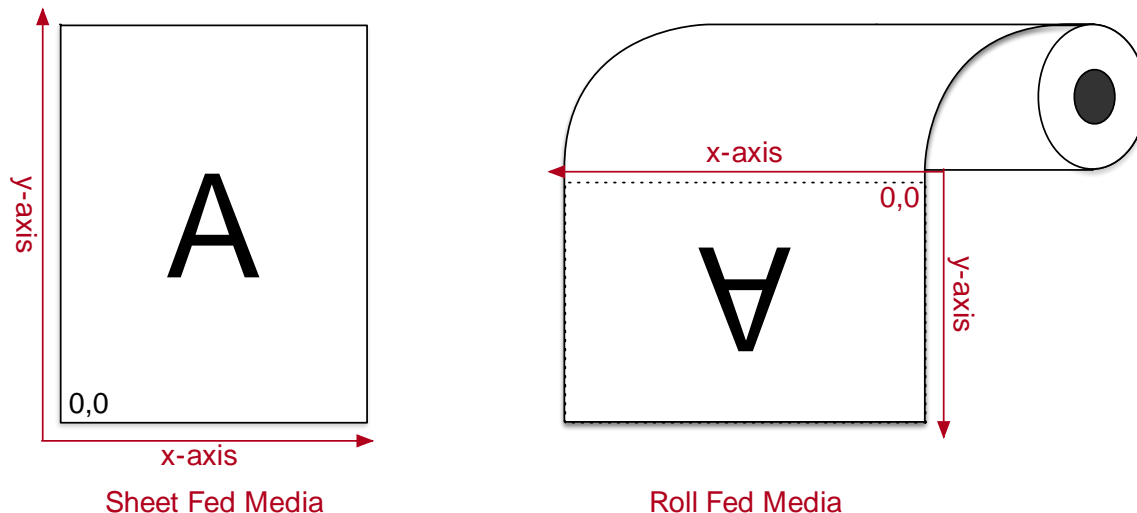
## 4. Model

This specification extends the Internet Printing Protocol/1.1 [STD92] model to include Job Template attributes for production printing that specify:

1. Which Input Pages are placed on the front side of a Media Sheet;
2. How Input Pages are imposed on each Impression;
3. How Input Pages are ordered prior to imposition;
4. How Input Pages are offset during imposition;
5. Job accounting information;
6. Job error reporting requirements;
7. Job scheduling requirements; and
8. A message to the operator.

### 4.1 Imaging Coordinate System and Units

Figure 1 shows the coordinate system used by IPP when addressing locations on a Media Sheet or within an Impression. Coordinates are provided without respect to the orientation of the Input Page. For sheet fed media the X dimension is the short side and the Y dimension is the long side ("portrait" orientation). For roll fed media the X dimension is in the cross-feed direction and the Y dimension is in the feed direction, with the "top" of the page being the leading edge of the roll.

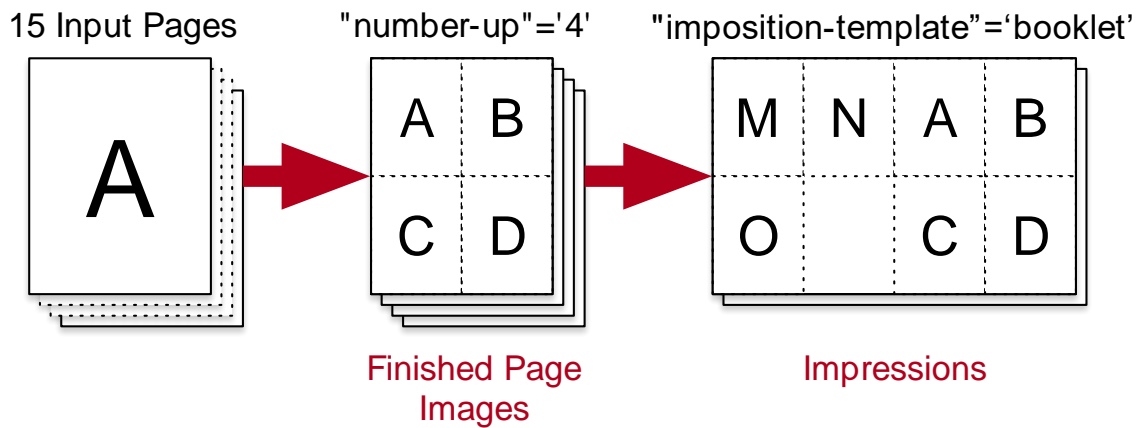


**Figure 1 - IPP Media Sheet Coordinate System**

Dimensions are always given in hundredths of millimeters (1/2540th of an inch) which are sometimes called "PWG units".

## 4.2 Number Up, Imposition, Shifting, and Rotation

The concepts of Number Up (“number-up” [STD92]) layout and Imposition are related but separate steps. Figure 2 shows these steps visually for booklet imposition.



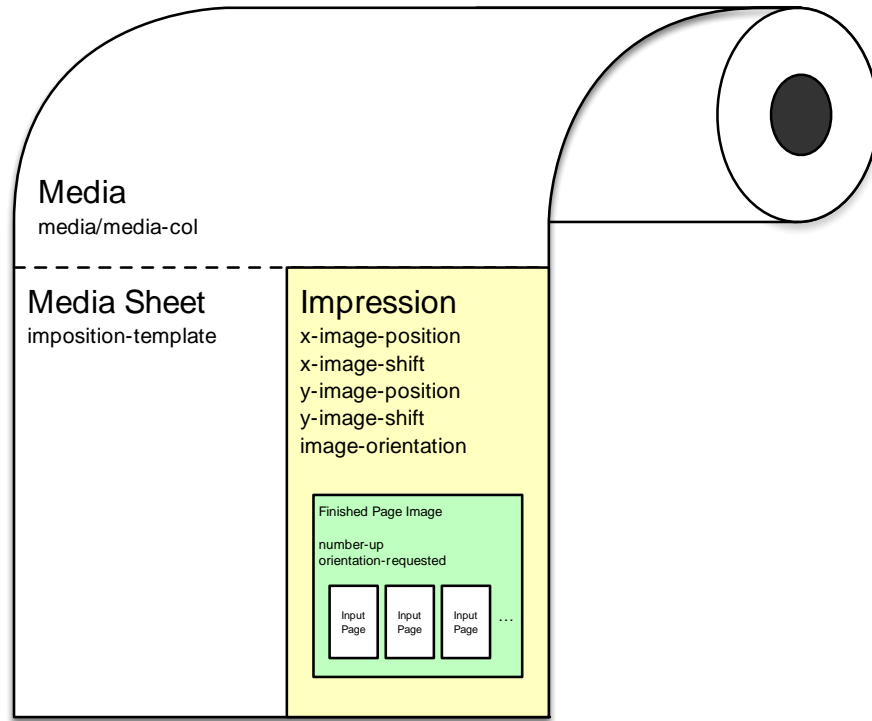
**Figure 2 - Relationship Between Number Up and Imposition**

Aside from the "imposition-template" Job Template attribute (section 5.2.4), this specification defines additional Job Template attributes to offset, position, and rotate the imposed Finished Page Images within the Impressions that are printed on the Media Sheet, typically to compensate for an application or scanning in some consistent direction, or to shift the Impressions toward or away from a binding edge. Figure 3 shows how these attributes are applied on roll media.

The Printer MUST apply “number-up”, “page-delivery”, “presentation-direction-number-up”, image rotation and shifting, and “imposition-template” attributes listed in Table 1 in the following order:

1. Order the Input Pages according to the "page-delivery" attribute (section 5.2.14). If "page-delivery" is unsupported or not applied, Input Pages are processed in the order they occur within the Document Data.
2. Create Finished Page Images by rotating the Input Pages as specified by the "orientation-requested" [STD92] attribute, laying out the number of Input Pages specified by the "number-up" [STD92] attribute. If "number-up" is unsupported or not applied, each Finished Page Image consists of a single Input Page.
3. Rotate the Finished Page Images as specified by the "image-orientation" (section 5.2.3) attribute.
4. Shift the Finished Page Images as specified by the "x-image-xxx" and "y-image-xxx" attributes.
5. Layout the Finished Page Images onto a number of (larger) Impressions according to the "imposition-template" (section 5.2.4) attribute.
6. Print the Impressions onto the surfaces (sides) of a number of Media Sheets according to the "force-front-side" (section 5.2.2), "multiple-document-handling" [STD92], and "sides" [STD92] attributes.





**Figure 3 - Imposition, Offset, and Rotation for Roll Media**

**Table 1 - Number Up, Imposition, Offset, and Rotation Attributes**

Template Attribute	Default Attribute	Supported Attribute
force-front-side (1setOf integer(1:MAX))	N/A	force-front-side-supported (rangeOfInteger(1:MAX))
image-orientation (type2 enum)	image-orientation-default (type2 enum)	image-orientation-supported (1setOf type2 enum)
imposition-template (type2 keyword   name(MAX))	imposition-template-default (type2 keyword   name(MAX))	imposition-template-supported (1setOf (type2 keyword   name(MAX)))
page-delivery (type2 keyword)	page-delivery-default (type2 keyword)	page-delivery-supported (1setOf type2 keyword)
presentation-direction-number-up (type2 keyword)	presentation-direction-number-up-default (type2 keyword)	presentation-direction-number-up-supported (1setOf type2 keyword)
x-image-position (type2 keyword)	x-image-position-default (type2 keyword)	x-image-position-supported (1setOf type2 keyword)
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))

Template Attribute	Default Attribute	Supported Attribute
y-image-position (type2 keyword)	y-image-position-default (type2 keyword)	y-image-position-supported (1setOf type2 keyword)
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))

### 4.3 Separator Sheets

Blank Separator Sheets can be added between Sets to separate each Set visually. Table 2 lists the Separator Sheet attributes.

For example, a Job can request five copies of a Document with blank pink Media Sheets separating each Set (copy) of the Document. When combined with IPP Finishings 2.1, the Media Sheets can be bound with the Separator Sheets left loose between the bound Sets. Figure 4 shows how these Media Sheets are ordered within the Job's output.

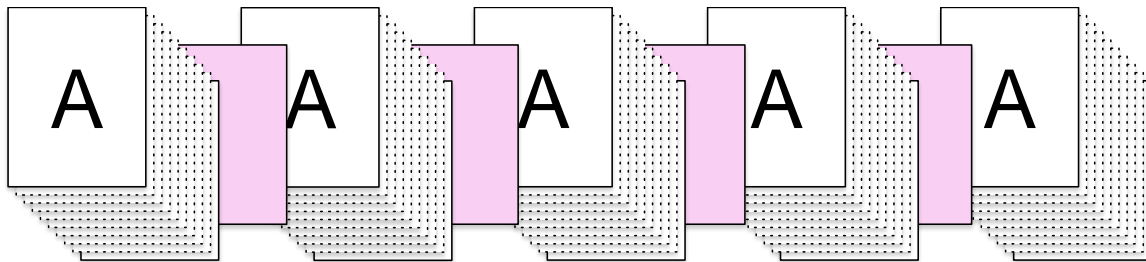


Figure 4 - Separator Sheets between Sets

**Table 2 - Separator Sheet Attributes**

Template Attribute	Default Attribute	Supported Attribute(s)
separator-sheets (collection)	separator-sheets-default (collection)	separator-sheets-supported (1setOf keyword) separator-sheets-type-supported (1setOf (type2 keyword   name(MAX)))

## 4.4 Error Sheets

Error Sheets are an important part of large print Jobs which provide a detailed processing report that can be used to troubleshoot a Job. Table 3 lists the Error Sheet attributes.

**Table 3 - Error Sheet Attributes**

Job Template Attribute	Default Attribute	Supported Attribute(s)
job-error-sheet (collection)	job-error-sheet-default (collection)	job-error-sheet-supported (1setOf keyword) job-error-sheet-type-supported (1setOf (type2 keyword   name(MAX))) job-error-sheet-when-supported (1setOf type2 keyword)
job-message-to-operator (text(MAX))	N/A	job-message-to-operator-supported (boolean)
job-sheet-message (text(MAX))	N/A	job-sheet-message-supported (boolean)

## 4.5 Job Scheduling

Job scheduling in production environments can be more complex than typical office printing. This specification defines several new Job Status attributes providing estimated processing and completion times: "date-time-at-completed-estimated" (section 5.1.1), "date-time-at-processing-estimated" (section 5.1.2), "time-at-completed-estimated" (section 5.1.3), and "time-at-processing-estimated" (section 5.1.4). The "xxx-at-completed-estimated" attributes can be updated at any time until the Job reaches a terminating state, while the "xxx-at-processing-estimated" attributes can be updated at any time until the Job reaches the 'processing' or 'processing-stopped' states.

This specification also defines new Job Template attributes that request a Job complete processing by a specific named time period ("job-complete-before", section 5.2.7) or date and time ("job-complete-before-time", section 5.2.8). There is no default attribute ("job-complete-before-default") since a default completion time would potentially conflict with other scheduling attributes.

## 5. New Attributes

### 5.1 Job Status Attributes

#### 5.1.1 date-time-at-completed-estimated (dateTime | unknown)

This RECOMMENDED attribute indicates the estimated date and time when the Job will be completed. Printers that support the "time-at-completed-estimated" Job Status attribute (section 5.1.3) MUST support this attribute.

The value of the "date-time-at-completed-estimated" attribute can be updated by a Printer at any time until the Job reaches a terminating state.

#### 5.1.2 date-time-at-processing-estimated (dateTime | unknown)

This RECOMMENDED attribute indicates the estimated date and time when the Job will enter the 'processing' state. Printers that support the "time-at-processing-estimated" Job Status attribute (section 5.1.4) MUST support this attribute.

The value of the "date-time-at-processing-estimated" attribute can be updated by a Printer at any time until the Job reaches the 'processing' or 'processing-stopped' states.

#### 5.1.3 time-at-completed-estimated (integer(MIN:MAX) | unknown)

This RECOMMENDED attribute indicates the estimated time when the Job will be completed. Printers that support the "date-time-at-completed-estimated" Job Status attribute (section 5.1.1) MUST support this attribute.

The value of the "time-at-completed-estimated" attribute can be updated by a Printer at any time until the Job reaches a terminating state.

#### 5.1.4 time-at-processing-estimated (integer(MIN:MAX) | unknown)

This RECOMMENDED attribute indicates the estimated time when the Job will enter the 'processing' state. Printers that support the "date-time-at-processing-estimated" Job Status attribute (section 5.1.2) MUST support this attribute.

The value of the "time-at-processing-estimated" attribute can be updated by a Printer at any time until the Job reaches the 'processing' or 'processing-stopped' states.

## 5.2 Job Template Attributes

Table 4 lists the new Job Template attributes.

**Table 4 - Job Template Attributes**

<b>Attribute</b>	<b>Printer Conformance</b>	<b>Reference</b>
cover-back (collection)	DEPRECATED	Section 5.2.1
cover-front (collection)	DEPRECATED	Section 5.2.1
force-front-side (1setOf integer(1:MAX))	RECOMMENDED	Section 5.2.2
image-orientation (type2 enum)	REQUIRED	Section 5.2.3
imposition-template (type2 keyword   name(MAX))	RECOMMENDED	Section 5.2.4
insert-sheet (1setOf collection)	DEPRECATED	Section 5.2.5
job-accounting-sheets (collection)	DEPRECATED	Section 5.2.6
job-complete-before (type2 keyword   name(MAX))	RECOMMENDED	Section 5.2.7
job-complete-before-time (dateTime)	RECOMMENDED	Section 5.2.8
job-error-sheet (collection)	REQUIRED	Section 5.2.9
job-message-to-operator (text(MAX))	REQUIRED	Section 5.2.10
job-phone-number (uri)	RECOMMENDED	Section 5.2.11
job-recipient-name (name(MAX))	RECOMMENDED	Section 5.2.12
job-sheet-message (text(MAX))	REQUIRED	Section <b>Error!</b> <b>Reference source not found.</b>
media-input-tray-check (type2 keyword   name(MAX))	DEPRECATED	Section 5.2.13
page-delivery (type2 keyword)	REQUIRED	Section 5.2.14
presentation-direction-number-up (type2 keyword)	DEPRECATED	Section 5.2.15
separator-sheets (collection)	REQUIRED	Section 5.2.16
x-image-position (type2 keyword)	REQUIRED	Section 5.2.17
x-image-shift (integer(MIN:MAX))	REQUIRED	Section 5.2.18
x-side1-image-shift (integer(MIN:MAX))	REQUIRED	Section 5.2.19
x-side2-image-shift (integer(MIN:MAX))	REQUIRED	Section 5.2.20
y-image-position (type2 keyword)	REQUIRED	Section 5.2.21
y-image-shift (integer(MIN:MAX))	REQUIRED	Section 5.2.22
y-side1-image-shift (integer(MIN:MAX))	REQUIRED	Section 5.2.23
y-side2-image-shift (integer(MIN:MAX))	REQUIRED	Section 5.2.24

### 5.2.1 cover-back (collection) and cover-front (collection)

These DEPRECATED attributes specify how Cover Sheets are applied to the back and front of each Set. Page overrides using the "overrides (1setOf collection)" Job Template attribute [PWG5100.6] SHOULD be used instead to specify media overrides for cover pages.

The Media Sheets in the rendered output that represent the Cover Sheets are treated like any other Media Sheet in the Set. For example, if the "finishings" Job Template attribute

[STD92] has a value of 'staple,' then the staple would bind the Cover Sheets along with all of the other Media Sheets in the Set.

Table 5 lists the member attributes. If the Client omits both the "media" and the "media-col" member attributes, then the media currently being used by the Printer for the Job SHOULD also be used for the Cover Sheets. The Client supplies either the "media" or "media-col" member attribute. A Printer receiving a request that contains both member attributes MUST reject the request, return the 'client-error-conflicting-attributes' status code, and return the corresponding "cover-back" or "cover-front" attribute in the unsupported attributes group.

**Table 5 - "cover-front" and "cover-back" Member Attributes**

<b>Member Attribute</b>	<b>Printer Conformance</b>
media (type2 keyword   name(MAX))	REQUIRED
media-col (collection)	REQUIRED
cover-type (type2 keyword)	REQUIRED

**5.2.1.1 media (type2 keyword | name(MAX))**

This REQUIRED member attribute specifies the media to use for the cover.

**5.2.1.2 media-col (collection)**

This REQUIRED member attribute specifies the media to use for the cover.

**5.2.1.3 cover-type (type2 keyword)**

This REQUIRED member attribute specifies whether a Cover Sheet is intended and which sides of the Cover Sheet are printed. The Input Pages used for printing on a Cover Sheet come from the Document Data.

Standard keyword values for "cover-type" are:

**'no-cover'**: No Cover Sheet is produced.

**'print-none'**: Add a Cover Sheet but do not print on either side.

**'print-front'**: Add a Cover Sheet that is printed on the front side (side one). For a front cover ("cover-front") the first Input Page is printed on side one of the Cover Sheet (this is the outside of the front cover) and the second Input Page is printed on side one of the first Media Sheet of the output. For back cover ("cover-back") the last Input Page is printed on side one of the Cover Sheet (this is the inside of the back cover).

**'print-back'**: Add a Cover Sheet that is printed on the back side (side two). For a front cover ("cover-front") the first Input Page is printed on side two of the Cover Sheet (this is the inside of the front cover) and the second Input Page is printed on

side one of the first Media Sheet of the output. For a back cover ("cover-back") the last Input Page is printed on side two of the Cover Sheet (this is the outside of the back cover).

**'print-both'**: Add a Cover Sheet that is printed on both sides of the cover. The front cover has the first and second Input Pages printed on the front and back sides of the Cover Sheet, respectively. The back cover has the second to last and last Input Pages printed on the front and back sides of the Cover Sheet, respectively.

When printing on the back side (side two) of a Cover Sheet, the value of the "sides" Job Template attribute [STD92] SHOULD be used to determine which edge is the reference edge, i.e., the long or short edge. When the "sides" attribute is 'one-sided', the reference edge SHOULD be the long edge.

In cases where the Document Data does not contain enough Input Pages to satisfy the "cover-type" request, the behavior is implementation dependent.

### 5.2.2 force-front-side (1setOf integer(1:MAX))

This RECOMMENDED attribute forces the identified Input Pages (numbered 1 to N) to be imposed on the front side of a Media Sheet. This attribute is typically used to start a new chapter or section of a document. For each identified Input Page, if that page would have been imposed on the back side of a Media Sheet, that back side is left blank and the page is imposed on the front side of the next Media Sheet.

If the "number-up" Job Template attribute [STD92] is also supplied and the specified page would have been in the first position on the front side of a Media Sheet anyway, this attribute has no effect. Otherwise, the Printer imposes the specified page in the first position of the front side of the next Media Sheet and the intervening page positions are left blank.

### 5.2.3 image-orientation (type2 enum)

This REQUIRED attribute specifies the orientation of the Finished Page Image with respect to the Imposition Template as shown in Figure 3. It uses the same values as the "orientation-requested" [STD92] attribute.

### 5.2.4 imposition-template (type2 keyword | name(MAX))

This RECOMMENDED attribute specifies how the Client wants the Impressions in a Job to be positioned, scaled, and rotated on one or more Media Sheets. Figure 5 shows the results of different kinds of imposition. Standard keyword values are:

**'none'**: No imposition template is applied.

**'banner'**: Blank space between the leading and trailing edges of Impressions is removed in order to produce a continuous banner print, typically for roll-fed media.

**'banner-compressed'**: Like 'banner' but blank space from the leading edge of the first Impression and the trailing edge of the last Impression is also removed.

**'booklet'**: A template is applied so that Impressions are positioned, scaled, and ordered for a saddle-stitched half-fold booklet.

**'position\_HALIGN\_VALIGN'**: Impressions are positioned for the specified horizontal and vertical alignment and rotated as needed to fit on the Media Sheets. HALIGN is **'left'**, **'center'**, or **'right'** while VALIGN is **'top'**, **'middle'**, or **'bottom'**.

**'same-up\_4\_3\_2x3.5in'**: Impressions are duplicated in four columns and three rows using the standard business card size, producing 12 business card images. For duplex printing, odd-numbered Impressions are duplicated for the front side and even-numbered Impressions are duplicated for the back side of each Media Sheet.

**'same-up\_2\_2\_3.5x5in'**: Impressions are duplicated in two columns and two rows using the standard US postcard size, producing four postcard images. For duplex printing, odd-numbered Impressions are duplicated for the front side and even-numbered Impressions are duplicated for the back side of each Media Sheet.

**'same-up\_2\_2\_105x148mm'**: Impressions are duplicated in two columns and two rows using the standard ISO A6 postcard size, producing four postcard images. For duplex printing, odd-numbered Impressions are duplicated for the front side and even-numbered Impressions are duplicated for the back side of each Media Sheet.

**'signature'**: An implementation-specific template is applied so that Impressions are printed on both sides of a single Media Sheet that is folded, trimmed, bound and cut to become a specific number of pages depending on the Impression size and the size of the Media Sheet. This value is DEPRECATED.

**'tile'**: Impressions are automatically tiled to minimize media usage, typically for roll-fed media. Printers can also merge the Impressions from multiple Documents and Jobs using 'tile' to further minimize media usage.

Other keywords using the 'same-up' prefix can be specified using the **'same-up\_COLS\_ROWS\_WIDTHxHEIGHTunits'** format. Vendor extensions follow the **'smiNNNN-'** prefix convention [STD92]. Figure 6 shows the ABNF [STD68] [PPX-ABNF] for "imposition-template" keyword values.

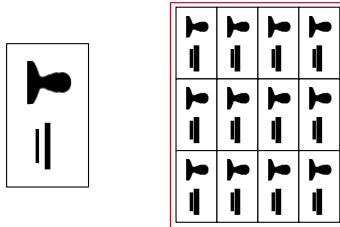
Notes:

1. The "imposition-template" and "number-up" [STD92] Job Template attributes can produce similar results but are performed at different times during Document processing. Some implementations might not support combining the two attributes.

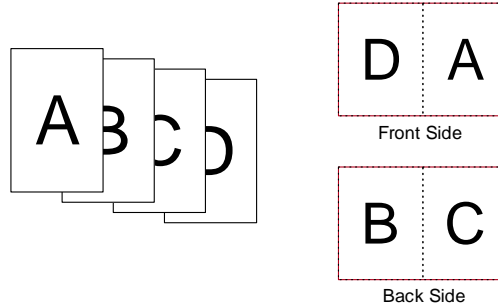


- Combining the "imposition-template" and "page-ranges" [STD92] Job Template attributes can be complicated since templates like 'booklet' change the order of Impressions.

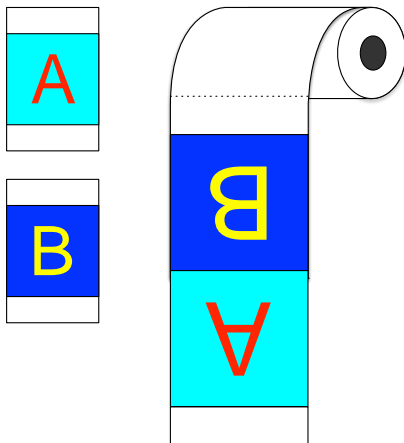
"imposition-template" = 'same-up\_4\_3\_2x3.5in'



"imposition-template" = 'booklet', "sides" = 'two-sided-short-edge'



"imposition-template" = 'banner'



"imposition-template" = 'tile'

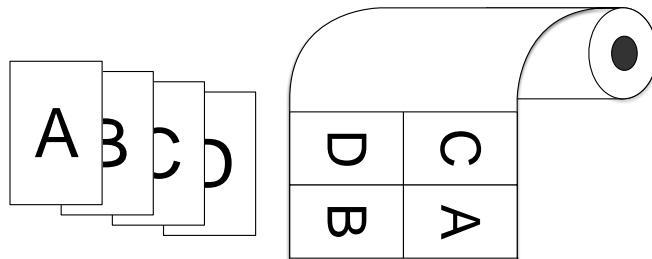


Figure 5 - "imposition-template" Examples

Figure 6 - ABNF for "imposition-template" Keyword Values

```

IMPOSITION-TEMPLATE = "banner" / "banner-compressed" / "booklet" /
    "none" / "signature" / "tile" /
    IMPOSITION-POSITION / IMPOSITION-SAME-UP /
    IMPOSITION-VENDOR

IMPOSITION-POSITION = "position_"                               ; position_...
    { "left" / "center" / "right" }                            ; HALIGN
    " "
    { "top" / "middle" / "bottom" }                            ; VALIGN

IMPOSITION-SAME-UP = "same-up_"                                ; same-up_...
    INITIAL *DIGIT "_"                                         ; Columns
    INITIAL *DIGIT "-"                                         ; Rows
    INITIAL *DIGIT [ "." 1*DIGIT ] "x"                         ; Width
    INITIAL *DIGIT [ "." 1*DIGIT ]                             ; Height
    ( "in" / "mm" )                                           ; Units
    
```

```

IMPOSITION-VENDOR = "smi" 1*DIGIT "-" 1*KEYWORDCHAR ; smiNNN-foo
INITIAL           = %x31-39 ; 1-9
KEYWORDCHAR      = %x61-7A / DIGIT / "." / "-" / "_" ; a-z, 0-9, etc.
    
```

### 5.2.5 insert-sheet (1setOf collection)

This DEPRECATED attribute specifies where Insert Sheets are included in the sequence of Media Sheets that are produced for Set in the Job. Page overrides using the "overrides (1setOf collection)" Job Template attribute [PWG5100.6] SHOULD be used instead to specify media overrides for insert sheets.

The order of the values of the "insert-sheet" attribute is significant - in the case where more than one value refers to the same "insert-after-page-number" member attribute value, the values of "insert-sheet" are applied in the order specified.

The Client supplies either the "media" or "media-col" member attribute. A Printer receiving a request that contains both member attributes MUST reject the request, return the 'client-error-conflicting-attributes' status code, and return the "insert-sheet" attribute in the unsupported attributes group.

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 Input 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 each Document separately. Table 6 lists the member attributes.

**Table 6 - "insert-sheet" Member Attributes**

<b>Member Attribute</b>	<b>Printer Conformance</b>
insert-after-page-number (integer(1:MAX))	REQUIRED
insert-count (integer(0:MAX))	REQUIRED
media (type2 keyword   name(MAX))	REQUIRED
media-col (collection)	REQUIRED

#### 5.2.5.1 insert-after-page-number (integer(0:MAX))

This REQUIRED member attribute specifies the Input Page number, starting at 1, after which the Insert Sheets are to be placed. The inserted sheets do not affect the numbering of Input 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 Page count.

If the value is '0' then the sheet is inserted before the first page. If the value is MAX ('2147483647'), then the sheet is inserted after the last page.

If the value is not a valid Input Page number, e.g., if the page number is beyond the last page and is not MAX, or if the "page-ranges" Job Template attribute [STD92] does not include the specified page number, then the Printer SHOULD ignore the request. There is no way to validate this member attribute with the Validate-Job operation since the validation cannot occur until the pages of the Documents have arrived at the Printer.

Since this member attribute refers to a specific Input Page, it is possible to specify a page that would not be the last page on a sheet, e.g., an insertion occurs after the page that is on the front side of a two-sided document. In this case, the Printer MUST force a new Media Sheet after the specified page, insert the specified sheet, and place the following pages starting on the first side of the next Media Sheet.

**5.2.5.2 insert-count (integer(0:MAX))**

This REQUIRED member attribute specifies how many sheets to insert. If omitted, the Printer assumes a value of '1'. The value '0' indicates that no inserts sheets are to be inserted.

**5.2.5.3 media (type2 keyword | name(MAX))**

This REQUIRED member attribute specifies the media to insert.

**5.2.5.4 media-col (collection)**

This REQUIRED member attribute specifies the media to insert.

**5.2.6 job-accounting-sheets (collection)**

This DEPRECATED attribute specifies which Job accounting sheets to print with the Job. Job accounting sheets typically contain information such as the value of the "job-account-id" and "job-accounting-user-id" attributes [PWG5100.7], 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 reflect the account information associated with the Job. Typically, Job accounting sheets are printed after the Job and are not finished, i.e., not stapled, with the Sets. Table 7 lists the member attributes.

The Client supplies either the "media" or "media-col" member attribute. A Printer receiving a request that contains both member attributes MUST reject the request, return the 'client-error-conflicting-attributes' status code, and return the "job-accounting-sheets" attribute in the unsupported attributes group.

**Table 7 - "job-accounting-sheets" Member Attributes**

<b>Member Attribute</b>	<b>Printer Conformance</b>
job-accounting-sheets-type (type2 keyword   name(MAX))	REQUIRED
media (type2 keyword   name(MAX))	REQUIRED
media-col (collection)	REQUIRED

<b>Member Attribute</b>	<b>Printer Conformance</b>
<u>job-accounting-output-bin (type2 keyword   name(MAX))</u>	RECOMMENDED

### 5.2.6.1 job-accounting-sheets-type (type2 keyword | name(MAX))

This REQUIRED member attribute specifies the Job accounting sheets format to use. Standard keyword values are:

**'none'**: Suppress printing of accounting sheets.

**'standard'**: Use the standard site accounting sheets.

### 5.2.6.2 media (type2 keyword | name(MAX))

This REQUIRED member attribute specifies the media to use for the Job accounting sheets.

### 5.2.6.3 media-col (collection)

This REQUIRED member attribute specifies the media to use for the Job accounting sheets.

### 5.2.6.4 job-accounting-output-bin (type2 keyword | name(MAX))

This RECOMMENDED member attribute specifies the output bin [PWG5100.2] in which the accounting sheets are to be placed. If this member attribute is not supplied by the Client or is not supported by the Printer, then the Printer places the accounting sheets in the same output bin as the rest of the Job.

### 5.2.7 job-complete-before (type2 keyword | name(MAX))

This RECOMMENDED attribute specifies when the printed output is needed. Standard keyword values are:

**'day-time'**: Complete the job before the beginning of the day (typically first shift or 8am)

**'evening'**: Complete the Job before the beginning of the evening (typically 6pm)

**'night'**: Complete the Job before sundown (typically 9pm)

**'none'**: Complete the Job at any time (no specific request)

**'second-shift'**: Complete the Job before the second shift (typically 4pm)

**'third-shift'**: Complete the Job before the third shift (typically 12am)

**'weekend'**: Complete the Job before Saturday at 12am

This attribute is analogous to the "job-hold-until" [STD92] and "job-delay-output-until" [PWG5100.7] Job Template attributes. Printers can refuse to accept a Job Creation request containing the "job-complete-before" attribute if the newly created Job cannot be printed before the requested time period. Even when accepted, specifying the "job-complete-before" attribute does not guarantee that a Job will be printed before the given time.

**5.2.8 job-complete-before-time (dateTime)**

This RECOMMENDED attribute specifies a date and time when the printed output is needed.

This attribute is analogous to the "job-hold-until-time" [PWG5100.7] and "job-delay-output-until-time" [PWG5100.7] Job Template attributes. Printers can refuse to accept a Job Creation request containing the "job-complete-before-time" attribute if the newly created Job cannot be printed before the requested date and time. Even when accepted, specifying the "job-complete-before-time" attribute does not guarantee that a Job will be printed before the given time.

**5.2.9 job-error-sheet (collection)**

This REQUIRED attribute specifies which Error Sheet to print with the Job. The Error Sheet lists 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 Client supplies either the "media" or "media-col" member attribute. A Printer receiving a request that contains both member attributes MUST reject the request, return the 'client-error-conflicting-attributes' status code, and return the "job-error-sheet" attribute in the unsupported attributes group.

If the Printer is producing a Job Sheet for this Job, the Printer can print any error and warning information on the 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 be used to print errors and warnings. Table 8 lists the member attributes.

**Table 8 - "job-error-sheet" Member Attributes**

<b>Member Attribute</b>	<b>Printer Conformance</b>
job-error-sheet-type (type2 keyword   name(MAX))	REQUIRED
job-error-sheet-when (type2 keyword)	REQUIRED
media (type2 keyword   name(MAX))	REQUIRED
media-col (collection)	REQUIRED

### 5.2.9.1 job-error-sheet-type (type2 keyword | name(MAX))

This REQUIRED member attribute specifies the type of Error Sheets to print. Standard keyword values are:

**'none'**: Do not print error information.

**'standard'**: Use the standard site or vendor defined error template.

### 5.2.9.2 job-error-sheet-when (type2 keyword)

This REQUIRED 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.

### 5.2.9.3 media (type2 keyword | name(MAX))

This REQUIRED member attribute specifies the media to use for the Error Sheets.

### 5.2.9.4 media-col (collection)

This REQUIRED member attribute specifies the media to use for the Error Sheets.

### 5.2.10 job-message-to-operator (text(MAX))

This REQUIRED attribute specifies a message from the End User to the Operator to indicate something about the processing of the print Job.

### 5.2.11 job-phone-number (uri)

This RECOMMENDED Job Template attribute specifies the contact telephone number for the Job. If supported, the Printer MUST accept the 'tel:' URI scheme [RFC2806] and MAY accept other schemes, such as the 'fax:' scheme [RFC2806]. How the Printer processes the "job-phone-number" attribute is implementation-dependent.

### 5.2.12 job-recipient-name (name(MAX))

This RECOMMENDED Job Template attribute specifies the name of the person that is to receive the output of the Job. A zero-length value indicates that there is no Job recipient name.

### 5.2.13 media-input-tray-check (type2 keyword | name(MAX))

This DEPRECATED attribute specifies that the Printer MUST verify that the characteristics of the media in the identified input tray are the same as characteristics of the media identified by the Job's "media" or "media-col" Job Template attributes. Clients SHOULD instead use the "media-source" member attribute of the "media-col" attribute [PWG5100.7].

The keyword values are the same input tray keyword values as defined in the PWG Media Standardized Names v2.0 (MSN2) [PWG5101.1].

Independent of the "ipp-attributes-fidelity" operation attribute supplied by the Client, if the characteristics differ, the Printer adds the 'resources-are-not-ready' value (see section 6.1) to the Job's "job-state-reasons" attribute and MAY either put the Job into the 'pending-held' state or start to process the Job normally but immediately stop the Job ("job-state" = 'processing-stopped') and the Printer ("printer-state" = 'stopped', "printer-state-reasons" includes 'media-needed'). In either implementation, the Operator can change the media in the input tray to agree with the Job or can modify the Job's "media" or "media-col" attributes to agree with the input tray, depending on policy.

### 5.2.14 page-delivery (type2 keyword)

This REQUIRED attribute specifies whether Input Pages of the Job are to be delivered to the output bin or finisher in the same page order as the original document and whether the Input Pages are delivered face up or face down. Standard keyword values for page delivery are:

**'same-order-face-up'**: The Media Sheets that represent the printed output MUST be delivered to the output bin or finishing device in the same order as defined by the "page-order-received" attribute. Furthermore, side one of each Media Sheet MUST be delivered face up to the output bin or finishing device.

**'same-order-face-down'**: The Media Sheets that represent the printed output MUST be delivered to the output bin or finishing device in the same order as defined by the "page-order-received" attribute. Furthermore, side one of each Media Sheet MUST be delivered face down to the output bin or finishing device.

**'reverse-order-face-up'**: The Media Sheets that represent the printed output MUST be delivered to the output bin or finishing device in the reverse order of the "page-order-received" attribute. Furthermore, side one of each Media 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 of the "page-order-received" attribute. Furthermore, side one of each Media Sheet MUST be delivered face down to the output bin or finishing device.

**'system-specified'**: The Printer selects the most efficient delivery order based on other Job Template attributes supplied by the Client, such as "finishings", "finishings-col", "page-order-received", and "sides".

This attribute is often used in conjunction with online and offline finishing devices. The intent is to be able to deliver the Media Sheets in either the order of the Input Pages or in the reverse of that order.

### 5.2.15 presentation-direction-number-up (type2 keyword)

This DEPRECATED attribute specifies the order that the Printer places Input Pages with the "number-up" attribute [STD92]. This attribute is especially useful to control the presentation direction in languages or multi-lingual documents that have more than one presentation direction but may be used with any language. For example, Japanese text on pages can have a presentation direction that is either top-to-bottom-right-to-left or left-to-right-top-to-bottom. Similarly, a mixed English and Hebrew document can have a presentation direction that is either left-to-right-top-to-bottom or right-to-left-top-to-bottom. This attribute allows the Client to specify the placement of Input Pages on Impressions to mirror the direction of the text on pages.

Note: There is no replacement for "presentation-direction-number-up". While "number-up" does not specify an order, existing implementations layout Input Pages from left to right and top to bottom as viewed by a human reader.

Table 9 below shows the standard keyword values. The name of each attribute value suggests the order of laying out Input Pages on an Impression when a human reader is holding the sheet in the proper orientation, i.e., oriented so text is oriented for normal reading. For each 'toxxx-toyyy' value, the images are placed according to the 'toxxx' direction, and then according to the 'toyyy' direction, and the first image is placed in the corner diagonally opposite the 'xxx-yyy' corner. For example, 'tright-tobottom' starts in the upper-left corner which is diagonally opposite the 'right-bottom' corner. The images are placed from left to right in a line, and the line progression is from top to bottom.

Unlike other Job Template attributes, the coordinate system for this attribute is relative to the orientation of the Input Pages. The reason that this attribute has a relative coordinate system is that the Client may not know what the orientation of the document actually is, especially if the Client did not generate the document.

The Printer determines the Document orientation in the following way:

1. If the Client supplies the "orientation-requested" Job Template attribute [STD92], that attribute specifies the orientation.
2. If the Client doesn't supply the "orientation-requested" attribute and the Printer is able to determine the orientation by inspecting the Document, that is the orientation.
3. If the Client doesn't supply the "orientation-requested" attribute and the Printer is unable to determine the orientation by inspecting the Document, the orientation







is the value specified by the “orientation-requested-default” Printer Description attribute [STD92].

The orientation is used by the “presentation-direction-number-up” attribute for laying out pages on the Impression as follows:

1. If the value of the “number-up” attribute is a power of 4, e.g., 1, 4, or 16, the orientation is used as-is.
2. If the value of the “number-up” attribute is 2 times the power of 4, e.g., 2 and 8, the orientation used for layout is:
  - a. ‘landscape’ if the Document orientation is ‘portrait’;
  - b. ‘portrait’ if the Document orientation is ‘landscape’;
  - c. ‘reverse-landscape’ if the Document orientation is ‘reverse-portrait’; and
  - d. ‘reverse-portrait’ if the Document orientation is ‘reverse-landscape’
3. If the value of “number-up” is any other value, e.g., 3, 6, or 12, the orientation used for layout is implementation-defined.

**Table 9 - Standard Values for the “presentation direction” Attribute**

Value	Portrait	Landscape	Reverse-Landscape	Reverse-Portrait
'toright-tobottom'				
'tobottom-toright'				
'toleft-tobottom'				
'tobottom-toleft'				
'toright-totop'				
'totop-toright'				
'toleft-totop'				

Value	Portrait	Landscape	Reverse-Landscape	Reverse-Portrait
'totopt-toleft'				

### 5.2.16 separator-sheets (collection)

This REQUIRED attribute specifies when Separator Sheets are printed between Sets in the Job. Separator Sheets can contain Printer-generated content or be blank Media Sheets. Table 10 lists the member attributes.

The Client supplies either the "media" or "media-col" member attribute. A Printer receiving a request that contains both member attributes MUST reject the request, return the 'client-error-conflicting-attributes' status code, and return the "separator-sheets" attribute in the unsupported attributes group.

Table 10 - "separator-sheets" Member Attributes

Member Attribute	Printer Conformance
separator-sheets-type (type2 keyword   name(MAX))	REQUIRED
media (type2 keyword   name(MAX))	REQUIRED
media-col (collection)	REQUIRED

#### 5.2.16.1 separator-sheets-type (type2 keyword | name(MAX))

This REQUIRED member attribute specifies the type of Separator Sheets to use. Standard keyword values are:

**'none'**: No Separator Sheets are delivered with the printed output.

**'slip-sheets'**: A Separator Sheet is printed between each Set of the Job.

**'start-sheet'**: A Separator Sheet is printed to indicate the start of each Set of the Job.

**'end-sheet'**: A Separator Sheet is printed to indicate the end of each Set of the Job.

**'both-sheets'**: Separator Sheets are printed to indicate both the start and end of each Set of the Job.

For example, a Job is created consisting of a single document, with the value of the "copies" attribute set to '3', the value of "job-sheets" attribute set to 'job-both-sheets', and the value of the "separator-sheets-type" attribute set to 'slip-sheets'. If each of the three Sets is denoted by (J1), (J2), (J3), a Job Sheet is denoted by X, and a Separator Sheet is denoted by S, then the delivered output would be:

X (J1) S (J2) S (J3) X.

If the value of the “separator-sheets-type” is ‘start-sheet’ instead, then the delivered output would be:

X S (J1) S (J2) S (J3) X

### 5.2.16.2 media (type2 keyword | name(MAX))

This REQUIRED member attribute specifies the media to use for the Separator Sheets.

### 5.2.16.3 media-col (collection)

This REQUIRED member attribute specifies the media to use for the Separator Sheets.

### 5.2.17 x-image-position (type2 keyword)

This REQUIRED attribute causes the specified point of the Finished Page Image to be offset to a specified location with respect to the Imposition Template as shown in Figure 3. One standard value causes the Finished Page Image to be centered along the x-axis on the Impression to which it is applied. Two other standard values specify that the location is co-incident with the specified edge of the printable area by moving the image parallel to the x-axis on the Impression to which it is applied.

Standard keyword values are:

**'none'**: Place the Finished Page Image wherever the print data specifies on the medium.

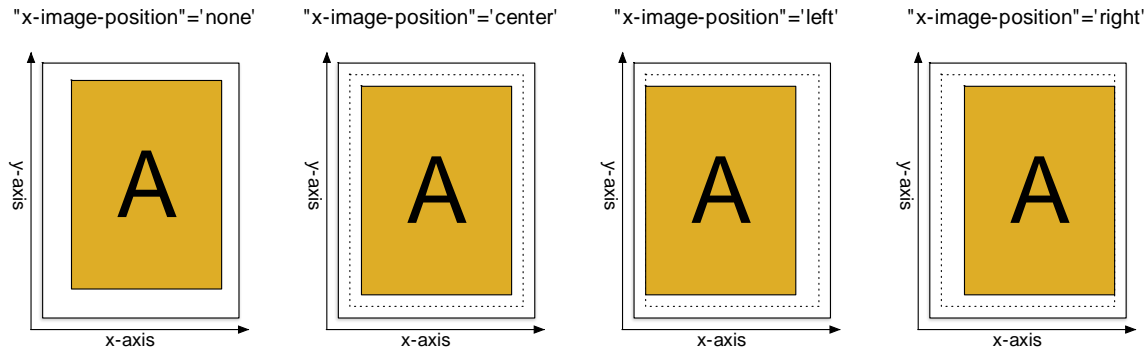
**'center'**: Center the Finished Page Image between the physical edges of the medium by moving the Finished Page Image in a direction parallel to the x-axis

**'left'**: Position the left edge of the Finished Page Image so that it is co-incident with the left edge of the printable area of the medium.

**'right'**: Position the right edge of the Finished Page Image so that it is co-incident with the right edge of the printable area of the medium.

Note: the ‘center’ value is centered with respect to the physical edges of the medium rather than the printable area of it because the printable area may have different left and right margins. If this specification defined two separate attributes, one for values that are medium-relative and one for values that are relative to printable area, the rules for defaulting would be too complicated.

Figure 7 shows the effect of different values on the location of the printed Finished Page Image.



**Figure 7 - "x-image-position" Values**

**5.2.18 x-image-shift (integer(MIN:MAX))**

This REQUIRED attribute causes the Finished Page Image (whether it will be on the front side or back side of a sheet of the Finished Document) to be offset in position with respect to the Imposition Template as shown in Figure 3. The direction of shift MUST be along the x-axis of the Coordinate System (see section 4.1) with respect to the Imposition Template. The sign of the value indicates the direction of the shift.

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

**5.2.19 x-side1-image-shift (integer(MIN:MAX))**

This REQUIRED attribute causes each Finished Page Image that would be placed on the front side of a Media Sheet to be offset in position with respect to the Imposition Template as shown in Figure 3. The direction MUST be along the x-axis of the Coordinate System (see section 4.1) with respect to the Imposition Template. 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 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' or imposition has equivalent behavior).

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

**5.2.20 x-side2-image-shift (integer(MIN:MAX))**

This REQUIRED attribute causes a Finished Page Image that would be placed on the back side of a Media Sheet to be offset in position with respect to the Imposition Template as shown in Figure 3. The direction of shift MUST be along the x-axis of the Coordinate System (see section 4.1) with respect to the Imposition Template. 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 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' or imposition has equivalent behavior).

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

### 5.2.21 y-image-position (type2 keyword)

This REQUIRED attribute causes the specified point of the Finished Page Image to be offset to a specified location with respect to the Imposition Template as shown in Figure 3. One standard value causes the Finished Page Image to be centered along the y-axis on the media to which it is applied. Two other standard values specify that the location is co-incident with the specified edge of the printable area by moving the image parallel to the y-axis on the media to which it is applied.

Standard keyword values are:

**'none'**: Place the Finished Page Image wherever the print data specifies on the medium.

**'center'**: Center the Finished Page Image between the physical edges of the medium by moving the Impression in the direction parallel to the y-axis

**'top'**: Position the top edge of the Finished Page Image so that it is co-incident with the top edge of the printable area of the medium.

**'bottom'**: Position the bottom edge of the Finished Page Image so that it is co-incident with the bottom edge of the printable area of the medium.

Figure 8 shows the effect of different values on the location of the printed Finished Page Image.

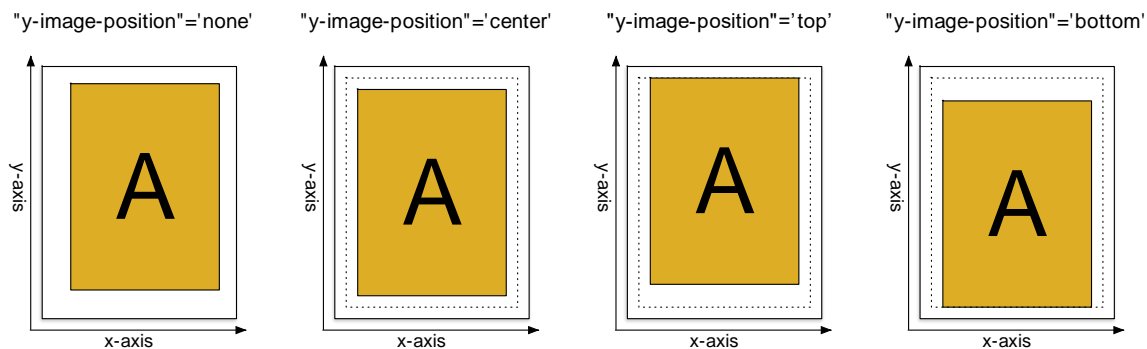


Figure 8 - "y-image-position" Values

### **5.2.22 y-image-shift (integer(MIN:MAX))**

This REQUIRED attribute causes the Finished Page Image (whether it will be on the front side or back side of a sheet of the Finished Document) to be offset in position with respect to the Imposition Template as shown in Figure 3. The direction of shift MUST be along the y-axis of the Coordinate System (see section 4.1) with respect to the Imposition Template. The sign of the value indicates the direction of the shift.

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

### **5.2.23 y-side1-image-shift (integer(MIN:MAX))**

This REQUIRED attribute causes each Finished Page Image that would be placed on the front side of a Media Sheet to be offset in position with respect to the Imposition Template as shown in Figure 3. The direction of shift MUST be along the y-axis of the Coordinate System (see section 4.1) with respect to the Imposition Template. 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 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' or imposition has equivalent behavior).

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

### **5.2.24 y-side2-image-shift (integer(MIN:MAX))**

This REQUIRED attribute causes each Finished Page Image that would be placed on the back side of a Media Sheet to be offset in position with respect to the Imposition Template as shown in Figure 3. The direction of shift MUST be along the y-axis of the Coordinate System (see section 4.1) with respect to the Imposition Template. 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 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' or imposition has equivalent behavior).

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

## 5.3 Printer Description Attributes

Table 11 lists the new Printer Description attributes.

**Table 11 - Printer Description Attributes**

<b>Attribute</b>	<b>Printer Conformance</b>	<b>Reference</b>
cover-back-default (collection   no-value)	C. REQUIRED	Section 5.3.1
cover-back-supported (1setOf keyword)	C. REQUIRED	Section 5.3.2
cover-front-default (collection   no-value)	C. REQUIRED	Section 5.3.3
cover-front-supported (1setOf keyword)	C. REQUIRED	Section 5.3.4
cover-type-supported (1setOf type keyword)	C. REQUIRED	Section 5.3.5
force-front-side-supported (rangeOfInteger(1:MAX))	C. REQUIRED	Section 5.3.6
image-orientation-default (type2 enum)	REQUIRED	Section 5.3.7
image-orientation-supported (1setOf type2 enum)	REQUIRED	Section 5.3.8
imposition-template-default (type2 keyword   name(MAX))	C. REQUIRED	Section 5.3.9
imposition-template-supported (1setOf (type2 keyword   name(MAX)))	C. REQUIRED	Section 5.3.10
insert-count-supported (rangeOfInteger(0:MAX))	REQUIRED	Section 5.3.11
insert-sheet-default (1setOf collection   no-value)	REQUIRED	Section 5.3.12
insert-sheet-supported (1setOf keyword)	REQUIRED	Section 5.3.13
job-accounting-output-bin-supported (1setOf (type2 keyword   name(MAX)))	DEPRECATED	Section 5.3.14
job-accounting-sheets-default (collection   no-value)	DEPRECATED	Section 5.3.15
job-accounting-sheets-supported (1setOf keyword)	DEPRECATED	Section 5.3.16
job-accounting-sheets-type-supported (1setOf (type2 keyword   name(MAX)))	DEPRECATED	Section 5.3.17
job-complete-before-supported (1setOf (type2 keyword   name(MAX)))	C. REQUIRED	Section 5.3.18
job-complete-before-time-supported (boolean)	C. REQUIRED	Section 5.3.19
job-error-sheet-default (collection   no-value)	REQUIRED	Section 5.3.20
job-error-sheet-supported (1setOf keyword)	REQUIRED	Section 5.3.21
job-error-sheet-type-supported (1setOf (type2 keyword   name(MAX)))	REQUIRED	Section 5.3.22
job-error-sheet-when-supported (1setOf type2 keyword)	REQUIRED	Section 5.3.23
job-message-to-operator-supported (boolean)	REQUIRED	Section 5.3.24
job-phone-number-default (uri   no-value)	C. REQUIRED	Section 5.3.25
job-phone-number-scheme-supported (1setOf uriScheme)	C. REQUIRED	Section 5.3.26
job-phone-number-supported (boolean)	C. REQUIRED	Section 5.3.27
job-recipient-name-supported (boolean)	C. REQUIRED	Section 5.3.28

Attribute	Printer Conformance	Reference
job-sheet-message-supported (boolean)	REQUIRED	Section <b>Error! Reference source not found.</b>
presentation-direction-number-up-default (type2 keyword   no-value)	DEPRECATED	Section 5.3.29
presentation-direction-number-up-supported (1setOf type2 keyword)	DEPRECATED	Section 5.3.30
separator-sheets-default (collection   no-value)	REQUIRED	Section 5.3.31
separator-sheets-supported (1setOf keyword)	REQUIRED	Section 5.3.32
separator-sheets-type-supported (1setOf (type2 keyword   name(MAX)))	REQUIRED	Section 5.3.33
x-image-position-default (type2 keyword   no-value)	REQUIRED	Section 5.3.34
x-image-position-supported (1setOf type2 keyword)	REQUIRED	Section 5.3.35
x-image-shift-default (integer(MIN:MAX) : no-value)	REQUIRED	Section 5.3.36
x-image-shift-supported (rangeOfInteger(MIN:MAX))	REQUIRED	Section 5.3.37
x-side1-image-shift-default (integer(MIN:MAX) : no-value)	REQUIRED	Section 5.3.38
x-side2-image-shift-default (integer(MIN:MAX) : no-value)	REQUIRED	Section 5.3.39
y-image-position-default (type2 keyword   no-value)	REQUIRED	Section 5.3.40
y-image-position-supported (1setOf type2 keyword)	REQUIRED	Section 5.3.41
y-image-shift-default (integer(MIN:MAX)   no-value)	REQUIRED	Section 5.3.42
y-image-shift-supported (rangeOfInteger(MIN:MAX))	REQUIRED	Section 5.3.43
y-side1-image-shift-default (integer(MIN:MAX) : no-value)	REQUIRED	Section 5.3.44
y-side2-image-shift-default (integer(MIN:MAX) : no-value)	REQUIRED	Section 5.3.45

### 5.3.1 cover-back-default (collection | no-value)

This CONDITIONALLY REQUIRED attribute contains the default value of the "cover-back" Job Template attribute (section 5.2.1). This attribute MUST be supported if the "cover-back" attribute is supported.

### 5.3.2 cover-back-supported (1setOf keyword)

This CONDITIONALLY REQUIRED attribute lists the supported "cover-back" Job Template attribute (section 5.2.1) member attributes. This attribute MUST be supported if the "cover-back" attribute is supported.



### **5.3.3 cover-front-default (collection | no-value)**

This CONDITIONALLY REQUIRED attribute contains the default value of the "cover-front" Job Template attribute (section 5.2.1). This attribute MUST be supported if the "cover-front" attribute is supported.

### **5.3.4 cover-front-supported (1setOf keyword)**

This CONDITIONALLY REQUIRED attribute lists the supported "cover-front" Job Template attribute (section 5.2.1) member attributes. This attribute MUST be supported if the "cover-front" attribute is supported.

### **5.3.5 cover-type-supported (1setOf type2 keyword)**

This CONDITIONALLY REQUIRED attribute lists the supported values of the "cover-type" member attribute (section 5.2.1.3). Printers that support the "cover-type" member attribute MUST support this attribute.

### **5.3.6 force-front-side-supported (rangeOfInteger(1:MAX))**

This CONDITIONALLY REQUIRED attribute indicates the range of supported "force-front-side" Job Template attribute (section 5.2.2) values. Printers MUST support this attribute if the "force-front-side" attribute is supported.

### **5.3.7 image-orientation-default (type2 enum)**

This REQUIRED attribute contains the default value of the "image-orientation" attribute (section 5.2.3).

### **5.3.8 image-orientation-supported (1setOf type2 enum)**

This REQUIRED attribute lists the supported values of the "image-orientation" attribute (section 5.2.3).

### **5.3.9 imposition-template-default (type2 keyword | name(MAX) | no-value)**

This CONDITIONALLY REQUIRED attribute contains the default value of the "imposition-template" Job Template attribute (section 5.2.4). Printers MUST support this attribute if the "imposition-template" attribute is supported.

### **5.3.10 imposition-template-supported (1setOf (type2 keyword | name(MAX)))**

This CONDITIONALLY REQUIRED attribute lists the supported values of the "imposition-template" Job Template attribute (section 5.2.4). Printers MUST support this attribute if the "imposition-template" attribute is supported.

**5.3.11 insert-count-supported (rangeOfInteger(0:MAX))**

This REQUIRED attribute indicates the supported range of values of the "insert-count" member attribute (section 5.2.5.2).

**5.3.12 insert-sheet-default (1setOf collection | no-value)**

This REQUIRED attribute contains the default value of the "insert-sheet" Job Template attribute (section 0).

**5.3.13 insert-sheet-supported (1setOf keyword)**

This REQUIRED attribute lists the supported member attributes of the "insert-sheet" Job Template attribute (section 0).

**5.3.14 job-accounting-output-bin-supported (1setOf (type2 keyword | name(MAX)))**

This DEPRECATED attribute lists the supported output bins for Job accounting sheets. Printers that support the "job-accounting-output-bin" attribute (section 5.2.6.4) MUST support this attribute.

**5.3.15 job-accounting-sheets-default (collection | no-value)**

This DEPRECATED attribute contains the default value of the "job-accounting-sheets" Job Template attribute (section 5.2.6). Printers MUST support this attribute if the "job-accounting-sheets" attribute is supported.

**5.3.16 job-accounting-sheets-supported (1setOf keyword)**

This DEPRECATED attribute lists the supported member attributes of the "job-accounting-sheets" Job Template attribute (section 5.2.6). Printers MUST support this attribute if the "job-accounting-sheets" attribute is supported.

**5.3.17 job-accounting-sheets-type-supported (1setOf (type2 keyword | name(MAX)))**

This DEPRECATED attribute lists the supported values of the "job-accounting-sheets-type" member attribute (section 5.2.6.1). Printers that support the "job-accounting-sheets" attribute (section 5.2.6) MUST support this attribute.

**5.3.18 job-complete-before-supported (1setOf (type2 keyword | name(MAX)))**

This CONDITIONALLY REQUIRED attribute lists the supported values of the "job-complete-before" Job Template attribute (section 5.2.7). Printers that support the "job-complete-before" attribute MUST support this attribute.

**5.3.19 job-complete-before-time-supported (boolean)**

This CONDITIONALLY REQUIRED attribute indicates whether the "job-complete-before-time" Job Template attribute (section 5.2.8). Printers that support the "job-complete-before-time" attribute MUST support this attribute.

**5.3.20 job-error-sheet-default (collection | no-value)**

This REQUIRED attribute contains the default value of the "job-error-sheet" Job Template attribute (section 5.2.9). Printers that support the "job-error-sheet" attribute MUST support this attribute.

**5.3.21 job-error-sheet-supported (1setOf keyword)**

This REQUIRED attribute lists the supported member attributes of the "job-error-sheet" Job Template attribute (section 5.2.9). Printers that support the "job-error-sheet" attribute MUST support this attribute.

**5.3.22 job-error-sheet-type-supported (1setOf (type2 keyword | name(MAX)))**

This REQUIRED attribute lists the supported values of the "job-error-sheet-type" member attribute (section 5.2.9.1). Printers that support the "job-error-sheet" Job Template attribute (section 5.2.9) MUST support this attribute.

**5.3.23 job-error-sheet-when-supported (1setOf type2 keyword)**

This REQUIRED attribute lists the supported values of the "job-error-sheet-when" member attribute (section 5.2.9.2).

**5.3.24 job-message-to-operator-supported (boolean)**

This REQUIRED attribute indicates whether the "job-message-to-operator" Job Template attribute (section 5.2.10) is supported.

**5.3.25 job-phone-number-default (uri | no-value)**

This CONDITIONALLY REQUIRED attribute contains the default value for the "job-phone-number" Job Template attribute (section 5.2.11). A Printer that supports the "job-phone-number" attribute MUST support this attribute.

**5.3.26 job-phone-number-scheme-supported (1setOf uriScheme)**

This CONDITIONALLY REQUIRED attribute lists the URI schemes that are supported for the "job-phone-number" Job Template attribute (section 5.2.11). A Printer that supports the "job-phone-number" attribute MUST support this attribute with (at least) the value 'tel'.

**5.3.27 job-phone-number-supported (boolean)**

This CONDITIONALLY REQUIRED attribute indicates whether the "job-phone-number" Job Template attribute (section 5.2.11) is supported. A Printer that supports the "job-phone-number" attribute MUST support this attribute with a value of 'true'.

**5.3.28 job-recipient-name-supported (boolean)**

This CONDITIONALLY REQUIRED attribute indicates whether the "job-recipient-name" Job Template attribute (section 5.2.12) is supported. A Printer that supports the "job-recipient-name" attribute MUST support this attribute with a value of 'true'.

**5.3.29 presentation-direction-number-up-default (type2 keyword | no-value)**

This DEPRECATED attribute contains the default value of the "presentation-direction-number-up" Job Template attribute (section 5.2.15). Printers that support the "presentation-direction-number-up" attribute MUST support this attribute.

**5.3.30 presentation-direction-number-up-supported (1setOf type2 keyword)**

This DEPRECATED attribute lists the supported values of the "presentation-direction-number-up" Job Template attribute (section 5.2.15). Printers that support the "presentation-direction-number-up" attribute MUST support this attribute.

**5.3.31 separator-sheets-default (collection | no-value)**

This REQUIRED attribute contains the default value of the "separator-sheets" Job Template attribute (section 5.2.16). Printers MUST support the same member attributes for this default collection attribute as it supports for the corresponding "separator-sheets" attribute.

**5.3.32 separator-sheets-supported (1setOf keyword)**

This REQUIRED attribute lists the supported member attributes of the "separator-sheets" Job Template attribute (section 5.2.16).

**5.3.33 separator-sheets-type-supported (1setOf (type2 keyword | name(MAX)))**

This REQUIRED attribute lists the supported values of the "separator-sheets-type" member attribute (section 5.2.16.1).

**5.3.34 x-image-position-default (type2 keyword | no-value)**

This REQUIRED attribute contains the default value of the "x-image-position" Job Template attribute (section 5.2.17).

**5.3.35 x-image-position-supported (1setOf type2 keyword)**

This REQUIRED attribute lists the supported values of the "x-image-position" Job Template attribute (section 5.2.17).

**5.3.36 x-image-shift-default (integer(MIN:MAX) | no-value)**

This REQUIRED attribute contains the default value of the "x-image-shift" Job Template attribute (section 5.2.18).

**5.3.37 x-image-shift-supported (rangeOfInteger(MIN:MAX))**

This REQUIRED attribute indicates the range of supported values of the "x-image-shift" Job Template attribute (section 5.2.18).

**5.3.38 x-side1-image-shift-default (integer(MIN:MAX) | no-value)**

This REQUIRED attribute contains the default value of the "x-side1-image-shift" Job Template attribute (section 5.2.19).

**5.3.39 x-side2-image-shift-default (integer(MIN:MAX) | no-value)**

This REQUIRED attribute contains the default value of the "x-side2-image-shift" Job Template attribute (section 5.2.20).

**5.3.40 y-image-position-default (type2 keyword | no-value)**

This REQUIRED attribute contains the default value of the "y-image-position" Job Template attribute (section 5.2.21).

**5.3.41 y-image-position-supported (1setOf type2 keyword)**

This REQUIRED attribute lists the supported values of the "y-image-position" Job Template attribute (section 5.2.21).

**5.3.42 y-image-shift-default (integer(MIN:MAX) | no-value)**

This REQUIRED attribute contains the default value of the "y-image-shift" Job Template attribute (section 5.2.22).

**5.3.43 y-image-shift-supported (rangeOfInteger(MIN:MAX))**

This REQUIRED attribute indicates the range of supported values of the "y-image-shift" Job Template attribute (section 5.2.22).

### **5.3.44 y-side1-image-shift-default (integer(MIN:MAX) | no-value)**

This REQUIRED attribute contains the default value of the "y-side1-image-shift" Job Template attribute (section 5.2.23).

### **5.3.45 y-side2-image-shift-default (integer(MIN:MAX) | no-value)**

This REQUIRED attribute contains the default value of the "y-side2-image-shift" Job Template attribute (section 5.2.24).

## **6. New Values for Existing Attributes**

### **6.1 job-state-reasons (1setOf type2 keyword)**

This specification defines the 'resources-are-not-supported' value for the "job-state-reasons" Job Status attribute [STD92]. When present, 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 can be detected when the Job is accepted, or subsequently while the Job is pending or processing, depending on implementation. The Job can:

1. Remain in its current state,
2. Be moved to the 'pending-held' state, depending on implementation and/or Job scheduling policy, or
3. Be scheduled normally, but the Printer is put into the 'stopped' state when the Job is attempted to be processed on the Printer.

## **7. Obsolete Attributes**

### **7.1 Obsolete Job and Document Template Attributes**

This specification makes the "page-order-received (type2 keyword)" Job and Document Template attribute [PWG5100.3-2001] OBSOLETE because it causes interoperability issues with any IPP attribute that specifies page numbers or ranges.

### **7.2 Obsolete Job Status Attributes**

This specification makes the "current-page-order (type2 keyword)" Job Status attribute [PWG5100.3-2001] OBSOLETE because IPP does not expose the implementation details of Document processing and because many implementations do not change Document Data in-place.

## 7.3 Obsolete Printer Description Attributes

Table 12 lists the Printer Description attributes from the previous version of this specification [PWG5100.3-2001] which are now OBSOLETE.

**Table 12 - OBSOLETE Printer Description Attributes**

Attribute	Notes
insert-after-page-number-supported (rangeOfInteger(0:MAX))	Unnecessary
job-accounting-output-bin-default (type2 keyword   name(MAX))	Unnecessary
job-recipient-name-default (name(MAX))	Unnecessary
page-order-received-default (type2 keyword)	See section 7.1
page-order-received-supported (1setOf type2 keyword)	See section 7.1
user-defined-values-supported (1setOf keyword)	Unnecessary
x-side1-image-shift-supported (rangeOfInteger(MIN:MAX))	Unnecessary
x-side2-image-shift-supported (rangeOfInteger(MIN:MAX))	Unnecessary
y-side1-image-shift-supported (rangeOfInteger(MIN:MAX))	Unnecessary
y-side2-image-shift-supported (rangeOfInteger(MIN:MAX))	Unnecessary

## 8. Conformance Requirements

### 8.1 Printer Conformance Requirements

In order for a Printer to claim conformance to this specification, a Printer **MUST** support:

1. The required attributes and values defined in section 5;
2. The additional values defined in section 6;
3. The internationalization considerations defined in section 9; and
4. The security considerations defined in section 10.

Printer **MUST NOT** support the OBSOLETE attributes listed in section 7.

### 8.2 Client Conformance Requirements

In order for a Client to claim conformance to this specification, a Client **MUST** support:

1. The required attributes and values defined in section 5;
2. The additional values defined in section 6;
3. The internationalization considerations defined in section 9; and
4. The security considerations defined in section 10.

## 9. Internationalization Considerations

For interoperability and basic support for multiple languages, conforming implementations **MUST** support:

1. The Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8) [STD63] encoding of Unicode [UNICODE] [ISO10646]; and
1. The Unicode Format for Network Interchange [RFC5198] which requires transmission of well-formed UTF-8 strings and recommends transmission of normalized UTF-8 strings in Normalization Form C (NFC) [UAX15].

Unicode NFC is defined as the result of performing Canonical Decomposition (into base characters and combining marks) followed by Canonical Composition (into canonical composed characters wherever Unicode has assigned them).

WARNING – Performing normalization on UTF-8 strings received from Clients and subsequently storing the results (e.g., in Job objects) could cause false negatives in Client searches and failed access (e.g., to Printers with percent-encoded UTF-8 URIs now 'hidden').

Implementations of this specification SHOULD conform to the following standards on processing of human-readable Unicode text strings, see:

Unicode Bidirectional Algorithm [UAX9] – left-to-right, right-to-left, and vertical

Unicode Line Breaking Algorithm [UAX14] – character classes and wrapping

Unicode Normalization Forms [UAX15] – especially NFC for [RFC5198]

Unicode Text Segmentation [UAX29] – grapheme clusters, words, sentences

Unicode Identifier and Pattern Syntax [UAX31] – identifier use and normalization

Unicode Collation Algorithm [UTS10] – sorting

Unicode Locale Data Markup Language [UTS35] – locale databases

Implementations of this specification are advised to also review the following informational documents on processing of human-readable Unicode text strings:

Unicode Character Encoding Model [UTR17] – multi-layer character model

Unicode Character Property Model [UTR23] – character properties

Unicode Conformance Model [UTR33] – Unicode conformance basis

## 10. Security Considerations

The IPP extensions defined in this document require the same security considerations as defined in the Internet Printing Protocol/1.1 [STD92].



Implementations of this specification SHOULD conform to the following standard on processing of human-readable Unicode text strings, see:

Unicode Security Mechanisms [UTS39] – detecting and avoiding security attacks

Implementations of this specification are advised to also review the following informational document on processing of human-readable Unicode text strings:

Unicode Security FAQ [UNISECFAQ] – common Unicode security issues

## 11. IANA Considerations

### 11.1 Attribute Registrations

The attributes defined in this specification will be published by IANA according to the procedures in the Internet Printing Protocol/1.1 [STD92] in the following file:

<https://www.iana.org/assignments/ipp-registrations>

The registry entries will contain the following information:

Job Status attributes: -----	Reference -----
current-page-order(obsolete) (type2 keyword)	[PWG5100.3]
date-time-at-completed-estimated (dateTime   unknown)	[PWG5100.3]
date-time-at-processing-estimated (dateTime   unknown)	[PWG5100.3]
time-at-completed-estimated (integer(MIN:MAX)   unknown)	[PWG5100.3]
time-at-processing-estimated (integer(MIN:MAX)   unknown)	[PWG5100.3]
Job Template attributes: -----	Reference -----
cover-back(deprecated) (collection)	[PWG5100.3]
cover-type (type2 keyword   name(MAX))	[PWG5100.3]
media (type2 keyword   name(MAX))	[PWG5100.3]
media-col (collection)	[PWG5100.3]
cover-front(deprecated) (collection)	[PWG5100.3]
< member attributes are the same as "cover-back" >	[PWG5100.3]
force-front-side (1setOf integer(1:MAX))	[PWG5100.3]
image-orientation (type2 enum)	[PWG5100.3]
imposition-template (type2 keyword   name(MAX))	[PWG5100.3]
insert-sheet(deprecated) (1setOf collection)	[PWG5100.3]
insert-after-page-number (integer(0:MAX))	[PWG5100.3]
insert-count (integer(0:MAX))	[PWG5100.3]
media (type2 keyword   name(MAX))	[PWG5100.3]
media-col (collection)	[PWG5100.3]
job-accounting-sheets(deprecated) (collection)	[PWG5100.3]
job-accounting-output-bin (type2 keyword   name(MAX))	[PWG5100.3]
job-accounting-sheets-type (type2 keyword   name(MAX))	[PWG5100.3]
media (type2 keyword   name(MAX))	[PWG5100.3]
media-col (collection)	[PWG5100.3]

job-complete-before (type2 keyword   name(MAX))	[PWG5100.3]
job-complete-before-time (dateTime)	[PWG5100.3]
job-error-sheet (collection)	[PWG5100.3]
job-error-sheet-type (type2 keyword   name(MAX))	[PWG5100.3]
job-error-sheet-when (type2 keyword)	[PWG5100.3]
media (type2 keyword   name(MAX))	[PWG5100.3]
media-col (collection)	[PWG5100.3]
job-message-to-operator (text(MAX))	[PWG5100.3]
job-phone-number (uri)	[PWG5100.3]
job-recipient-name (name(MAX))	[PWG5100.3]
job-sheet-message (text(MAX))	[PWG5100.3]
media-input-tray-check(deprecated) (type2 keyword   name(MAX))	[PWG5100.3]
page-delivery (type2 keyword)	[PWG5100.3]
page-order-received(obsolete) (type2 keyword)	[PWG5100.3]
presentation-direction-number-up(deprecated) (type2 keyword)	[PWG5100.3]
separator-sheets (collection)	[PWG5100.3]
media (type2 keyword   name(MAX))	[PWG5100.3]
media-col (collection)	[PWG5100.3]
separator-sheets-type (type2 keyword   name(MAX))	[PWG5100.3]
x-image-position (type2 keyword)	[PWG5100.3]
x-image-shift (integer(MIN:MAX))	[PWG5100.3]
x-side1-image-shift (integer(MIN:MAX))	[PWG5100.3]
x-side2-image-shift (integer(MIN:MAX))	[PWG5100.3]
y-image-position (type2 keyword)	[PWG5100.3]
y-image-shift (integer(MIN:MAX))	[PWG5100.3]
y-side1-image-shift (integer(MIN:MAX))	[PWG5100.3]
y-side2-image-shift (integer(MIN:MAX))	[PWG5100.3]
 Printer Description attributes:	 Reference
-----	-----
cover-back-default(deprecated) (collection   no-value)	[PWG5100.3]
cover-back-supported(deprecated) (1setOf keyword)	[PWG5100.3]
cover-front-default(deprecated) (collection   no-value)	[PWG5100.3]
cover-front-supported(deprecated) (1setOf keyword)	[PWG5100.3]
cover-type-supported(deprecated) (1setOf type2 keyword)	[PWG5100.3]
force-front-side-supported (rangeOfInteger(1:MAX))	[PWG5100.3]
image-orientation-default (type2 enum)	[PWG5100.3]
image-orientation-supported (1setOf type2 enum)	[PWG5100.3]
imposition-template-default (type2 keyword   name(MAX))	[PWG5100.3]
imposition-template-supported (1setOf (type2 keyword   name(MAX)))	[PWG5100.3]
insert-after-page-number-supported(obsolete) (rangeOfInteger(0:MAX))	[PWG5100.3]
insert-count-supported(deprecated) (rangeOfInteger(0:MAX))	[PWG5100.3]
insert-sheet-default(deprecated) (1setOf collection)	[PWG5100.3]
insert-sheet-supported(deprecated) (1setOf keyword)	[PWG5100.3]
job-account-id-default (name(MAX)   no-value)	[PWG5100.3]
job-account-id-supported (boolean)	[PWG5100.3]
job-accounting-output-bin-default(obsolete) (type2 keyword   name(MAX))	[PWG5100.3]
job-accounting-output-bin-supported(deprecated) (1setOf (type2 keyword   name(MAX)))	[PWG5100.3]
job-accounting-sheets-default(deprecated) (collection)	[PWG5100.3]

```
job-accounting-sheets-supported(deprecated) (1setOf keyword)
[PWG5100.3]
job-accounting-sheets-type-supported(deprecated) (1setOf (type2 keyword |
name(MAX)))
[PWG5100.3]
job-accounting-user-id-default (name(MAX))
[PWG5100.3]
job-accounting-user-id-supported (boolean)
[PWG5100.3]
job-complete-before-supported (1setOf (type2 keyword | name(MAX)))
[PWG5100.3]
job-error-sheet-default (collection)
[PWG5100.3]
job-error-sheet-supported (1setOf keyword)
[PWG5100.3]
job-error-sheet-type-supported (1setOf (type2 keyword | name(MAX)))
[PWG5100.3]
job-error-sheet-when-supported (1setOf type2 keyword)
[PWG5100.3]
job-message-to-operator-supported (boolean)
[PWG5100.3]
job-phone-number-default (uri | no-value)
[PWG5100.3]
job-phone-number-scheme-supported (1setOf uriScheme)
[PWG5100.3]
job-phone-number-supported (boolean)
[PWG5100.3]
job-recipient-name-default(obsolete) (name(MAX) | no-value)
[PWG5100.3]
job-recipient-name-supported (boolean)
[PWG5100.3]
job-sheet-message-supported (boolean)
[PWG5100.3]
job-sheets-col-default (collection)
[PWG5100.3]
job-sheets-col-supported (1setOf keyword)
[PWG5100.3]
page-delivery-default (type2 keyword)
[PWG5100.3]
page-delivery-supported (1setOf type2 keyword)
[PWG5100.3]
page-order-received-default(obsolete) (type2 keyword)
[PWG5100.3]
page-order-received-supported(obsolete) (1setOf type2 keyword)
[PWG5100.3]
presentation-direction-number-up-default(deprecated) (type2 keyword)
[PWG5100.3]
presentation-direction-number-up-supported(deprecated) (1setOf type2
keyword)
[PWG5100.3]
separator-sheets-default (collection)
[PWG5100.3]
separator-sheets-supported (1setOf keyword)
[PWG5100.3]
user-defined-values-supported(obsolete) (1setOf keyword)
[PWG5100.3]
x-image-position-default (type2 keyword)
[PWG5100.3]
x-image-position-supported (1setOf type2 keyword)
[PWG5100.3]
x-image-shift-default (integer(MIN:MAX))
[PWG5100.3]
x-image-shift-supported (rangeOfInteger(MIN:MAX))
[PWG5100.3]
x-side1-image-shift-default (integer(MIN:MAX))
[PWG5100.3]
x-side1-image-shift-supported(obsolete) (rangeOfInteger(MIN:MAX))
[PWG5100.3]
x-side2-image-shift-default (integer(MIN:MAX))
[PWG5100.3]
x-side2-image-shift-supported(obsolete) (rangeOfInteger(MIN:MAX))
[PWG5100.3]
y-image-position-default (type2 keyword)
[PWG5100.3]
y-image-position-supported (1setOf type2 keyword)
[PWG5100.3]
y-image-shift-default (integer(MIN:MAX))
[PWG5100.3]
y-image-shift-supported (rangeOfInteger(MIN:MAX))
[PWG5100.3]
y-side1-image-shift-default (integer(MIN:MAX))
[PWG5100.3]
y-side1-image-shift-supported(obsolete) (rangeOfInteger(MIN:MAX))
[PWG5100.3]
y-side2-image-shift-default (integer(MIN:MAX))
[PWG5100.3]
y-side2-image-shift-supported(obsolete) (rangeOfInteger(MIN:MAX))
[PWG5100.3]
```

## 11.2 Type2 enum Registrations

The enum values defined in this specification will be published by IANA according to the procedures in the Internet Printing Protocol/1.1 [STD92] in the following file:

<https://www.iana.org/assignments/ipp-registrations>

The registry entries will contain the following information:

Attributes (attribute syntax)	Reference
Enum Value    Enum Symbolic Name	
-----    -----	-----
image-orientation (type2 enum)	[PWG5100.3]
< any "orientation-requested" value >	[PWG5100.3]
image-orientation-default (type2 enum)	[PWG5100.3]
< any "orientation-requested" value >	[PWG5100.3]
image-orientation-supported (1setOf type2 enum)	[PWG5100.3]
< any "orientation-requested" value >	[PWG5100.3]

## 11.3 Type2 keyword Registrations

The keyword values defined in this specification will be published by IANA according to the procedures in the Internet Printing Protocol/1.1 [STD92] in the following file:

<https://www.iana.org/assignments/ipp-registrations>

The registry entries will contain the following information:

Attributes (attribute syntax)	Reference
Keyword Attribute Value	
-----	-----
cover-type(deprecated) (type2 keyword)	[PWG5100.3]
no-cover	[PWG5100.3]
print-back	[PWG5100.3]
print-both	[PWG5100.3]
print-front	[PWG5100.3]
print-none	[PWG5100.3]
imposition-template (type2 keyword   name(MAX))	[PWG5100.3]
banner	[PWG5100.3]
banner-compressed	[PWG5100.3]
booklet	[PWG5100.3]
none	[PWG5100.3]
position_center_bottom	[PWG5100.3]
position_center_middle	[PWG5100.3]
position_center_top	[PWG5100.3]
position_left_bottom	[PWG5100.3]
position_left_middle	[PWG5100.3]
position_left_top	[PWG5100.3]
position_right_bottom	[PWG5100.3]
position_right_middle	[PWG5100.3]
position_right_top	[PWG5100.3]

same-up_2_2_3.5x5in	[PWG5100.3]
same-up_2_2_104x148mm	[PWG5100.3]
same-up_4_3_2x3.5in	[PWG5100.3]
signature (deprecated)	[PWG5100.3]
tile	[PWG5100.3]
job-accounting-output-bin (deprecated) (type2 keyword   name (MAX))	[PWG5100.3]
< any "output-bin" value >	[PWG5100.3]
job-accounting-sheets-type (deprecated) (type2 keyword   name (MAX))	[PWG5100.3]
none	[PWG5100.3]
standard	[PWG5100.3]
job-complete-before (type2 keyword   name (MAX))	[PWG5100.3]
day-time	[PWG5100.3]
evening	[PWG5100.3]
night	[PWG5100.3]
none	[PWG5100.3]
second-shift	[PWG5100.3]
third-shift	[PWG5100.3]
weekend	[PWG5100.3]
job-complete-before-supported (1setOf (type2 keyword   name (MAX)))	[PWG5100.3]
< any "job-complete-before" value >	[PWG5100.3]
job-error-sheet-type (type2 keyword   name (MAX))	[PWG5100.3]
none	[PWG5100.3]
standard	[PWG5100.3]
job-error-sheet-when (type2 keyword)	[PWG5100.3]
always	[PWG5100.3]
on-error	[PWG5100.3]
job-state-reasons (1setOf type2 keyword)	[STD92]
resources-are-not-supported	[PWG5100.3]
page-delivery (type2 keyword)	[PWG5100.3]
reverse-order-face-down	[PWG5100.3]
reverse-order-face-up	[PWG5100.3]
same-order-face-down	[PWG5100.3]
same-order-face-up	[PWG5100.3]
system-specified	[PWG5100.3]
separator-sheets-type (type2 keyword   name (MAX))	[PWG5100.3]
both-sheets	[PWG5100.3]
end-sheet	[PWG5100.3]
none	[PWG5100.3]
slip-sheets	[PWG5100.3]
start-sheet	[PWG5100.3]
x-image-position (type2 keyword)	[PWG5100.3]
center	[PWG5100.3]
left	[PWG5100.3]
none	[PWG5100.3]

right	[PWG5100.3]
y-image-position (type2 keyword)	[PWG5100.3]
bottom	[PWG5100.3]
center	[PWG5100.3]
none	[PWG5100.3]
top	[PWG5100.3]

## 12. Overview of Changes

### 12.1 IPP Production Printing Extensions v2.0

The following changes were made to the previous version of this specification [PWG5100.3-2001]:

- A new REQUIRED "image-orientation" Job Template attribute has been added to support rotation as well as shifting of Finished Page Images;
- New RECOMMENDED "date-time-at-completed-estimated", "date-time-at-processing-estimated", "time-at-completed-estimated", and "time-at-processing-estimated" Job Status attributes have been added to provide Job scheduling estimates;
- New RECOMMENDED "job-complete-before" and "job-complete-before-time" Job Template attributes have been added to allow a Client to specify when a Job needs to be finished;
- Finishing attributes have been moved to the IPP Finishings v3.0 specification [PWG5100.1];
- The "job-account-id", "job-accounting-user-id", "job-sheets-col", and "media-col" attributes have been moved to the IPP Job Extensions v2.0 specification [PWG5100.7];
- References to the original page overrides draft and attributes have been removed since that specification was withdrawn;
- The "job-error-sheet", "job-message-to-operator", "job-sheet-message", "page-delivery", "separator-sheets", "x-image-position", "x-image-shift", "x-side1-image-shift", "x-side2-image-shift", "y-image-position", "y-image-shift", "y-side1-image-shift", and "y-side2-image-shift" Job Template attributes and corresponding Printer Description attributes have been made REQUIRED;
- The "force-front-side", and "imposition-template" Job Template attributes have been made RECOMMENDED and the corresponding Printer Description attributes have been made CONDITIONALLY REQUIRED;

- The "media-col" member attribute is now REQUIRED for the "cover-back", "cover-front", "insert-sheet", "job-accounting-sheets", "job-error-sheet", and "separator-sheets" Job Template attributes;
- The "cover-back", "cover-front", "insert-sheet", and "job-accounting-sheets" Job Template attributes and corresponding Printer Description attributes have been DEPRECATED because they are no longer needed;
- The "media-input-tray-check" Job Template attribute has been DEPRECATED because the functionality is provided by the "media-source" member attribute of the "media-col" Job and Document Template attribute;
- The "presentation-direction-number-up" Job Template attribute and "presentation-direction-number-up-default" and "presentation-direction-number-up-supported" Printer Description attributes have been DEPRECATED because the functionality is typically provided by the Client operating system;
- The "page-order-received" Job and Document Template attribute has been made OBSOLETE because it causes interoperability issues;
- The "current-page-order" Job Status attribute has been made OBSOLETE because the parent attribute has been made OBSOLETE, IPP does not expose the implementation details of Document processing, and because many implementations do not change Document Data in-place;
- The "insert-after-page-number-supported" Printer Description attribute has been made OBSOLETE because it is unnecessary;
- The "job-accounting-output-bin-default" Printer Description attribute has been made OBSOLETE because it is unnecessary;
- The "job-recipient-name-default" Printer Description attribute has been made OBSOLETE because it is unnecessary;
- The "page-order-received-default" and "page-order-received-supported" Printer Description attributes have been made OBSOLETE because the corresponding Job and Document Template attribute is OBSOLETE; and
- The "user-defined-values-supported", "x-side1-image-offset-supported", "x-side2-image-offset-supported", "y-side1-image-offset-supported", "y-side2-image-offset-supported" Printer Description attributes have been made OBSOLETE because they are unnecessary.

## 13. References

### 13.1 Normative References

- [BCP14] S. Bradner, "Key words for use in RFCs to Indicate Requirement Levels", RFC 2119/BCP 14, March 1997, <https://datatracker.ietf.org/doc/html/bcp14>
- [ISO10646] "Information technology -- Universal Coded Character Set (UCS)", ISO/IEC 10646:2011
- [PWG5100.1] S. Kennedy, M. Sweet, "IPP Finishings v3.0 (FIN)", PWG 5100.1-2022, May 2022, <https://ftp.pwg.org/pub/pwg/candidates/cs-ippfinishings30-20220527-5100.1.pdf>
- [PWG5100.6] P. Zehler, R. Herriot, K. Ocke, "IPP: Page Overrides", PWG 5100.6-2003, October 2003, <https://ftp.pwg.org/pub/pwg/candidates/cs-ipppageoverride10-20031031-5100.6.pdf>
- [PWG5100.7] M. Sweet, "IPP Job Extensions v2.0 (JOBEXT)", PWG 5100-7-2019, August 2019, <https://ftp.pwg.org/pub/pwg/candidates/cs-ippjobext20-20190816-5100.7.pdf>
- [PWG5101.1] M. Sweet, R. Bergman, T. Hastings, "PWG Media Standardized Names v2.0 (MSN2)", PWG 5101.1-2013, March 2013, <https://ftp.pwg.org/pub/pwg/candidates/cs-pwgmsn20-20130328-5101.1.pdf>
- [RFC2806] A. Vaha-Sipila, "URLs for Telephone Calls", RFC 2806, April 2000, <https://datatracker.ietf.org/doc/html/rfc2806>
- [RFC5198] J. Klensin, M. Padlipsky, "Unicode Format for Network Interchange", RFC 5198, March 2008, <https://datatracker.ietf.org/doc/html/rfc5198>
- [STD63] F. Yergeau, "UTF-8, a transformation format of ISO 10646", RFC 3629/STD 63, November 2003, <https://datatracker.ietf.org/doc/html/std63>
- [STD68] D. Crocker, P. Overell, "Augmented BNF for Syntax Specifications: ABNF", RFC 5234/STDS 68, January 2008, <https://datatracker.ietf.org/doc/html/std68>
- [STD92] M. Sweet, I. McDonald, "Internet Printing Protocol/1.1", STD 92/RFC 8010/RFC 8011, June 2018, <https://datatracker.ietf.org/doc/html/std92>
- [STD99] R. Fielding, J. Reschke, "HTTP/1.1", RFC 9112/STD 99, June 2014, <https://datatracker.ietf.org/doc/html/rfc9112>



- [UAX9] Unicode Consortium, “Unicode Bidirectional Algorithm”, UAX#9, May 2018, <https://www.unicode.org/reports/tr9>
- [UAX14] Unicode Consortium, “Unicode Line Breaking Algorithm”, UAX#14, May 2018, <https://www.unicode.org/reports/tr14>
- [UAX15] M. Davis, M. Duerst, "Unicode Normalization Forms", Unicode Standard Annex 15, May 2018, <https://www.unicode.org/reports/tr15>
- [UAX29] Unicode Consortium, “Unicode Text Segmentation”, UAX#29, May 2018, <https://www.unicode.org/reports/tr29>
- [UAX31] Unicode Consortium, “Unicode Identifier and Pattern Syntax”, UAX#31, June 2018, <https://www.unicode.org/reports/tr31>
- [UNICODE] Unicode Consortium, "Unicode Standard", Version 12.0.0, March 2019, <https://www.unicode.org/versions/Unicode12.0.0/>
- [UTS10] Unicode Consortium, “Unicode Collation Algorithm”, UTS#10, May 2018, <https://www.unicode.org/reports/tr10>
- [UTS35] Unicode Consortium, “Unicode Locale Data Markup Language”, UTS#35, March 2018, <https://www.unicode.org/reports/tr35>
- [UTS39] Unicode Consortium, “Unicode Security Mechanisms”, UTS#39, May 2018, <https://www.unicode.org/reports/tr39>

## 13.2 Informative References

- [PPX-ABNF] Collected ABNF for this specification, <https://ftp.pwg.org/pub/pwg/informational/pwg5100.3-abnf.txt>
- [PWG5100.3-2001] K. Ocke, T. Hastings, "Internet Printing Protocol (IPP): Production Printing Attributes - Set 1", PWG 5100.3-2001, February 2001, <https://ftp.pwg.org/pub/pwg/candidates/cs-ippprodprint10-20010212-5100.3.pdf>
- [UTR17] Unicode Consortium “Unicode Character Encoding Model”, UTR#17, November 2008, <https://www.unicode.org/reports/tr17>
- [UTR23] Unicode Consortium “Unicode Character Property Model”, UTR#23, May 2015, <https://www.unicode.org/reports/tr23>
- [UTR33] Unicode Consortium “Unicode Conformance Model”, UTR#33, November 2008, <https://www.unicode.org/reports/tr33>

[UNISECFAQ] Unicode Consortium “Unicode Security FAQ”, November 2016,  
<https://www.unicode.org/faq/security.html>

## 14. Author

Primary author:

Michael Sweet  
Lakeside Robotics Corporation

The author would also like to thank the following individuals for their contributions to this specification:

Kirk Ocke (Co-author of previous version)  
Tom Hastings (Co-author of previous version)