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The Printer Working Group

IPP Finishings 2.1

Status: Stable

Abstract: This document defines new "finishings" and "finishings-col" Job Template attribute values to specify additional finishing intent, including the placement of finishings with respect to the corners and edges of portrait and landscape documents.

This document is a PWG Candidate Standard. For a definition of a "PWG Candidate Standard", see: http://ftp.pwg.org/pub/pwg/general/pwg-process30.pdf

This document is available electronically at:

http://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippfinishings21-20170216.docx
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About the Internet Printing Protocol Workgroup

The Internet Printing Protocol (IPP) workgroup has developed a modern, full-featured network printing protocol, which is now the industry standard. IPP allows a print client to query a printer for its supported capabilities, features, and parameters to allow the selection of an appropriate printer for each print job. IPP also provides Job information prior to, during, and at the end of Job processing.

For additional information regarding IPP visit:

http://www.pwg.org/ipp/

Implementers of this specification are encouraged to join the IPP mailing list in order to participate in any discussions of the specification. Suggested additions, changes, or clarification to this specification, should be sent to the IPP mailing list for consideration.

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1. Introduction

The Internet Printing Protocol/1.1: Model and Semantics [RFC8011] and Internet Printing Protocol (IPP): Production Printing Attributes - Set 1 [PWG5100.3] specifications define the basic attributes and values needed to support advanced finishing processes on printed output. This specification, which was originally titled 'IPP: "finishings" attribute values extension', defines additional values and member attributes needed to support the full breadth of finishing options available in modern Printers. It also revisits the original definitions of the "finishings" and "finishings-col" attributes in order to provide a holistic view of the various finishing processes that some Printers support.

The "finishings" Job Template attribute [RFC8011] allows Clients to specify simple intent - staple, fold, trim, etc. This specification extends the original values to include positional characteristics, e.g., staple top-left, as well as common variations, e.g., Z fold.

The "finishings-col" Job Template attribute [PWG5100.3] allows Clients to specify detailed intent - staple at the following coordinates, fold at the following positions and directions, trim at the following positions and cut types, etc. This specification extends the original "finishing-template" member attribute to include standard names and adds member attributes for each type of finishing.

The coordinate system scheme used in this specification agrees with the Finisher MIB [RFC3806], which in turn follows the ISO DPA [ISO10175] approach of using a coordinate system as if the document were portrait. The approach for coordinate system being relative to the intended reading direction depends on the device being able to understand the orientation embedded in the PDL, which is too problematic for many PDLs. The approach for the coordinate system of being relative to the media feed direction is too dependent on the way the device is configured, i.e., pulling short edge first vs. long edge first, and can vary between different output bins in the same device.

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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 [RFC2119]. The term CONDITIONALLY REQUIRED is additionally defined for a conformance requirement that applies to a particular capability or feature.

2.2 Protocol Role Terminology

This document defines the following protocol roles in order to specify unambiguous conformance requirements:

Client: Initiator of outgoing IPP session requests and sender of outgoing IPP operation requests (Hypertext Transfer Protocol -- HTTP/1.1 [RFC7230] User Agent).

Printer: Listener for incoming IPP session requests and receiver of incoming IPP operation requests (Hypertext Transfer Protocol -- HTTP/1.1 [RFC7230] Server) that represents one or more Physical Devices or a Logical Device.

2.3 Printing Terminology

Normative definitions and semantics of printing terms are imported from the Printer MIB v2 [RFC3805], Printer Finishings MIB [RFC3806], and Internet Printing Protocol/1.1: Model and Semantics [RFC8011].

Deleted: , and IPP: Job Progress Attributes [RFC3381]

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

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

Finishing Location: The distance along the Finishing Reference Edge as measured from the bottom or left of the media sheet.

Finishing Offset: The distance from the Finishing Reference Edge.

Finishing Reference Edge: The edge or side of the media sheets that is used for finishing processes. For example, when staples are placed along the left side of a set of sheets, the Finishing Reference Edge is ‘left’.

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,

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each of the 50 printed copies of the document constitutes a "set". If the pages were uncollated, then 50 copies of each of the individual pages within the document would represent each "set".

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2.4 Acronyms and Organizations

CIP4: The International Cooperation for the Integration of Processes in Prepress, Press, and Postpress Organization, http://www.cip4.org/

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

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

Field Code Changed

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

Field Code Changed

PWG: IEEE ISTO Printer Working Group, http://www.pwg.org/

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3. Requirements

3.1 Rationale for IPP Finishings

Existing specifications define the following:

1. The Internet Printing Protocol/1.1: Model and Semantics [RFC8011] defines the "finishings" Job Template attribute and basic values.
2. The Internet Printing Protocol (IPP): Production Printing Attributes - Set 1 [PWG5100.3] defines the "finishings-col" Job Template attribute for stapling.
3. IPP Finishings 2.0 [PWG5100.1-2014] defined additional Printer Description attributes that allow a Client to determine the type and extent of finishing options supported by the printer, allowing the User to select choices with higher fidelity and allowing the Client to accurately present a preview to the User of the selected finishing processes. It also defines Job Template attributes and values that allow the Client to express finishing intent clearly.

In order to allow Clients to use and clearly specify finishing intent, this IPP Finishings 2.1 specification:

1. Defines Job Template attributes and values needed to clearly express finishing intent; and

2. Defines Printer Description attributes and values needed to allow a Client to determine the type and extent of finishing options supported by the Printer as well as preview the results of finishing processes for the User.

3.2 Use Cases

The following use cases are derived in part from the list of finishing processes defined in section 2.2 of [RFC3806].

3.2.1 Band

Jane needs to ship ten copies of a fifty-page report. Using software on her Client device, she specifies a finishing intent that will band wrap each copy and submits the print request.

3.2.2 Bind

Jane is self-publishing a book on lawn ornaments. Using software on her Client device, she specifies a finishing intent that will bind the long edge of each book and submits the print request.

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3.2.3 Booklet Maker

Jane is producing an orientation guide for new students. Using software on her Client device, she specifies a finishing intent that will impose the pages from her Document onto folded sheets and submits the print request.

3.2.4 Coat

Jane needs to protect a digital photographic print from sunlight. Using software on her Client device, she specifies a finishing intent that coats the media sheet with an archival UV protectant and submits the print request.

3.2.5 Cover

Jane needs to print an investor report for an upcoming meeting with the preprinted company report cover. Using software on her Client device, she specifies a finishing intent that will add the report cover to each Set and submits the print request.

3.2.6 Edge Stitch

Jane wants to print a multi-page checklist. Using software on her Client device, she specifies a finishing intent that will stitch the tops of the pages in the output and submits the print request.

3.2.7 Fold

Jane has a set of attendee cards she wants to print. Using software on her Client device, she specifies a finishing intent that will fold the cardstock in half after printing and submits the print request.

3.2.8 Jog Offset

Jane is printing several copies of a report and would like each copy separated. Using software on her Client device, she specifies a finishing intent that will offset each Set in the output bin and submits the print request.

3.2.9 Laminate

Jane is printing operating procedure checklists that will be used many times. Using software on her Client device, she specifies a finishing intent that will laminate each checklist and submits the print request.

3.2.10 Punch

Jane is printing invoices that will be placed in a 3-ring binder. Using software on her Client device, she specifies a finishing intent that will punch three holes along the left side of each sheet and submits the print request.

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3.2.11 Saddle Stitch

Jane is printing a short informational booklet. Using software on her Client device, she specifies a finishing intent that will place two staples along the midline of each Set and submits the print request.

3.2.12 Staple

Jane is printing an accounts-receivable report. Using software on her Client device, she specifies a finishing intent that will place a single staple at the top left corner of each Set and submits the print request.

3.2.13 Trim

Jane is printing a large photograph on her roll-fed printer. Using software on her Client device, she specifies a finishing intent that will cut the roll at the end of the printed photograph and submits the print request.

3.2.14 Wrap

Jane is printing documentation for a software product. Using software on her Client device, she specifies a finishing intent that will shrink-wrap each Set and submits the print request.

3.2.15 Multiple Finishing Options

Jane is printing an eight-page brochure booklet. Using software on her Client device, she specifies finishing intent to first impose the pages from her Document onto sheets, then staple the sheets along the midline, fold the sheets along the midline, and finally shrink-wrap each booklet. She then submits the print request.

3.2.16 Finishing of Multiple Copies

Jane is printing a seven-page report to a Printer that only supports a raster format. Using software on her Client device, she specifies a copy count of 10 and finishing intent to staple each Set. She then submits the print request. Her Client device generates and submits 70 pages of raster data to the Printer.

3.2.17 Finishing Supplies

Jane is printing an accounts-receivable report. Using software on her Client device, she specifies a finishing intent that will place a single staple at the top left corner of each Set. She is notified that the number of staples in the Printer is low.

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3.3 Exceptions

3.3.1 Unsupported Media

After submitting the orientation guide for printing (section 3.2.3), the Printer returns an error indicating that the requested media cannot be used with the booklet maker.

3.3.2 Unsupported Combinations of Finishing Options

After submitting an eight page brochure booklet for printing (section 3.2.15), the Printer returns an error indicating that the requested finishing intent cannot be combined as requested.

3.3.3 Finishing with Finisher Fidelity Restrictions

Jane is printing an eight-page brochure booklet. Using software on her Client device, she specifies finishing intent to impose the pages from her Document onto sheets, fold and staple the sheets along the midline, and shrink-wrap each produced copy of the booklet. The Client looks up finisher restrictions for the Printer's media and orientation, and presents an accurate print preview. Jane submits the print request, and the output accurately matches the preview and her expectations.

3.4 Out of Scope

The following are out of scope for this specification:

1. Explicitly specifying the order of finishing processes, i.e., processing instructions instead of intent;
2. Support for folds not parallel to a Finishing Reference Edge;
3. Support for cuts not parallel to a Finishing Reference Edge; and
4. Support for cuts that do not extend the full width or length of the media

3.5 Design Requirements

The design requirements for this specification are:

1. Follow the naming conventions defined in the IPP/1.1 Model and Semantics [RFC8011], including keyword value (lowercase) and hyphenation requirements;
2. Optimize compatibility with existing IETF and PWG IPP operations when making design decisions in defining new operations and attributes;
3. Define values for the "finishings" Job Template attribute to support the full range of finishing options supported by modern Printers;
4. Define Printer Description and member attributes for the "finishings-col" Job Template attribute to support the full range of finishing options supported by modern Printers;

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5. Update the definition of the "finishing-template" member attribute for all of the standard finishing options supported by modern Printers; and
6. Register all attributes and values with IANA and the PWG.

4. Overview of Finishing

The finishing processes supported by Printers are identified in the Printer Finishing MIB [RFC3806]. IPP finishing is any post-processing of the hardcopy output performed by any of the Subunits of the Printer. Common finishing processes include baling, binding, booklet making, coating, covering, folding, jogging, laminating, punching, stapling, stitching, trimming, and wrapping. As in [RFC3806], all IPP finishing processes are specified with respect to portrait media orientation. The "multiple-document-handling" Job Template attribute [RFC8011] defines how multiple copies and Documents are combined into sets for finishing.

A key concept with IPP finishing processes is that the “finishings” and “finishings-col” Job Template attributes define the Client’s intent and not the processing order of finishing processes. That is, a Client can specify the intent that a Document be covered and bound or bound and covered and get the intended output – the Printer is responsible for determining the correct processing order for a sequence of finishing values.

The original finishing support in IPP/1.1: Model and Semantics [RFC8011] only allows a Printer to list and a Client to specify simple finishing intent using the "finishings" attribute - staple, fold, punch, and so forth. The IPP Production Printing Extensions, Set 1 [PWG5100.3] provided the first definition of the "finishings-col" Job Template attribute to provide explicit intent for the number and location of staples. This specification expands the "finishings-col" attribute so that it is possible to specify explicit intent for all finishing processes. In addition, the "finishings-col-database" and "finishings-col-ready" Printer Description attributes allow the Client to discover which "finishings-col" values are supported and to provide an accurate preview of those values.

The following subsections describe each of the finishing processes supported by this specification.

4.1 Bale (or Band) and Wrap

Bale finishers bundle hardcopy output with string or straps. Wrap finishings completely enclose the output, such as with a shrink-wrap material.

4.2 Bind

Bind finishers join hardcopy output along one edge. Binding can be performed by gluing the edge, joining using plastic or wire loops, padded, or taped.

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4.3 Booklet Making

Booklet making combines a half fold with signature imposition, placing and ordering input pages so that the resulting output can be read as a booklet. Booklet making is often combined with a saddle stitch to hold the hardcopy output together.

4.4 Coat and Laminate

Coating finishers apply a liquid or powdered material to the surface of the hardcopy output, e.g., a clear UV light and weather resistant paint over a sign, while laminator finishers combine a solid material with the hardcopy output using heat and/or adhesives.

4.5 Cover

Cover finishers place cover media over the hardcopy output, either as two separate sheets or a single sheet that covers the binding edge.

4.6 Fold

A fold finisher places folds in hardcopy output at certain positions and directions. Figure 1 shows common fold styles that are supported by this specification.

4.7 Jog

A jog finisher offsets the stack of sheets for each Set by a fixed distance so that each Set can be retrieved separately.

4.8 Punch

A punch finisher creates holes in the hardcopy Set by drilling or punching with a die. The number and location of holes varies and is not well standardized [PUNCH].

4.9 Staple, Edge Stitch, and Saddle Stitch

Staple and stitch finishers bind Sets of hardcopy output using 'U' shaped pieces of metal wire ("staples"). Staples are placed in a corner, along an edge, or along the middle fold (for saddle stitching). IPP uses the keyword 'edge-stitch' when multiple staples are used along an edge and 'saddle-stitch' when multiple staples are placed along the middle fold.

4.10 Trim (Cut, Perforate, or Score)

Trim finishers cut, perforate, or score hardcopy output along a straight line - most only support trimming along lines parallel or perpendicular to the feed direction.

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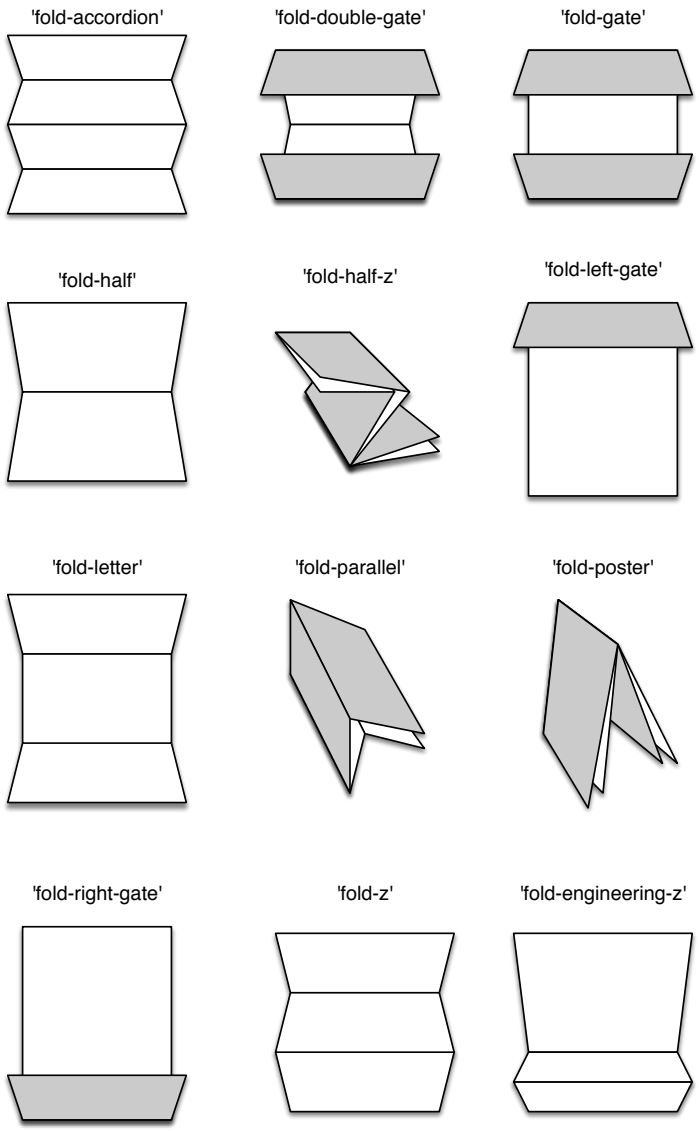

508

509 **Figure 1 - Standard Folds**

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5. Job Template Attributes

5.1 finishings (1setOf type2 enum)

The "finishings" Job Template attribute [RFC8011] identifies the finishing processes that the Printer uses for each copy of each printed Document in the Job. Printers that support any of the finishing processes listed in section 4 of this specification MUST support this attribute.

The order of values supplied in the "finishings" attribute is not significant. Printers MUST NOT require Clients to supply values in a particular order. If the Client supplies a value of 'none' along with any other combination of values, it is the same as if only that other combination of values had been supplied, i.e., the 'none' value has no effect.

The positional values are specified with respect to the Document as if the Document were a portrait Document. If the Document is actually a landscape or a reverse-landscape Document, the Client supplies the appropriate transformed value. For example, to position a staple in the upper left hand corner of a landscape Document when held for reading, the Client supplies the 'staple-bottom-left' value since landscape is defined as an anti-clockwise rotation from portrait. On the other hand, to position a staple in the upper left hand corner of a reverse-landscape Document when held for reading, the Client supplies the 'staple-top-right' value since reverse-landscape is defined as a clockwise rotation from portrait. Figure 2 shows how content is placed on sheets for each "orientation-requested" value where "feed-orientation" is 'short-edge-first'. Figure 3 shows how content is placed on sheets for each "orientation-requested" value where "feed-orientation" is 'long-edge-first'. If the Printer supports "media-col-ready" and / or "media-col-database", the Client could discover the media feed orientation and direction by checking the values of the "media-source-feed-orientation" and "media-source-feed-direction" sub-member attributes of "media-col".

Note: The effect of this attribute on Jobs with multiple copies and Documents is controlled by the "multiple-document-handling" Job Template attribute (section 4.2.4 [RFC8011]) and the relationship of this attribute and the other attributes that control Document processing is described in section 15.3 [RFC8011].

Field Code Changed

Deleted: [RFC2911]

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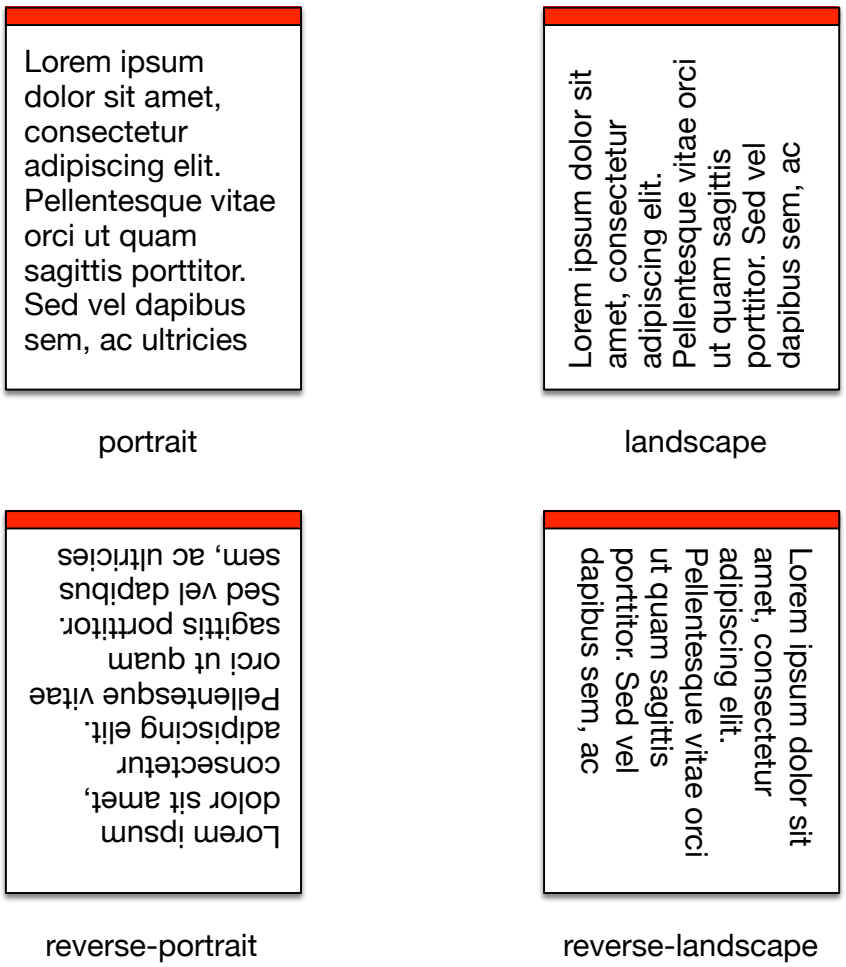

538

539 **Figure 2 - Effect of "orientation-requested" on Output with Short Edge First Feed**

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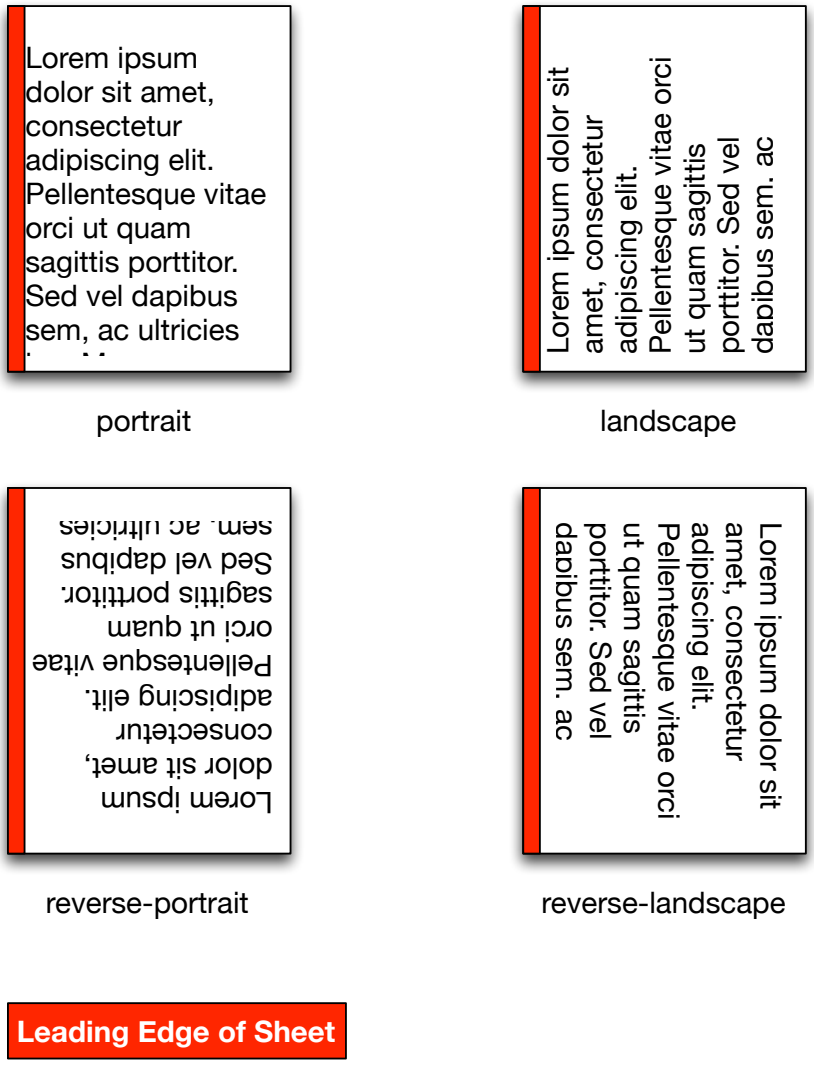

Figure 3 - Effect of "orientation-requested" on Output with Long Edge First Feed

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5.1.1 RFC 2911 “finishings” Values

The Internet Printing Protocol/1.1: Model and Semantics [RFC8011] defines the following standard enum values:

‘none’ (3): Perform no finishing

‘staple’ (4): Bind the Set(s) with one or more staples. The exact number, placement, and orientation of the staples are implementation and/or site-defined.

‘punch’ (5): This value indicates that holes are required in the finished hardcopy output. The exact number and placement of the holes are implementation and/or site-defined. The punch specification MAY be satisfied (in a site- and implementation-specific manner) either by drilling/punching, or by substituting pre-drilled media.

‘cover’ (6): This value is specified when it is desired to select a non-printed (or pre-printed) cover for each Set. This does not supplant the specification of a printed cover (on cover stock medium) by the Document itself.

‘bind’ (7): This value indicates that a binding is to be applied to the Set; the type and placement of the binding are implementation and/or site-defined.

‘saddle-stitch’ (8): Bind the Set(s) with two or more staples (wire stitches) along the middle fold. The exact number and placement of the staples and the middle fold are implementation and/or site-defined.

‘edge-stitch’ (9): Bind the Set(s) with two or more staples (wire stitches) along one edge. The exact number and placement of the staples are implementation and/or site-defined.

‘staple-top-left’ (20): Bind the Set(s) with one or more staples in the top left corner.

‘staple-bottom-left’ (21): Bind the Set(s) with one or more staples in the bottom left corner.

‘staple-top-right’ (22): Bind the Set(s) with one or more staples in the top right corner.

‘staple-bottom-right’ (23): Bind the Set(s) with one or more staples in the bottom right corner.

‘edge-stitch-left’ (24): Bind the Set(s) with two or more staples (wire stitches) along the left edge. The exact number and placement of the staples are implementation and/or site-defined.

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574 'edge-stitch-top' (25): Bind the Set(s) with two or more staples (wire stitches) along
575 the top edge. The exact number and placement of the staples are implementation
576 and/or site-defined.

577 'edge-stitch-right' (26): Bind the Set(s) with two or more staples (wire stitches)
578 along the right edge. The exact number and placement of the staples are
579 implementation and/or site-defined.

580 'edge-stitch-bottom' (27): Bind the Set(s) with two or more staples (wire stitches)
581 along the bottom edge. The exact number and placement of the staples are
582 implementation and/or site-defined.

583 'staple-dual-left' (28): Bind the Set(s) with two staples (wire stitches) along the left
584 edge assuming a portrait document (see section 6).

585 'staple-dual-top' (29): Bind the Set(s) with two staples (wire stitches) along the top
586 edge assuming a portrait document (see section 6).

587 'staple-dual-right' (30): Bind the Set(s) with two staples (wire stitches) along the
588 right edge assuming a portrait document (see section 6).

589 'staple-dual-bottom' (31): Bind the Set(s) with two staples (wire stitches) along the
590 bottom edge assuming a portrait document (see section 6).

591 **5.1.2 PWG 5100.1-2001 "finishings" Values**

592 The IPP "finishings" attribute values extension [PWG5100.1-2001] defines the following
593 "finishings" enum values:

594 'fold' (10): Fold the hardcopy output. The exact number and orientations of the
595 folds is implementation and/or site-defined.

596 'trim' (11): Trim the hardcopy output on one or more edges. The exact number of
597 edges and the amount to be trimmed is implementation and/or site-defined.

598 'bale' (12): Bale the Set(s). The type of baling is implementation and/or site-
599 defined.

600 'booklet-maker' (13): Deliver the Set(s) to the signature booklet maker. This value
601 is a short cut for specifying a Job that is to be folded, trimmed and then saddle-
602 stitched.

603 'jog-offset' (14): Shift each Set from the previous one by a small amount which is
604 device dependent. This value has no effect on the "job-sheet". This value
605 SHOULD NOT have an effect if each Set of the Job consists of one sheet.

606 'bind-left' (50): Bind the Set(s) along the left edge; the type of the binding is
607 implementation and/or site-defined.

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‘bind-top’ (51): Bind the Set(s) along the top edge; the type of the binding is implementation and/or site-defined.

‘bind-right’ (52): Bind the Set(s) along the right edge; the type of the binding implementation and/or is site-defined.

‘bind-bottom’ (53): Bind the Set(s) along the bottom edge; the type of the binding is implementation and/or site-defined.

5.1.3 PWG 5100.1-2014 “finishings” Values

The IPP Finishings 2.0 specification [PWG5100.1-2014] defines the following “finishings” enum values:

'coat' (15): Apply a protective liquid or powdered coating to each sheet in an implementation and/or site-defined manner.

'laminate' (16): Apply a protective (solid) material to each sheet in an implementation and/or site-defined manner.

‘staple-triple-left’ (32): Bind the Set(s) with three staples (wire stitches) along the left edge assuming a portrait document (see section 6).

‘staple-triple-top’ (33): Bind the Set(s) with three staples (wire stitches) along the top edge assuming a portrait document (see section 6).

‘staple-triple-right’ (34): Bind the Set(s) with three staples (wire stitches) along the right edge assuming a portrait document (see section 6).

‘staple-triple-bottom’ (35): Bind the Set(s) with three staples (wire stitches) along the top edge assuming a portrait document (see section 6).

‘punch-top-left’ (70): Punch a single hole in the top left of the hardcopy output.

‘punch-bottom-left’ (71): Punch a single hole in the bottom left of the hardcopy output.

‘punch-top-right’ (72): Punch a single hole in the top right of the hardcopy output.

‘punch-bottom-right’ (73): Punch a single hole in the bottom right of the hardcopy output.

‘punch-dual-left’ (74): Punch two holes on the left side of the hardcopy output.

‘punch-dual-top’ (75): Punch two holes at the top of the hardcopy output.

‘punch-dual-right’ (76): Punch two holes on the right side of the hardcopy output.

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‘punch-dual-bottom’ (77): Punch two holes at the bottom of the hardcopy output.

‘punch-triple-left’ (78): Punch three holes on the left side of the hardcopy output.

‘punch-triple-top’ (79): Punch three holes at the top of the hardcopy output.

‘punch-triple-right’ (80): Punch three holes on the right side of the hardcopy output.

‘punch-triple-bottom’ (81): Punch three holes at the bottom of the hardcopy output.

‘punch-quad-left’ (82): Punch four holes on the left side of the hardcopy output.

‘punch-quad-top’ (83): Punch four holes at the top of the hardcopy output.

‘punch-quad-right’ (84): Punch four holes on the right side of the hardcopy output.

‘punch-quad-bottom’ (85): Punch four holes at the bottom of the hardcopy output.

'fold-accordion' (90): Accordion-fold the hardcopy output vertically into four sections.

'fold-double-gate' (91): Fold the top and bottom quarters of the hardcopy output towards the midline, then fold in half vertically.

'fold-gate' (92): Fold the top and bottom quarters of the hardcopy output towards the midline.

'fold-half' (93): Fold the hardcopy output in half vertically.

'fold-half-z' (94): Fold the hardcopy output in half horizontally, then Z-fold the paper vertically into three sections.

'fold-left-gate' (95): Fold the top quarter of the hardcopy output towards the midline.

'fold-letter' (96): Fold the hardcopy output into three sections vertically; sometimes also known as a C fold.

'fold-parallel' (97): Fold the hardcopy output in half vertically two times, yielding four sections.

'fold-poster' (98): Fold the hardcopy output in half horizontally and vertically; sometimes also called a cross fold.

'fold-right-gate' (99): Fold the bottom quarter of the hardcopy output towards the midline.

'fold-z' (100): Fold the hardcopy output vertically into three sections, forming a Z.

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5.1.4 PWG 5100.1-2017 “finishings” Values

This specification defines the following “finishings” enum values:

' fold-engineering-z' (101): Fold the hardcopy output vertically into three sections, forming a Z but leaving room for binding, punching, or stapling along the top edge

'punch-multiple-left' (86): Drill or punch more than four holes along the reference edge. For 1-4 holes, the individual explicit value ('punch-top-left’, 'punch-dual-left’, 'punch-triple-left’ and 'punch-quad-left’) SHOULD be used instead. The number and location of holes can be advertised by the Printer in the "finishings-col-database" and "finishings-col-ready" Printer Description attributes in the "punching" member attribute.

'punch-multiple-top' (87): Drill or punch more than four holes along the reference edge. For 1-4 holes, the individual explicit value ('punch-top-top’, 'punch-dual-top’, 'punch-triple-top’ and 'punch-quad-top’) SHOULD be used instead. The number and location of holes can be advertised by the Printer in the "finishings-col-database" and "finishings-col-ready" Printer Description attributes in the "punching" member attribute.

'punch-multiple-right' (88): Drill or punch more than four holes along the reference edge. For 1-4 holes, the individual explicit value ('punch-top-right’, 'punch-dual-right’, 'punch-triple-right’ and 'punch-quad-right’) SHOULD be used instead. The number and location of holes can be advertised by the Printer in the "finishings-col-database" and "finishings-col-ready" Printer Description attributes in the "punching" member attribute.

'punch-multiple-bottom' (89): Drill or punch more than four holes along the reference edge. For 1-4 holes, the individual explicit value ('punch-top-bottom’, 'punch-dual-bottom’, 'punch-triple-bottom’ and 'punch-quad-bottom’) SHOULD be used instead. The number and location of holes can be advertised by the Printer in the "finishings-col-database" and "finishings-col-ready" Printer Description attributes in the "punching" member attribute.

5.1.5 PWG 5100.13 “finishings” Values

The IPP Job and Printer Extensions - Set 3 (JPS3) [PWG5100.13] defines the following standard enum values:

'trim-after-pages' (60): Trim output after each page.

'trim-after-documents' (61): Trim output after each Document.

'trim-after-copies' (62): Trim output after each Set.

'trim-after-job' (63): Trim output after Job.

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5.2 finishings-col (no-value | 1setOf collection)

The "finishings-col" Job Template attribute (originally defined in section 3.2 of [PWG5100.3]) augments the "finishings" Job Template attribute (section 5.1) and allows the Client to specify detailed finishing instructions that cannot be specified using the simple enumerated values of the "finishings" attribute. Printers that support any of the finishing processes listed in section 4 SHOULD support this attribute and MUST support the "finishings" attribute.

Clients MUST NOT specify both the "finishings" and "finishings-col" attributes in a Job Creation request. Printers MUST reject Job Creation requests containing both the "finishings" and "finishings-col" attributes with the 'client-error-conflicting-attributes' status code.

The "finishings-col" member attributes are listed in Table 1. The order of values supplied in the "finishings-col" attribute is not significant. Supported values are provided in the "xxx-supported" Printer Description attributes defined in section 6. Printers MUST NOT require Clients to supply values in a particular order. If the Client does not want any finishings applied it sends the ‘no-value’ out-of-band value.

The "xxx-reference-edge" member attributes are single valued, e.g., top-left is not allowed. The standard keyword values are:

'bottom': The bottom edge coincides with the x-axis of the coordinate system.

'top': The top edge is opposite and parallel to the bottom edge.

'left': The left edge coincides with the y-axis of the coordinate system.

'right': The right edge is opposite and parallel to the left edge.

Table 1 - "finishings-col" Member Attributes

Member Attribute	Client Support	Printer Support
finishing-template (type2 keyword | name(MAX))	MUST	MUST
baling (collection)	MAY	MUST (note 1)
binding (collection)	MAY	MUST (note 1)
coating (collection)	MAY	MUST (note 1)
covering (collection)	MAY	MUST (note 1)
folding (1setOf collection)	MAY	MUST (note 1)
imposition-template (type2 keyword | name(MAX)	MAY	MAY (note 2)
laminating (collection)	MAY	MUST (note 1)
media-sheets-supported (rangeOfInteger(1:MAX))	MAY	MAY (note 2)
media-size (collection)	MAY	MAY (note 2)
media-size-name (type2 keyword)	MAY	MAY (note 2)
punching (collection)	MAY	MUST (note 1)
stitching (collection)	MAY	MUST (note 1)
trimming (1setOf collection)	MAY	MUST (note 1)

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Note 1: MUST be supported when the corresponding finishing option is supported.

Note 2: Only returned in the "finishings-col-database" and "finishings-col-ready" attributes.

5.2.1 finishing-template (type2 keyword | name(MAX))

The REQUIRED "finishing-template" member attribute (originally defined in section 3.2.1 of [PWG5100.3]) specifies the particular finishing process using either one of the standard IANA-registered "finishing-template" keywords (many of which have matching "finishings" enum equivalents) or an implementation or site defined name. Specifying only the "finishing-template" member attribute with no other member attributes results in the default values for those member attributes.

Keywords can be extended by appending a qualifying label to the existing keyword, separated by an underscore. For example, 'punch-quad-left_trio-binder', where 'punch-quad-left' is the IANA registered type2 keyword, and 'trio-binder' is the qualifying label. This allows a more specific localized user visible string to be presented (retrieved from the string catalog at the URI from the "printer-strings-uri" Printer Description attribute. These qualifying labels also allows variants' specific values for locations or offsets to be characterized precisely, while limiting the need to register a number of new keywords for obscure and/or locale-specific variations.

In addition to the registered keywords corresponding to the registered "finishings" enum value labels, this specification also defines keywords for each JDF @FoldCatalog [JDF1.5] value of the form 'jdf-fN-N'. For example, the JDF @FoldCatalog value 'F8-6' (a triple fold instruction similar to 'fold-parallel') would be specified using a "finishing-template" value of 'jdf-f8-6'.

Deleted: [JDF1.5]

For vendor attribute extensions, implementors SHOULD use keywords with a suitable distinguishing prefix such as 'smiNNN-' where NNN is an SMI Private Enterprise Number (PEN) [IANA-PEN]. For example, if the company Example Corp. had obtained the SMI PEN 32473, then a vendor attribute 'foo' would be 'smi32473-foo'.

Deleted: [IANA-PEN]

Note: Prior versions of this document recommended using a reversed domain name (e.g., 'com.example-foo'). Domain names have proven problematic due to the length of some domain names, parallel use of country-specific domain names (e.g., 'example.co.jp-foo'), and changes in ownership of domain names.

Localized strings for "finishing-template" values unique to the Printer SHOULD be made available by the Printer using the language-specific strings file at the URI referenced by the "printer-strings-uri" Printer Description attribute [PWG5100.13].

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5.2.2 baling (collection)

The "baling" member attribute specifies which baling to apply to the hardcopy output. Printers with a baling finisher MUST support this member attribute and all "baling-xxx" member attributes if they support the "finishings-col" attribute.

5.2.2.1 baling-type (type2 keyword | name(MAX))

The "baling-type" member attribute specifies the type of baling to apply. The following values are defined by this specification:

'band': each Set is baled with a paper or plastic band.

'shrink-wrap': each Set is shrink-wrapped in plastic.

'wrap': each Set is wrapped in paper.

Additional keyword values can be registered in the IANA IPP Registry of Keywords [IANA-IPP].

5.2.2.2 baling-when (type2 keyword)

The "baling-when" member attribute specified when baling is performed. The default value can be derived from the "finishing-template" value or, if a default value cannot be determined from that value, using an implementation or site defined value. The following values are defined by this specification:

'after-sets': Baling occurs after each Set (the typical default).

'after-job': Baling occurs only after the entire Job is printed.

Additional keyword values can be registered in the IANA IPP Registry of Keywords [IANA-IPP].

5.2.3 binding (collection)

The "binding" member attribute specifies the location and type of binding to apply to the hardcopy output. Printers with a binding finisher MUST support this member attribute and all "binding-xxx" member attributes if they support the "finishings-col" attribute.

5.2.3.1 binding-reference-edge (type1 keyword)

The "binding-reference-edge" member attribute specifies which edge ('bottom', 'left', 'right', or 'top') is bound. If not specified, the default value is either derived from the "finishing-template" keyword value ('bind-bottom', 'bind-left', 'bind-right', 'bind-top') or, if no edge is specified, is an implementation or site defined value.

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5.2.3.2 binding-type (type2 keyword | name(MAX))

The "binding-type" member attribute specifies the type of binding to apply. If not specified, an implementation or site defined value is used. The following keyword values are defined by this specification:

'adhesive': sheets are bound using glue or adhesive.

'comb': sheets are bound by placing small rectangular holes along the binding edge and using a tube-shaped plastic binding strip with comb like fingers that fit through the holes.

'flat': sheets are bound so that they can lay flat when the hardcopy output is opened. The specific method of producing such a binding is implementation defined.

'padding': sheets are bound by applying a non-penetrating adhesive to the edge of the stack of sheets so that the sheets can be easily peeled off one at a time.

'perfect': sheets are bound by roughing the binding edge and applying an adhesive.

'spiral': sheets are bound by placing small round holes along the binding edge and winding plastic or metal wire through the holes in a spiral pattern.

'tape': sheets are bound by placing tape along the binding edge, overlapping the top and bottom sheets of the stack.

'velo': sheets are bound by placing small holes along the binding edge and joining the sheets using plastic strips with pins that extend through those holes.

Additional keyword values can be registered in the IANA IPP Registry of Keywords [IANA-IPP].

5.2.4 coating (collection)

The "coating" member attribute specifies which coating to apply to the hardcopy output. Typically, the coating is applied to the entire page, although some Printers MAY only coat those areas that have been marked on. Printers with a coating finisher MUST support this member attribute and all "coating-xxx" member attributes if they support the "finishings-col" attribute.

5.2.4.1 coating-sides (type1 keyword)

The "coating-sides" member attribute specifies which sides of the sheets are coated: 'front', 'back', or 'both', If not specified, an implementation or site defined default value is used.

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5.2.4.2 coating-type (type2 keyword | name(MAX))

The "coating-type" member attribute specifies the type of coating to apply. The following values are defined by this specification:

'archival': each sheet is coated to preserve the output for an extended period of time, e.g., a UV protectant.

'archival-glossy': each sheet is coated to produce a glossy surface that preserves the output for an extended period of time, e.g., a UV protectant.

'archival-matte': each sheet is coated to produce a matte surface that preserves the output for an extended period of time, e.g., a UV protectant.

'archival-semi-gloss': each sheet is coated to produce a semi-gloss surface that preserves the output for an extended period of time, e.g., a UV protectant.

'glossy': each sheet is coated to produce a glossy surface.

‘high-gloss’: each sheet is coated to produce a high-gloss surface.

'matte': each sheet is coated to produce a matte surface.

‘semi-gloss’: each sheet is coated to produce a semi-gloss surface.

'silicone': each sheet is coated to produce a water resistent surface.

'translucent': each sheet is coated to produce a translucent surface.

Additional keyword values can be registered in the IANA IPP Registry of Keywords [IANA-IPP].

5.2.5 covering (collection)

The "covering" member attribute specifies which cover to apply over the hardcopy output. Printers with a cover finisher MUST support this member attribute and all "covering-xxx" member attributes if they support the "finishings-col" attribute.

Note: Unlike the "cover-back" and "cover-front" Job Template attributes [PWG5100.3], finishing covers are applied over any binding, edge stitching, or staples and do not contain print-stream pages.

5.2.5.1 covering-name (type2 keyword | name(MAX))

The "covering-name" member attribute specifies which cover to apply. The default is implementation or site defined. The name typically represents a pre-printed, pre-cut, or generic cover that is available to the Printer. Clients MUST query the value of the "covering-

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name-supported" (section 6.7) Printer attribute for the list of supported values. The following values are defined by this specification:

'plain': a plain (blank) cover is applied.

'pre-cut': a pre-cut cover is applied.

‘pre-printed’: a pre-printed cover is applied.

Additional keyword values can be registered in the IANA IPP Registry of Keywords [IANA-IPP].

5.2.6 folding (1setOf collection)

The "folding" member attribute specifies the location and direction of folds to apply to the hardcopy output. Printers with a folding finisher MUST support this member attribute and all "folding-xxx" member attributes if they support the "finishings-col" attribute.

Note: The order of “folding” values is significant and is part of the fold intent. Printers MAY re-order “folding” values so long as the final result matches the specified intent.

Note: This specification only defines folds parallel to the reference edge. Diagonal folds are explicitly not supported.

5.2.6.1 folding-direction (type1 keyword)

The "folding-direction" member attribute specifies whether the sheets are pushed outward ('outward') or pulled inward ('inward') for the current fold. The default value can be derived from the "finishing-template" value or, if a default value cannot be determined from that value, using an implementation or site defined value.

5.2.6.2 folding-offset (integer(0:MAX))

The "folding-offset" member attribute specifies where the fold is made. The value is the distance from the reference edge specified by the "folding-reference-edge" member attribute toward the center of the medium in hundredths of millimeters (1/2540th of an inch). The default value is generally derived from the "finishing-template" value and output media.

5.2.6.3 folding-reference-edge (type1 keyword)

The "folding-reference-edge" member attribute specifies which edge is used as the basis of the fold instructions: 'bottom', 'left', 'right', or 'top'. Folds are placed parallel to the reference edge at the offset specified by the "folding-location" member attribute. The default value is generally derived from the "finishing-template" value and output media.

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5.2.6.4 “folding” Examples

The following example shows a "finishings-col-database" expressing the definitions of “folding” values for the standard folds in Figure 1 applied to A4 media sheets.

```
finishings-col-database=
{
    finishing-template='fold-accordion'
    media-size-name="iso_a4_210x297mm"
    folding=
    {
        folding-direction='inward'
        folding-location=7425
        folding-reference-edge='top'
    },
    {
        folding-direction='inward'
        folding-location=22275
        folding-reference-edge='top'
    },
    {
        folding-direction='outward'
        folding-location=14850
        folding-reference-edge='top'
    }
},
{
    finishing-template='fold-double-gate'
    media-size-name="iso_a4_210x297mm"
    folding=
    {
        folding-direction='inward'
        folding-offset=7425
        folding-reference-edge='top'
    },
    {
        folding-direction='inward'
        folding-offset=22275
        folding-reference-edge='top'
    },
    {
        folding-direction='inward'
        folding-offset=14850
        folding-reference-edge='top'
    }
},
{
    finishing-template='fold-engineering-z'
    media-size-name="iso_a4_210x297mm"
    folding=
    {
        folding-direction='inward'
        folding-offset=11593
        folding-reference-edge='top'
    },
    {
        folding-direction='outward'
        folding-offset=20646
        folding-reference-edge='top'
    }
},
```

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```
        {
            finishing-template='fold-gate'
            media-size-name="iso_a4_210x297mm"
            folding=
            {
                folding-direction='inward'
                folding-offset=7425
                folding-reference-edge='top'
            },
            {
                folding-direction='inward'
                folding-offset=22275
                folding-reference-edge='top'
            }
        },
        {
            finishing-template='fold-half'
            media-size-name="iso_a4_210x297mm"
            folding=
            {
                folding-direction='inward'
                folding-offset=14850
                folding-reference-edge='top'
            }
        },
        {
            finishing-template='fold-half-z'
            media-size-name="iso_a4_210x297mm"
            folding=
            {
                folding-direction='inward'
                folding-offset=10500
                folding-reference-edge='left'
            },
            {
                folding-direction='inward'
                folding-offset=9900
                folding-reference-edge='top'
            },
            {
                folding-direction='outward'
                folding-offset=19800
                folding-reference-edge='top'
            }
        },
        {
            finishing-template='fold-left-gate'
            media-size-name="iso_a4_210x297mm"
            folding=
            {
                folding-direction='inward'
                folding-offset=7425
                folding-reference-edge='top'
            }
        },
        {
            finishing-template='fold-letter'
            media-size-name="iso_a4_210x297mm"
            folding=
            {
                folding-direction='inward'
                folding-offset=9900
```

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```
                folding-reference-edge='top'
            },
            {
                folding-direction='inward'
                folding-offset=19800
                folding-reference-edge='top'
            }
        },
        {
            finishing-template='fold-parallel'
            media-size-name="iso_a4_210x297mm"
            folding=
            {
                folding-direction='inward'
                folding-offset=14850
                folding-reference-edge='top'
            },
            {
                folding-direction='inward'
                folding-offset=7425
                folding-reference-edge='top'
            }
        },
        {
            finishing-template='fold-poster'
            media-size-name="iso_a4_210x297mm"
            folding=
            {
                folding-direction='inward'
                folding-offset=10500
                folding-reference-edge='left'
            },
            {
                folding-direction='outward'
                folding-offset=14850
                folding-reference-edge='top'
            }
        },
        {
            finishing-template='fold-right-gate'
            media-size-name="iso_a4_210x297mm"
            folding=
            {
                folding-direction='inward'
                folding-offset=22275
                folding-reference-edge='top'
            }
        },
        {
            finishing-template='fold-z'
            media-size-name="iso_a4_210x297mm"
            folding=
            {
                folding-direction='inward'
                folding-offset=9900
                folding-reference-edge='top'
            },
            {
                folding-direction='outward'
                folding-offset=19800
                folding-reference-edge='top'
            }
```

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```
}
```

5.2.7 imposition-template (type2 keyword | name(MAX))

The "imposition-template" member attribute specifies the default imposition template used for the specified finishing process. The "imposition-template" member attribute is only allowed in "finishings-col" collections in the "finishings-col-database" (section 6.9) and "finishings-col-ready" (section 6.11) Printer description attributes. For example, when applying a 'booklet-maker' finishing process a Printer could automatically apply a 'signature' imposition template when processing input pages.

5.2.8 laminating (collection)

The "laminating" member attribute specifies which material to apply to the hardcopy output. Printers with a laminating finisher MUST support this member attribute and all "laminating-xxx" member attributes if they support the "finishings-col" attribute.

5.2.8.1 laminating-sides (type2 keyword)

The "laminating-sides" member attribute specifies which sides of the sheets are laminated: 'front', 'back', or 'both', If not specified, an implementation or site defined default value is used.

5.2.8.2 laminating-type (type2 keyword | name(MAX))

The "laminating-type" member attribute specifies the type of material to laminate with. The following values are defined by this specification:

'archival': each sheet is laminated to preserve the output for an extended period of time, e.g., a UV protectant.

'glossy': each sheet is laminated to produce a glossy surface.

‘high-gloss’: each sheet is laminated to produce a high-gloss surface.

'matte': each sheet is laminated to produce a matte surface.

‘semi-gloss’: each sheet is laminated to produce a semi-gloss surface.

'translucent': each sheet is laminated to produce a translucent surface.

Additional keyword values can be registered in the IANA IPP Registry of Keywords [IANA-IPP].

5.2.9 media-sheets-supported (rangeOfInteger(1:MAX))

The "media-sheets-supported" member attribute specifies the minimum and maximum number of sheets supported for that set of finishing values. This attribute is related to the

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"job-media-sheets-supported" attribute [RFC8011] in that the value of "media-sheets-supported" MUST be within the range of "job-media-sheets-supported". The "media-sheets-supported" member attribute is only allowed in "finishings-col" collections in the "finishings-col-database" (section 6.9) and "finishings-col-ready" (section 6.11) Printer description attributes. As an example, if a Printer implementing the 'fold-half' finishing template has a minimum of 1 sheet and a maximum of 5 sheets, the Printer's "media-sheets-supported" attribute specifies this limit with a value of '1-5'.

5.2.10 media-size (collection)

The "media-size" member attribute specifies the applicable media size dimensions for the specified finishing values and is only provided in "finishings-col-database" (section 6.9) and "finishings-col-ready" (section 6.11) Printer attribute values. For example, a Printer can list the supported "punching-locations" values for ISO A4 and US Letter media sizes.

The "x-dimension (integer(0:MAX))" and "y-dimension (integer(0:MAX))" member attributes provide the dimensions of the media.

5.2.11 media-size-name (type2 keyword)

The "media-size-name" member attribute specifies the applicable media size for the specified finishing values and is only provided in "finishings-col-database" (section 6.9) and "finishings-col-ready" (section 6.11) Printer attribute values. For example, a Printer can list the supported "punching-locations" values for ISO A4 and US Letter media sizes.

The values are PWG media size names

[PWG5101.1]

Deleted: [PWG5101.1]

5.2.12 punching (collection)

The "punching" member attribute specifies the locations of holes to make in the hardcopy output. Printers with a hole punching/drilling finisher MUST support this member attribute and all "punching-xxx" member attributes if they support the "finishings-col" attribute.

The diameter of the hole made by the punch is indicated by the "punching-hole-diameter-configured" Printer description attribute (section 6.22).

A Client that chooses to request custom punching using the "punching" collection attribute MUST specify the "punching-locations", the "punching-offset", and the "punching-reference-edge" member attributes. If the Client supplies a malformed request by not supplying all three member attributes, the Printer MUST (depending on implementation) either reject the request and return the ‘client-error-bad-request' (see [RFC8011] section 13.1.4.1) or default the omitted member attributes, independent of the value of the "ipp-attribute-fidelity" attribute [RFC8011] supplied by the Client.

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5.2.12.1 punching-locations (1setOf integer(0:MAX))

The "punching-locations" member attribute specifies the locations to be punched or drilled along the reference edge. Each value in the 1setOf MUST be in order of increasing distance.

If the "punching-reference-edge" is either 'top' or 'bottom', then each value in the "punching-locations" represents an offset in hundredths of millimeters (1/2540th of an inch) from the left edge toward the center of the medium. If the "punching-reference-edge" is either 'left' or 'right, then each value in the "punching-locations" represents an offset in hundredths of millimeters (1/2540th of an inch) from the bottom edge toward the center of the medium.

The default value can be derived from the "finishing-template" value or, if a default value cannot be determined from that value, using an implementation or site defined value.

5.2.12.2 punching-offset (integer(0:MAX))

The "punching-offset" member attribute specifies the distance from the center of the hole to the reference edge (specified by the "punching-reference-edge" member attribute) measured in hundredths of millimeters (1/2540th of an inch). The default value can be derived from the "finishing-template" value or, if a default value cannot be determined from that value, using an implementation or site defined value.

5.2.12.3 punching-reference-edge (type1 keyword)

The "punching-reference-edge" member attribute specifies which edge of the sheets will be punched or drilled: 'bottom', 'left', 'right', or 'top'. The default value can be derived from the "finishing-template" value or, if a default value cannot be determined from that value, using an implementation or site defined value.

5.2.13 stitching (collection)

The "stitching" member attribute (originally defined in section 3.2.2 of [PWG5100.3]) specifies the locations of stitches or staples that are used to bind the hardcopy output. Printers with a stapler and/or stitching finisher MUST support this member attribute and all "stitching-xxx" member attributes if they support the "finishings-col" attribute.

A Client that chooses to request custom stitching using the "stitching" collection attribute MUST specify the "stitching-reference-edge", the "stitching-offset", and the "stitching-locations" member attributes. If the Client supplies a malformed request by not supplying all three member attributes, the Printer MUST (depending on implementation) either reject the request and return the ‘client-error-bad-request' (see [RFC8011] section 13.1.4.1) or default the omitted member attributes, independent of the value of the "ipp-attribute-fidelity" attribute [RFC8011] supplied by the Client.

5.2.13.1 stitching-angle (integer(0:359))

The "stitching-angle" member attribute specifies the staple or stitch's angle of rotation in a counter-clockwise direction around the center of the staple, measured in degrees. A staple

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or stitch rotated to 0º (zero degrees) shall be parallel to the top edge of the page. The range of allowable values is 0 (0º) to 359 (359º).

5.2.13.2 stitching-locations (1setOf integer(0:MAX))

Each value of "stitching-locations" specifies an absolute offset along the Finishing Reference Edge at which a stitch MUST occur. Each value in the 1setOf MUST be in order of increasing distance.

If the "stitching-reference-edge" is either 'top' or 'bottom', then each value in the "stitching-locations" represents an offset in hundredths of millimeters from the left edge along the Finishing Reference Edge toward the center of the medium. If the "stitching-reference-edge" is either 'left' or 'right, then each value in the "stitching-locations" represents an offset in hundredths of millimeters from the bottom edge along the Finishing Reference Edge toward the center of the medium.

The unit of measure for the "stitching-locations" member attribute is one hundredth of a millimeter. This unit is equivalent to 1/2540th of an inch resolution.

5.2.13.3 stitching-method (type2 keyword)

The "stitching-method" member attribute specifies the type of stitching to use. The following values are defined by this specification:

'auto': Automatically choose a stitching type based on the Set being finished.

'crimp': Crimp the Set together.

'wire': Use wire staples.

Additional keyword values can be registered in the IANA IPP Registry of Keywords [IANA-IPP].

5.2.13.4 stitching-offset (integer(0:MAX))

The "stitching-offset" member attribute specifies the perpendicular distance of the staples from the Finishing Reference Edge. Since the "stitching-offset" member attribute is positive or zero, the offset is always in the direction that is both away from the Finishing Reference Edge and toward the center of the media sheet.

The unit of measure for the "stitching-offset" member attribute is one hundredth of a millimeter. This unit is equivalent to 1/2540th of an inch resolution.

If the Client specifies a "stitching-offset" then the Printer MUST produce a stitch (or stitches) along a line that is the specified number of hundredths of millimeters specified by the "stitching-offset" attribute away from the "stitching-reference-edge".

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5.2.13.5 stitching-reference-edge (type1 keyword)

The "stitching-reference-edge" member attribute specifies the Finishing Reference Edge of the output media relative to which the stapling or stitching MUST be applied. The individual staples or stitches are situated along a line or axis parallel to the Finishing Reference Edge.

A Printer MUST support this member attribute and at least the 'left' value.

Note: The 'left' value works with 'portrait' and 'landscape' Documents since 'landscape' Documents are rotated anti-clock-wise 90 degrees, i.e., plus 90 degrees, with respect to 'portrait' Documents. The left edge becomes the top edge when the human reader orients the landscape Document for reading.

5.2.14 trimming (1setOf collection)

The "trimming" member attribute specifies the locations of cuts to make in the hardcopy output. Printers with a trimming/cutting/perforation/scoring finisher MUST support this member attribute and all "trimming-xxx" member attributes if they support the "finishings-col" attribute.

5.2.14.1 trimming-offset (1setOf integer(0:MAX))

The "trimming-offset" member attribute specifies where the cut, perforation, or score is made. The value is the distance from the Finishing Reference Edge specified by the "trimming-reference-edge" member attribute toward the center of the medium in hundredths of millimeters (1/2540th of an inch). The default value is generally derived from the "finishing-template" value and output media.

5.2.14.2 trimming-reference-edge (type1 keyword)

The "trimming-reference-edge" member attribute specifies which edge is used as the basis of the cut, perforation, or score: 'bottom', 'left', 'right', or 'top'. Cuts, perforations, and scores are placed parallel to the reference edge at the offset specified by the "trimming-offset" member attribute. The default value is generally derived from the "finishing-template" value and output media.

5.2.14.3 trimming-type (type2 keyword | name(MAX))

The "trimming-type" member attribute specifies the type of trim that is to be performed. The default value is implementation and/or site defined. The following values are defined by this specification:

'draw-line': Marks a cut line on the media where it could be cut by an operator

'full': Cuts the hardcopy output the full length parallel to the reference edge.

'partial': Partially cuts the hardcopy output along the length parallel to the reference edge.

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'perforate': Perforates the hardcopy output the full length parallel to the reference edge.

'score': Scores the hardcopy output the full length parallel to the reference edge.

'tab': Cuts the hardcopy output along the length parallel to the reference edge leaving a hanging tab.

Additional keyword values can be registered in the IANA IPP Registry of Keywords [IANA-IPP].

5.2.14.4 trimming-when (type2 keyword)

The "trimming-when" member attribute specified when trimming is performed. The default value could be derived from the "finishing-template" value or, if a default value cannot be determined from that value, using an implementation or site defined value. The following values are defined by this specification:

'after-documents': Trimming occurs after each Document.

'after-job': Trimming occurs only after the entire Job is printed.

'after-sets': Trimming occurs after each Set (the typical default).

'after-sheets': Trimming occurs after each sheet.

Additional keyword values can be registered in the IANA IPP Registry of Keywords [IANA-IPP].

5.3 job-pages-per-set (integer(1:MAX))

The RECOMMENDED "job-pages-per-set" Job Template attribute specifies the number of input pages that constitute a set for finishing processes. It is used when the Client generates the copies in the Document content because the Printer does not support the "copies" attribute [RFC8011] for the given Document format. If the Client includes the "job-pages-per-set" Job Template attribute in a Job Creation request:

- The Client SHOULD NOT include the "copies" Job Template attribute, or if included MUST use the value 1; and
- The Printer MUST ignore the value of the "copies-default" Printer Description attribute.

The value of "job-pages-per-set" MUST be evenly divisible with the number of Input Pages since it is being used to demarcate the length of a single copy or Set. See the sections on the "multiple-document-handling" Job Template attribute [RFC8011] for more information on using this attribute with multiple Document Jobs.

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For example, if a Client submits a 14 page PWG Raster Format [PWG5102.4] Document for printing that contains two copies of four duplex pages each, the Client might specify a "job-pages-per-set" Job Template attribute with a value of 7, a "sides" attribute with a value of 'two-sided-long-edge', and a "finishings" attribute with a value of 4 (staple) to have the Printer staple two Sets of four sheets. Figure 4 shows a graphical representation of this example.

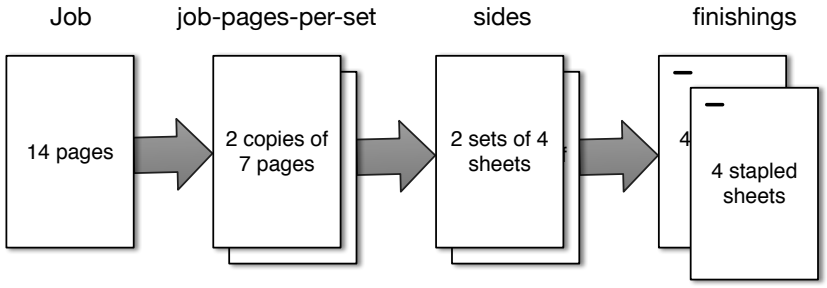

Figure 4 - Handling of "job-pages-per-set" Job Template Attribute

6. Printer Description Attributes

6.1 baling-type-supported (1setOf (type2 keyword | name(MAX)))

The "baling-type-supported" Printer attribute lists the supported values for the "baling-type" (section 5.2.2.1) member attribute.

6.2 baling-when-supported (1setOf type2 keyword)

The "baling-when-supported" Printer attribute lists the supported values for the "baling-when" (section 5.2.2.2) member attribute.

6.3 binding-reference-edge-supported (1setOf type1 keyword)

The "binding-reference-edge-supported" Printer attribute lists the supported values for the "binding-reference-edge" (section 5.2.3.1) member attribute.

6.4 binding-type-supported (1setOf type2 keyword)

The "binding-type-supported" Printer attribute lists the supported values for the "binding-type" (section 5.2.3.2) member attribute.

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6.5 coating-sides-supported (1setOf type1 keyword)

The "coating-sides-supported" Printer attribute lists the supported values for the "coating-sides" (section 5.2.4.1) member attribute.

6.6 coating-type-supported (1setOf (type2 keyword | name(MAX)))

The "coating-type-supported" Printer attribute lists the supported values for the "coating-type" (section 5.2.4.2) member attribute.

6.7 covering-name-supported (1setOf (type2 keyword | name(MAX)))

The "covering-name-supported" Printer attribute lists the supported values for the "covering-name" (section 5.2.5.1) member attribute.

6.8 finishing-template-supported (1setOf (name(MAX) | type2 keyword))

The "finishing-template-supported" Printer attribute lists the supported values for the "finishing-template" (section 5.2.1) member. Except for 'none', Printers MUST list all "finishings-supported" keyword value equivalents in the list of "finishing-template-supported" values.

6.9 finishings-col-database (1setOf collection)

The RECOMMENDED "finishings-col-database" Printer attribute lists the "finishings-col" member attributes corresponding to each "finishings-supported" value. Unlike the "media-col-database" Printer attribute [PWG5100.11], the "finishings-col-database" attribute does not provide a definitive list of the combinations of valid finishing processes. Instead, it lists the basic finishing processes separately as well as vendor or site defined preset combinations, each identified by a corresponding "finishing-template" name or keyword.

For example, a Printer that supports the 'booklet-maker', 'punch-triple-left' and 'staple-top-left' values for "finishings-template" and "finishings-supported" might report the following for "finishings-col-database":

```
finishings-col-database=
{
  finishing-template='booklet-maker'
  imposition-template='signature'
  media-size-name='na_tabloid_11x17in'
  media-sheets-supported=1-5
  folding=
  {
    folding-direction='inward'
    folding-offset=21590
    folding-reference-edge='top'
  }
```

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```
      stitching=
      {
        stitching-locations=9313,18626
        stitching-offset=21590
        stitching-reference-edge='top'
      }
    },
    {
      finishing-template='booklet-maker'
      imposition-template='signature'
      media-sheets-supported=1-8
      media-size=
      {
        x-dimension=29700
        y-dimension=42000
      }
      folding=
      {
        folding-direction='inward'
        folding-offset=21000
        folding-reference-edge='top'
      }
      stitching=
      {
        stitching-locations=9900,19800
        stitching-offset=21000
        stitching-reference-edge='top'
      }
    },
    {
      finishing-template='punch-triple-left'
      media-sheets-supported=1-100
      media-size-name='na_letter_8.5x11in'
      punching=
      {
        punching-locations=5715,16510,27305
        punching-offset=1300
        punching-reference-edge='left'
      }
    },
    {
      finishing-template='staple-top-left'
      media-sheets-supported=1-150
      stitching=
      {
        stitching-locations=635
        stitching-offset=635
        stitching-reference-edge='left'
      }
    }
```

Note that the Printer SHOULD specify each of these separately to limit the size of the value for "finishings-col-database". While it is possible to create "finishings-col" collections that each represent one of the combinatorial permutations from combining the discrete "finishing-template" definitions (e.g. "staple-top-left_punch-triple-left"), that greatly and unnecessarily

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expands the size of "finishings-col-database" and "finishings-col-ready" (section 6.11). A Client creates the "finishings-col" for a Job by itself combining the settings contained within multiple "finishings-col" collections from "finishings-col-ready" or "finishings-col-database", after resolving any constraints, as discussed later in this section.

Printers SHOULD report "finishings-col-database" values for each "finishings-supported" value other than 'none' (which is equivalent to a no-value for "finishings-col"), and MAY report multiple instances with the same "finishing-template" value but different "media-size" or "media-size-name" values. This allows a Client to easily discover which finishing processes are supported for a given media size, and to preview the results of each finishing process for the User. This attribute can also provide Printer and site-defined "presets" for compound finishing processes.

The same values SHOULD be returned in the "finishings-col-ready" Printer attribute (section 6.11) for each finisher Subunit that is available.

There can be situations where a setting within a particular "finishings-col" collection is not compatible with some other selected Job Template attribute, such as a particular media type, media orientation, etc. These situations are described by the Printer using the IPP "job-constraints-supported" and "job-resolvers-supported" Printer Description attributes [PWG5100.13]. For example:

```
job-constraints-supported={
  resolver-name=A
  finishings-col={
    finishing-template='staple-top-left','staple-bottom-right'
  }
  finishings=20,23
  media-col={
    media-source-properties={
      media-source-feed-direction='long-edge-first'
    }
  }
}

job-resolvers-supported={
  resolver-name=A
  media-col={
    media-source-properties={
      media-source-feed-direction='short-edge-first'
    }
  },
  {
    media-source='manual'
  }
}
```

Notice that in "job-constraints-supported" the value for "finishing-template" contains multiple values.

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6.10 finishings-col-default (1setOf collection | no-value)

The "finishings-col-default" Printer attribute provides the default "finishings-col" (section 5.2) Job Template attribute value. Each collection value MUST contain the "finishing-template" member attribute and SHOULD contain all finishing process member attributes that are not affected by media size. For example, if the default is to staple output in the top left corner then the collection value SHOULD contain the "stitching" member attribute because the location of the staple does not depend on the media size. However, if the default is to punch three holes along the left edge of the media, the collection value SHOULD contain the "punching-reference-edge" and "punching-offset" member attributes but SHOULD NOT contain the "punching-locations" member attribute since the value of that member attribute depends upon the media size.

The "finishings-col-default" Printer attribute MUST report the same finishing processes as the "finishings-default" [RFC8011] Printer attribute. If "finishings-default" has the value 'none', then "finishings-col-default" MUST have the 'no-value' out-of-band value.

6.11 finishings-col-ready (1setOf collection)

The RECOMMENDED "finishings-col-ready" Printer attribute lists the "finishings-col" member attributes corresponding to each "finishing-template" value for Subunits that are available and media that is loaded. The values are always the same as, or a subset of, the "finishings-col-database" Printer attribute (section 6.9).

6.12 folding-direction-supported (1setOf type1 keyword)

The "folding-direction-supported" Printer attribute lists the supported values for the "folding-direction" (section 5.2.6.1) member attribute.

Deleted: 5.2.5.1

6.13 folding-offset-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX)))

The "folding-offset-supported" Printer attribute lists the supported values for the "folding-offset" (section 5.2.6.2) member attribute.

Deleted: 5.2.5.2

6.14 folding-reference-edge-supported (1setOf type1 keyword)

The "folding-reference-edge-supported" Printer attribute lists the supported values for the "folding-reference-edge" (section 5.2.6.3) member attribute.

Deleted: 5.2.5.3

6.15 laminating-sides-supported (1setOf type1 keyword)

The "laminating-sides-supported" Printer attribute lists the supported values for the "laminating-sides" (section 5.2.8.1) member attribute.

Deleted: 5.2.7.1

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6.16 laminating-type-supported (1setOf (type2 keyword | name(MAX)))

The "laminating-type-supported" Printer attribute lists the supported values for the "laminating-type" (section 5.2.8.2) member attribute.

Deleted: 5.2.7.2

6.17 job-pages-per-set-supported (boolean)

The "job-pages-per-set-supported" Printer Attribute specifies whether the "job-pages-per-set" Job Template attribute (section 5.3) is supported. This attribute MUST be supported if the "job-pages-per-set" attribute is supported.

6.18 printer-finisher (1setOf octetString(MAX))

The "printer-finisher" Printer Description attribute provides current finisher details mapped from the SNMP finDeviceTable defined in IETF Finishing MIB [RFC3806]. This attribute MUST be supported if the Printer implements the IETF Finishing MIB [RFC3806].

The Printer MUST support this attribute if it supports the "printer-finisher-description" attribute (section 6.18.3). If supported, this attribute MUST have the same cardinality (contain the same number of values) as the "printer-finisher-description" attribute. The ith value in the "printer-finisher" attribute corresponds to the ith value in the "printer-finisher-description" attribute.

As with finDeviceTable, Printers MUST only list those finishers that are currently attached.

6.18.1 Keywords for printer-finisher

Table 2 defines the IPP datatypes and keywords for encoding "printer-finisher" from all of the machine-readable (non-localized) columnar objects in finDeviceTable or finDeviceAttributeTable [RFC3806].

Table 2 - Keywords for "printer-finisher"

Finishing MIB Object	IPP Data Type	IPP Keyword	PWG SM Keyword	Conformance
finDeviceTable (note 1)			Finishers	
finDeviceIndex (note 1)	Integer	index	Id	OPTIONAL
finDeviceType	String	type	FinisherType	REQUIRED
finDeviceCapacityUnit	String	unit	FinisherCapacityUnit	REQUIRED
finDeviceMaxCapacity	Integer	maxcapacity	FinisherMax Capacity	REQUIRED
finDeviceCurrentCapacity	Integer	capacity	FinisherCurrent Capacity	REQUIRED
finDevicePresentOnOff	String	presentonoff	FinisherPresentOnOff	OPTIONAL
finDeviceAssociatedMediaPaths	---	---	FinisherAssociatedMediaPaths	---
finDeviceAssociatedOutputs	---	---	FinisherAssociatedOutputs	---
finDeviceStatus	Integer	status	SubunitStates	OPTIONAL

Notes:

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1. finDeviceIndex is OPTIONAL in "printer-finisher", because correlation with the original MIB order is considered unimportant. If "printer-finisher-supplies" is implemented, then finDeviceIndex is REQUIRED.

6.18.2 Encoding of printer-finisher

Values of "printer-finisher" MUST be encoded using a visible subset of the US-ASCII character set [RFC20]. Control codes (0x00 to 0x1F and 0x7F) MUST NOT be used. The ABNF [STD68] [FIN-ABNF] in Figure 5 defines the standard encoding in "printer-finisher" for all the machine-readable (non-localized) columnar objects in finDeviceTable [RFC3806].

Figure 5 - ABNF for "printer-finisher" Values

```
printer-finisher = 1*finisher-required *finisher-optional
    ; set of finisher elements encoded into one value
finisher-required = finisher-req ";"
finisher-req = finisher-type / finisher-unit /
                finisher-max-capacity /
                finisher-capacity
finisher-optional = finisher-opt ";"
finisher-opt = finisher-index / finisher-presentonoff /
                finisher-status / finisher-ext

finisher-type = "type" "=" 1*ALPHA
    ; enumerated value as an alpha string (e.g.,
    ; 'stitcher') of finDeviceType in [RFC3806] mapped
    ; indirectly from the *label* in FinDeviceTypeTC

finisher-unit = "unit" "=" 1*ALPHA
    ; enumerated value as an alpha string (e.g., 'other') of
    ; finDeviceCapacityUnit in [RFC3806] mapped indirectly from
    ; the *label* in PrtCapacityUnitTC in [RFC3805]

finisher-max-capacity = "maxcapacity" "=" 1*[DIGIT / "-"]
    ; integer value as a numeric string mapped directly from
    ; finDeviceMaxCapacity in [RFC3806]

finisher-capacity = "capacity" "=" 1*[DIGIT / "-"]
    ; integer value as a numeric string mapped directly from
    ; finDeviceCurrentCapacity in [RFC3806]

finisher-index = "index" "=" 1*DIGIT
    ; integer value as a numeric string mapped directly from
    ; finDeviceIndex in [RFC3806]

finisher-presentonoff = "presentonoff" "=" 1*ALPHA
    ; string value as an alpha string mapped directly from
    ; PresentOnOff in [RFC3805]

finisher-status = "status" "=" 1*DIGIT
    ; integer value as a numeric string mapped directly from
    ; finDeviceStatus in [RFC3806]
```

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```
finisher-ext      = finisher-extname "=" finisher-extvalue
finisher-extname  = 1*[ALPHA / DIGIT / "-"]
finisher-extvalue = 1*[ALPHA / DIGIT / "-" / "." / ","]
    ; extension point for other MIB values not mapped
```

6.18.3 Example of printer-finisher

The following example shows a "printer-finisher" attribute where its value is a set of two octetString strings encoding the machine-readable (non-localized) columnar objects from the Finisher MIB [RFC3806] finDeviceTable, presented using a PAPI [PAPI] encoding. Each string is wrapped in double-quotes (") for readability.

```
printer-finisher="type=stitcher;unit=sheets;maxcapacity=500;capacity=100;",
                 "type=puncher;unit=sheets;maxcapacity=100;capacity=20;"
```

6.19 printer-finisher-description (1setOf text(MAX))

The "printer-finisher-description" READ-ONLY Printer Status attribute provides current supply descriptions mapped from the SNMP finDeviceDescription object in the finDeviceTable defined in IETF Finishing MIB [RFC3806]. This attribute MUST be supported if the Printer implements the IETF Finishing MIB [RFC3806].

This attribute MUST be supported if the "printer-finisher" (section 6.18) Printer attribute is supported. If supported, this attribute MUST have the same cardinality (contain the same number of values) as the "printer-finisher" attribute. The ith value in the "printer-finisher-description" attribute corresponds to the ith value in the "printer-finisher" attribute.

6.19.1 Encoding of printer-finisher-description

Values of the "printer-finisher-description" attribute MUST be mapped from the corresponding human-readable (localized) values of finDeviceDescription, exactly as follows:

1. Each value of finDeviceDescription MUST be converted from the character set [RFC3808] specified by prtGeneralCurrentLocalization and prtLocalizationCharacterSet into the charset specified by "charset-configured" and then copied into a text value of "printer-finisher-description"; and
2. Each value of "printer-finisher-description" MUST be tagged with the natural language [RFC5646] specified by prtGeneralCurrentLocalization, prtLocalizationLanguage, and prtLocalizationCountry unless the natural language matches the default language used in the response.

6.19.2 Example of printer-finisher-description

The first example shows two instances of the human-readable (localized) columnar object finDeviceDescription in the finDeviceTable encoded into corresponding values of "printer-finisher-description", presented using a PAPI [PAPI] encoding:

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```
printer-finisher-description="Stapler S/N:EXAMPLE-12345","Hole Punch
S/N:EXAMPLE-67890"
```

The second example shows the same values, but also demonstrates tagging with a natural language identifier, presented using a PAPI [PAPI] encoding:

```
printer-finisher-description="Hefter SN:BEISPIEL-12345"(de),"Lochstanze
S/N:BEISPIEL-67890"(de)
```

6.20 printer-finisher-supplies (1setOf octetString(MAX))

The "printer-finisher-supplies" Printer Description attribute describes the finishing unit's supplies, mapped from the SNMP finSupplyTable defined in IETF Finishing MIB [RFC3806]. Although some supplies could be described by the "printer-supply" attribute [PWG5100.13] this attribute supports the full fidelity of the finSupplyTable, which is more descriptive. This attribute MUST be supported if the Printer implements the IETF Finishing MIB [RFC3806] finSupplyTable.

This attribute MUST be supported if the "printer-finisher-supplies-description" (section 6.21) Printer attribute is supported. If supported, this attribute MUST have the same cardinality (contain the same number of values) as the "printer-finisher-supplies-description" attribute. The ith value in the "printer-finisher-supplies" attribute corresponds to the ith value in the "printer-finisher-supplies-description" attribute.

6.20.1 Keywords for printer-finisher-supplies

Table 3 defines the IPP datatypes and keywords for encoding "printer-finisher-supplies" from all of the machine-readable (non-localized) columnar objects in finSupplyTable [RFC3806].

Table 3 - Keywords for "printer-finisher-supplies"

Finishing MIB Object	IPP Data Type	IPP Keyword	PWG SM Keyword	Conformance
finSupplyTable (note 1)			FinisherSupplies	
finSupplyIndex (note 1)	Integer	index	Id	OPTIONAL
finSupplyDeviceIndex (note 2)	Integer	deviceIndex	Id	REQUIRED
finSupplyClass	String	class	FinisherClass	REQUIRED
finSupplyType	String	type	FinisherSupplyType	REQUIRED
finSupplyUnit	String	unit	FinisherSupplyCapacityUnit	REQUIRED
finSupplyMaxCapacity	Integer	max	FinisherSupplyMaxCapacity	REQUIRED
finSupplyCurrentLevel	Integer	level	FinisherSupplyCurrentLevel	REQUIRED
finSupplyColorName	String	color	FinisherSupplyColorName	---

Notes:

1. finSupplyIndex is OPTIONAL in "printer-finisher-supplies", because correlation with the original MIB order is considered unimportant
2. finSupplyDeviceIndex is REQUIRED in "printer-finisher-supplies" because a connection between the supply and the finisher is needed if User / Operator engagement is required for resolving a supply level condition.

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6.20.2 Encoding of printer-finisher-supplies

Values of "printer-finisher-supplies" MUST be encoded using a visible subset of the US-ASCII character set [RFC20]. Control codes (0x00 to 0x1F and 0x7F) MUST NOT be used. The ABNF [STD68] [FIN-ABNF] in Figure 5 defines the standard encoding in "printer-finisher-supplies" for all the machine-readable (non-localized) columnar objects in finSupplyTable [RFC3806].

Figure 6 - ABNF for "printer-finisher-supplies" Values

```
finisher-supply = 1*supply-required *supply-optional
    ; set of finisher supply elements encoded into one value
supply-required = supply-req ";"
supply-req = supply-class / supply-type / supply-description /
             supply-unit / supply-max / supply-current-level /
             supply-color

supply-optional = supply-opt ";"
supply-opt = supply-index / supply-device-index / supply-ext

supply-class = "class" "=" 1*ALPHA
    ; enumerated value as an alpha string (e.g., 'supplyThatIsConsumed')
    ; of prtMarkerSuppliesClass in [RFC3805] mapped indirectly from
    ; the *label* in PrtMarkerSuppliesClassTC in [RFC3805]

supply-type = "type" "=" 1*ALPHA
    ; enumerated value as an alpha string (e.g., 'staples') of
    ; prtMarkerSuppliesType in [RFC3805] mapped indirectly from
    ; the *label* in PrtMarkerSuppliesTypeTC in [RFC3805]

supply-unit = "unit" "=" 1*ALPHA
    ; enumerated value as an alpha string (e.g., 'items' or 'percent')
    ; of finSupplyUnit in [RFC3806] mapped indirectly from the *label*
    ; in PrtMarkerSuppliesSupplyUnitTC in [RFC3805]

supply-max = "max" "=" 1*[DIGIT / "-"]
    ; integer value as a numeric string mapped directly from
    ; finSupplyMaxCapacity in [RFC3806]

supply-current-level = "level" "=" 1*[DIGIT / "-"]
    ; integer value as a numeric string mapped directly from
    ; finSupplyCurrentLevel in [RFC3806]

supply-color = "color" "=" 1*ALPHA
    ; enumerated value as an alpha string (e.g., 'silver') of
    ; finSupplyColorName in [RFC3806] mapped indirectly from the color

; names from PWG Media Standardized Names 2.0

[PWG5101.1]

supply-index = "index" "=" 1*DIGIT
    ; integer value as a numeric string mapped directly from
    ; finSupplyIndex in [RFC3806]
```

Deleted: [PWG5101.1]

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```
supply-device-index = "deviceIndex" "=" 1*ALPHA
    ; string value as an alpha string mapped directly from
    ; finSupplyDeviceIndex in [RFC3806]

supply-ext      = supply-extname "=" supply-extvalue
supply-extname  = 1*[ALPHA / DIGIT / "-"]
supply-extvalue = 1*[ALPHA / DIGIT / "-" / "." / ","]
    ; extension point for other MIB values not mapped
```

6.20.3 Example of printer-finisher-supplies

The following is an example of "printer-finisher-supplies", which contains one supply, presented using a PAPI [PAPI] encoding:

```
printer-finisher-
supplies="class=supplyThatIsConsumed;type=staples;unit=items;max=500;level=100;c
olor=silver;"
```

6.21 printer-finisher-supplies-description (1setOf text(MAX))

The "printer-finisher-supplies-description" READ-ONLY Printer Status attribute provides current supply descriptions mapped from the SNMP finSupplyDescription object in the finSupplyEntry sequences in the finSupplyTable defined in IETF Finishing MIB [RFC3806]. This attribute MUST be supported if the Printer implements the IETF Finishing MIB [RFC3806] finSupplyTable.

This attribute MUST be supported if the "printer-finisher-supplies" (section 6.18) Printer attribute is supported. If supported, this attribute MUST have the same cardinality (contain the same number of values) as the "printer-finisher-supplies" attribute. The ith value in the "printer-finisher-supplies-description" attribute corresponds to the ith value in the "printer-finisher-supplies" attribute.

6.21.1 Encoding of printer-finisher-supplies-description

Values of the "printer-finisher-supplies-description" attribute MUST be mapped from the corresponding human-readable (localized) values of finSupplyDescription, exactly as follows:

1. Each value of finSupplyDescription MUST be converted from the character set [RFC3808] specified by prtGeneralCurrentLocalization and prtLocalizationCharacterSet into the charset specified by "charset-configured" and then copied into a text value of "printer-finisher-supplies-description"; and
2. Each value of "printer-finisher-supplies-description" MUST be tagged with the natural language [RFC5646] specified by prtGeneralCurrentLocalization, prtLocalizationLanguage, and prtLocalizationCountry unless the natural language matches the default language used in the response.

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6.21.2 Example of printer-finisher-supplies-description

The first example shows two instances of the human-readable (localized) columnar object finSupplyDescription in the finSupplyTable encoded into corresponding values of "printer-finisher-supplies-description", presented using a PAPI [PAPI] encoding:

```
printer-finisher-supplies-description="Staples","Staples"
```

The second example shows the same values, but also demonstrates tagging with a natural language identifier, presented using a PAPI [PAPI] encoding:

```
printer-finisher-supplies-description="Heftklammern"(de),"Heftklammern"(de)
```

6.22 punching-hole-diameter-configured (integer(0:MAX))

The "punching-hole-diameter-configured" member attribute specifies the diameter of the punched hole, measured in hundredths of millimeters (1/2540th of an inch). If this attribute is not provided by the Printer, the value is assumed to be 790 (7.9mm or 5/16in.) for media sizes whose dimensions are measured in inches, or 650 (6.5mm) for media sizes whose dimensions are measured in millimeters.

6.23 punching-locations-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX)))

The "punching-locations-supported" Printer attribute lists the supported values for the "punching-locations" (section 5.2.12.1) member attribute.

Deleted: 5.2.11.1

6.24 punching-offset-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX)))

The "punching-offset-supported" Printer attribute lists the supported values for the "punching-offset" (section 5.2.12.2) member attribute.

Deleted: 5.2.11.2

6.25 punching-reference-edge-supported (1setOf type1 keyword)

The "punching-reference-edge-supported" Printer attribute lists the supported values for the "punching-reference-edge" (section 5.2.12.3) member attribute.

Deleted: 5.2.11.3

6.26 stitching-angle-supported (1setOf (integer(0:359) | rangeOfInteger(0:359)))

The "stitching-angle-supported" Printer attribute lists the supported values for the "stitching-angle" (section 5.2.13.1) member attribute.

Deleted: 5.2.12.1

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6.27 stitching-locations-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX)))

The "stitching-locations-supported" Printer attribute lists the supported values for the "stitching-locations" (section 5.2.13.1) member attribute.

Deleted: 5.2.12.1

6.28 stitching-method-supported (1setOf type2 keyword)

The "stitching-method-supported" Printer attribute lists the supported values for the "stitching-method" (section 5.2.13.3) member attribute.

Deleted: 5.2.12.3

6.29 stitching-offset-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX)))

The "stitching-offset-supported" Printer attribute lists the supported values for the "stitching-offset" (section 5.2.13.3) member attribute.

Deleted: 5.2.12.3

6.30 stitching-reference-edge-supported (1setOf type1 keyword)

The "stitching-reference-edge-supported" Printer attribute lists the supported values for the "stitching-reference-edge" (section 5.2.13.5) member attribute.

Deleted: 5.2.12.5

6.31 trimming-offset-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX)))

The "trimming-offset-supported" Printer attribute lists the supported values for the "trimming-offset" (section 5.2.14.1) member attribute.

Deleted: 5.2.13.1

6.32 trimming-reference-edge-supported (1setOf type1 keyword)

The "trimming-reference-edge-supported" Printer attribute lists the supported values for the "trimming-reference-edge" (section 5.2.14.2) member attribute.

Deleted: 5.2.13.2

6.33 trimming-type-supported (1setOf type2 keyword)

The "trimming-type-supported" Printer attribute lists the supported values for the "trimming-type" (section 5.2.14.3) member attribute.

Deleted: 5.2.13.3

6.34 trimming-when-supported (1setOf type2 keyword)

The "trimming-when-supported" Printer attribute lists the supported values for the "trimming-when" (section 5.2.14.4) member attribute.

Deleted: 5.2.13.4

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7. Conformance Requirements

This section summarizes the Conformance Requirements detailed in the definitions in this document for Clients and Printers.

7.1 Conformance Requirements for Clients

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

1. The IPP Printer attributes defined in section 6;
2. The IPP Job Template attributes defined in section 5;
3. The internationalization considerations in section 8; and
4. The security considerations in section 9.

7.2 Conformance Requirements for Printers

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

1. The IPP Printer attributes for any supported finishings defined in section 6;
2. The IPP Job Template attributes for any supported finishings defined in section 5;
3. The internationalization considerations in section 8; and
4. The security considerations in section 9.

8. 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
2. 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 IPP Clients and subsequently storing the results (e.g., in IPP Job objects) could cause false negatives in IPP Client searches and failed access (e.g., to IPP Printers with percent-encoded UTF-8 URIs now 'hidden').

Deleted: For interoperability and basic support for multiple languages, conforming implementations MUST support: ... [4]

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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 Character Encoding Model [UTR17] – multi-layer character model
- Unicode in XML and other Markup Languages [UTR20] – XML usage
- Unicode Character Property Model [UTR23] – character properties
- Unicode Conformance Model [UTR33] – Unicode conformance basis+
- Unicode Collation Algorithm [UTS10] – sorting
- Unicode Locale Data Markup Language [UTS35] – locale databases

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9. Security Considerations

In addition to the security considerations described in the IPP/1.1: Model and Semantics [RFC8011], implementations MAY support different access control to various finishing features, depending on the identity of the User submitting the Job.

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

- Unicode Security Mechanisms [UTS39] – detecting and avoiding security attacks
- Unicode Security FAQ [UNISECFAQ] – common Unicode security issues

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10. IANA and PWG Considerations

10.1 Attribute Registrations

The attributes defined in this document will be published by IANA according to the procedures in IPP Model and Semantics [RFC8011] section 6.2 in the following file:

http://www.iana.org/assignments/ipp-registrations

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The registry entries will contain the following information:

Job Template attributes:	Reference
finishings-col (no-value | 1setOf collection)	[PWG5100.1]
baling (collection)	[PWG5100.1]
baling-type (type2 keyword | name(MAX))	[PWG5100.1]
baling-when (type2 keyword)	[PWG5100.1]
binding (collection)	[PWG5100.1]
binding-reference-edge (type1 keyword)	[PWG5100.1]
binding-type (type2 keyword | name(MAX))	[PWG5100.1]
coating (collection)	[PWG5100.1]
coating-sides (type1 keyword)	[PWG5100.1]
coating-type (type2 keyword | name(MAX))	[PWG5100.1]
covering (collection)	[PWG5100.1]
covering-name (type2 keyword | name(MAX))	[PWG5100.1]
finishing-template (name(MAX) | type2 keyword)	[PWG5100.1]
folding (1setOf collection)	[PWG5100.1]
folding-direction (type1 keyword)	[PWG5100.1]
folding-offset (integer(0:MAX))	[PWG5100.1]
folding-reference-edge (type1 keyword)	[PWG5100.1]
imposition-template (type2 keyword | name(MAX))	[PWG5100.1]
laminating (collection)	[PWG5100.1]
laminating-sides (type1 keyword)	[PWG5100.1]
laminating-type (type2 keyword | name(MAX))	[PWG5100.1]
media-sheets-supported (rangeOfInteger(1:MAX))	[PWG5100.1]
media-size (collection)	[PWG5100.1]
media-size-name (type2 keyword)	[PWG5100.1]
punching (collection)	[PWG5100.1]
punching-locations (1setOf integer(0:MAX))	[PWG5100.1]
punching-offset (integer(0:MAX))	[PWG5100.1]
punching-reference-edge (type1 keyword)	[PWG5100.1]
stitching (collection)	[PWG5100.3]
stitching-angle (integer(0:359))	[PWG5100.1]
stitching-method (type2 keyword]	[PWG5100.1]
trimming (1setOf collection)	[PWG5100.1]
trimming-offset (integer(0:MAX))	[PWG5100.1]
trimming-reference-edge (type1 keyword)	[PWG5100.1]
trimming-type (type2 keyword | name(MAX))	[PWG5100.1]
trimming-when (type2 keyword)	[PWG5100.1]
job-pages-per-set (integer(1:MAX))	[PWG5100.1]

Printer Description attributes:	Reference
baling-type-supported (1setOf (type2 keyword | name(MAX)))	[PWG5100.1]
baling-when-supported (1setOf type2 keyword)	[PWG5100.1]
binding-reference-edge-supported (1setOf type1 keyword)	[PWG5100.1]
binding-type-supported (1setOf type2 keyword)	[PWG5100.1]
coating-sides-supported (1setOf type1 keyword)	[PWG5100.1]
coating-type-supported (1setOf (type2 keyword | name(MAX)))	[PWG5100.1]
covering-name-supported (1setOf (type2 keyword | name(MAX)))	[PWG5100.1]
finishing-template-supported (1setOf (name(MAX) | type2 keyword))	[PWG5100.1]
finishings-col-database (1setOf collection)	[PWG5100.1]

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```
    < member attributes are the same as finishings-col >      [PWG5100.1]
  folding-direction-supported (1setOf type1 keyword)          [PWG5100.1]
  folding-offset-supported (1setOf (integer(0:MAX) | rangeOfInteger(0:MAX))
                                                              [PWG5100.1]
  folding-reference-edge-supported (1setOf type1 keyword)     [PWG5100.1]
  laminating-sides-supported (1setOf type1 keyword)           [PWG5100.1]
  laminating-type-supported (1setOf (type2 keyword | name(MAX)))
                                                              [PWG5100.1]
  job-pages-per-set-supported (boolean)                       [PWG5100.1]
  printer-finisher (1setOf octetString(MAX))                  [PWG5100.1]
  printer-finisher-description (1setOf text(MAX))             [PWG5100.1]
  printer-finisher-supplies (1setOf octetString(MAX))         [PWG5100.1]
  printer-finisher-supplies-description (1setOf text(MAX))    [PWG5100.1]
  punching-hole-diameter-configured (integer(0:MAX))          [PWG5100.1]
  punching-locations-supported (1setOf (integer(0:MAX) |
        rangeOfInteger(0:MAX)))                               [PWG5100.1]
  punching-offset-supported (1setOf (integer(0:MAX) |
        rangeOfInteger(0:MAX)))                               [PWG5100.1]
  punching-reference-edge-supported (1setOf type1 keyword)    [PWG5100.1]
  stitching-angle-supported (1setOf (integer(0:359) |
        rangeOfInteger(0:359)))                               [PWG5100.1]
  stitching-method-supported (1setOf (type2 keyword))         [PWG5100.1]
  trimming-offset-supported (1setOf (integer(0:MAX) |
        rangeOfInteger(0:MAX)))                               [PWG5100.1]
  trimming-reference-edge-supported (1setOf type1 keyword)    [PWG5100.1]
  trimming-type-supported (1setOf type2 keyword)              [PWG5100.1]
  trimming-when-supported (1setOf type2 keyword)              [PWG5100.1]
```

10.2 Attribute Value Registrations

The keyword attribute values defined in this document will be published by IANA according to the procedures in the IPP Model and Semantics [RFC8011] section 6.1 in the following file:

http://www.iana.org/assignments/ipp-registrations

The registry entries will contain the following information:

```
  Attributes (attribute syntax)
    Keyword Attribute Value                                   Reference
    -----------------------                                   ---------
  baling-type (type2 keyword | name(MAX))                     [PWG5100.1]
    band                                                      [PWG5100.1]
    shrink-wrap                                               [PWG5100.1]
    wrap                                                      [PWG5100.1]
  baling-type-supported (1setOf (type2 keyword | name(MAX)))  [PWG5100.1]
    < all baling-type values >

  baling-when (type2 keyword)                                 [PWG5100.1]
    after-sets                                                [PWG5100.1]
    after-job                                                 [PWG5100.1]
  baling-when-supported (1setOf type2 keyword)                [PWG5100.1]
    < all baling-when values >                                [PWG5100.1]
```

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```
      binding-reference-edge (type1 keyword)                    [PWG5100.1]
        bottom                                                  [PWG5100.1]
        left                                                    [PWG5100.1]
        right                                                   [PWG5100.1]
        top                                                     [PWG5100.1]
      binding-reference-edge-supported (1setOf type1 keyword)   [PWG5100.1]
        < all binding-reference-edge values >                   [PWG5100.1]

      binding-type (type2 keyword | name(MAX))                  [PWG5100.1]
        adhesive                                                [PWG5100.1]
        comb                                                    [PWG5100.1]
        flat                                                    [PWG5100.1]
        padding                                                 [PWG5100.1]
        perfect                                                 [PWG5100.1]
        spiral                                                  [PWG5100.1]
        tape                                                    [PWG5100.1]
        velo                                                    [PWG5100.1]
      binding-type-supported ((1setOf type2 keyword | name(MAX))) [PWG5100.1]
        < all binding-type values >                             [PWG5100.1]

      coating-sides (type1 keyword)                             [PWG5100.1]
        back                                                    [PWG5100.1]
        both                                                    [PWG5100.1]
        front                                                   [PWG5100.1]
      coating-sides-supported (1setOf type1 keyword)            [PWG5100.1]
        < all coating-sides values >                            [PWG5100.1]

      coating-type (type2 keyword | name(MAX))                  [PWG5100.1]
        archival                                                [PWG5100.1]
        archival-glossy                                         [PWG5100.1]
        archival-matte                                          [PWG5100.1]
        archival-semi-gloss                                     [PWG5100.1]
        glossy                                                  [PWG5100.1]
        high-gloss                                              [PWG5100.1]
        matte                                                   [PWG5100.1]
        semi-gloss                                              [PWG5100.1]
        silicone                                                [PWG5100.1]
        translucent                                             [PWG5100.1]
      coating-type-supported ((1setOf type2 keyword | name(MAX))) [PWG5100.1]
        < all coating-type values >                             [PWG5100.1]

      covering-name (type2 keyword | name(MAX))                 [PWG5100.1]
        plain                                                   [PWG5100.1]
        pre-cut                                                 [PWG5100.1]
        pre-printed                                             [PWG5100.1]
      covering-name-supported (1setOf (type2 keyword | name(MAX)))
                                                                [PWG5100.1]
        < all covering-name values >                            [PWG5100.1]

      finishing-template (name(MAX) | type2 keyword)            [PWG5100.1]
        bale                                                    [PWG5100.1]
        bind                                                    [PWG5100.1]
        bind-bottom                                             [PWG5100.1]
        bind-left                                               [PWG5100.1]
        bind-right                                              [PWG5100.1]
        bind-top                                                [PWG5100.1]
```

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booklet-maker	[PWG5100.1]
coat	[PWG5100.1]
cover	[PWG5100.1]
edge-stitch	[PWG5100.1]
edge-stitch-bottom	[PWG5100.1]
edge-stitch-left	[PWG5100.1]
edge-stitch-right	[PWG5100.1]
edge-stitch-top	[PWG5100.1]
fold	[PWG5100.1]
fold-accordion	[PWG5100.1]
fold-double-gate	[PWG5100.1]
fold-engineering-z	[PWG5100.1]
fold-gate	[PWG5100.1]
fold-half	[PWG5100.1]
fold-half-z	[PWG5100.1]
fold-left-gate	[PWG5100.1]
fold-letter	[PWG5100.1]
fold-parallel	[PWG5100.1]
fold-poster	[PWG5100.1]
fold-right-gate	[PWG5100.1]
fold-z	[PWG5100.1]
jdf-f2-1	[PWG5100.1]
jdf-f4-1	[PWG5100.1]
jdf-f4-2	[PWG5100.1]
jdf-f6-1	[PWG5100.1]
jdf-f6-2	[PWG5100.1]
jdf-f6-3	[PWG5100.1]
jdf-f6-4	[PWG5100.1]
jdf-f6-5	[PWG5100.1]
jdf-f6-6	[PWG5100.1]
jdf-f6-7	[PWG5100.1]
jdf-f6-8	[PWG5100.1]
jdf-f8-1	[PWG5100.1]
jdf-f8-2	[PWG5100.1]
jdf-f8-3	[PWG5100.1]
jdf-f8-4	[PWG5100.1]
jdf-f8-5	[PWG5100.1]
jdf-f8-6	[PWG5100.1]
jdf-f8-7	[PWG5100.1]
jdf-f10-1	[PWG5100.1]
jdf-f10-2	[PWG5100.1]
jdf-f10-3	[PWG5100.1]
jdf-f12-1	[PWG5100.1]
jdf-f12-2	[PWG5100.1]
jdf-f12-3	[PWG5100.1]
jdf-f12-4	[PWG5100.1]
jdf-f12-5	[PWG5100.1]
jdf-f12-6	[PWG5100.1]
jdf-f12-7	[PWG5100.1]
jdf-f12-8	[PWG5100.1]
jdf-f12-9	[PWG5100.1]
jdf-f12-10	[PWG5100.1]
jdf-f12-11	[PWG5100.1]
jdf-f12-12	[PWG5100.1]
jdf-f12-13	[PWG5100.1]
jdf-f12-14	[PWG5100.1]

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jdf-f14-1	[PWG5100.1]
jdf-f16-1	[PWG5100.1]
jdf-f16-2	[PWG5100.1]
jdf-f16-3	[PWG5100.1]
jdf-f16-4	[PWG5100.1]
jdf-f16-5	[PWG5100.1]
jdf-f16-6	[PWG5100.1]
jdf-f16-7	[PWG5100.1]
jdf-f16-8	[PWG5100.1]
jdf-f16-9	[PWG5100.1]
jdf-f16-10	[PWG5100.1]
jdf-f16-11	[PWG5100.1]
jdf-f16-12	[PWG5100.1]
jdf-f16-13	[PWG5100.1]
jdf-f16-14	[PWG5100.1]
jdf-f18-1	[PWG5100.1]
jdf-f18-2	[PWG5100.1]
jdf-f18-3	[PWG5100.1]
jdf-f18-4	[PWG5100.1]
jdf-f18-5	[PWG5100.1]
jdf-f18-6	[PWG5100.1]
jdf-f18-7	[PWG5100.1]
jdf-f18-8	[PWG5100.1]
jdf-f18-9	[PWG5100.1]
jdf-f20-1	[PWG5100.1]
jdf-f20-2	[PWG5100.1]
jdf-f24-1	[PWG5100.1]
jdf-f24-2	[PWG5100.1]
jdf-f24-3	[PWG5100.1]
jdf-f24-4	[PWG5100.1]
jdf-f24-5	[PWG5100.1]
jdf-f24-6	[PWG5100.1]
jdf-f24-7	[PWG5100.1]
jdf-f24-8	[PWG5100.1]
jdf-f24-9	[PWG5100.1]
jdf-f24-10	[PWG5100.1]
jdf-f24-11	[PWG5100.1]
jdf-f28-1	[PWG5100.1]
jdf-f32-1	[PWG5100.1]
jdf-f32-2	[PWG5100.1]
jdf-f32-3	[PWG5100.1]
jdf-f32-4	[PWG5100.1]
jdf-f32-5	[PWG5100.1]
jdf-f32-6	[PWG5100.1]
jdf-f32-7	[PWG5100.1]
jdf-f32-8	[PWG5100.1]
jdf-f32-9	[PWG5100.1]
jdf-f36-1	[PWG5100.1]
jdf-f36-2	[PWG5100.1]
jdf-f40-1	[PWG5100.1]
jdf-f48-1	[PWG5100.1]
jdf-f48-2	[PWG5100.1]
jdf-f64-1	[PWG5100.1]
jdf-f64-2	[PWG5100.1]
jog-offset	[PWG5100.1]
laminate	[PWG5100.1]

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```
        punch                                                   [PWG5100.1]
        punch-bottom-left                                       [PWG5100.1]
        punch-bottom-right                                      [PWG5100.1]
        punch-dual-bottom                                       [PWG5100.1]
        punch-dual-left                                         [PWG5100.1]
        punch-dual-right                                        [PWG5100.1]
        punch-dual-top                                          [PWG5100.1]
        punch-multiple-bottom                                   [PWG5100.1]
        punch-multiple-left                                     [PWG5100.1]
        punch-multiple-right                                    [PWG5100.1]
        punch-multiple-top                                      [PWG5100.1]
        punch-quad-bottom                                       [PWG5100.1]
        punch-quad-left                                         [PWG5100.1]
        punch-quad-right                                        [PWG5100.1]
        punch-quad-top                                          [PWG5100.1]
        punch-top-left                                          [PWG5100.1]
        punch-top-right                                         [PWG5100.1]
        punch-triple-bottom                                     [PWG5100.1]
        punch-triple-left                                       [PWG5100.1]
        punch-triple-right                                      [PWG5100.1]
        punch-triple-top                                        [PWG5100.1]
        saddle-stitch                                           [PWG5100.1]
        staple                                                  [PWG5100.1]
        staple-bottom-left                                      [PWG5100.1]
        staple-bottom-right                                     [PWG5100.1]
        staple-dual-bottom                                      [PWG5100.1]
        staple-dual-left                                        [PWG5100.1]
        staple-dual-right                                       [PWG5100.1]
        staple-dual-top                                         [PWG5100.1]
        staple-top-left                                         [PWG5100.1]
        staple-top-right                                        [PWG5100.1]
        staple-triple-bottom                                    [PWG5100.1]
        staple-triple-left                                      [PWG5100.1]
        staple-triple-right                                     [PWG5100.1]
        staple-triple-top                                       [PWG5100.1]
        trim                                                    [PWG5100.1]
        trim-after-copies                                       [PWG5100.1]
        trim-after-documents                                    [PWG5100.1]
        trim-after-job                                          [PWG5100.1]
        trim-after-pages                                        [PWG5100.1]
      finishing-template-supported (1setOf (type2 keyword | name(MAX))
                                                                [PWG5100.1]
        < any finishing-template value >                        [PWG5100.1]

      folding-direction (type1 keyword)                         [PWG5100.1]
        inward                                                  [PWG5100.1]
        outward                                                 [PWG5100.1]
      folding-direction-supported (1setOf type1 keyword)        [PWG5100.1]
        < all folding-direction values >                        [PWG5100.1]

      folding-reference-edge (type1 keyword)                    [PWG5100.1]
        bottom                                                  [PWG5100.1]
        left                                                    [PWG5100.1]
        right                                                   [PWG5100.1]
        top                                                     [PWG5100.1]
      folding-reference-edge-supported (1setOf type1 keyword)   [PWG5100.1]
```

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```
    < all folding-reference-edge values >                    [PWG5100.1]

  laminating-sides (type1 keyword)                           [PWG5100.1]
    back                                                     [PWG5100.1]
    both                                                     [PWG5100.1]
    front                                                    [PWG5100.1]
  laminating-sides-supported (1setOf type1 keyword)          [PWG5100.1]
    < all laminating-sides values >                          [PWG5100.1]

  laminating-type (type2 keyword | name(MAX))                [PWG5100.1]
    archival                                                 [PWG5100.1]
    glossy                                                   [PWG5100.1]
    high-gloss                                               [PWG5100.1]
    matte                                                    [PWG5100.1]
    semi-gloss                                               [PWG5100.1]
    translucent                                              [PWG5100.1]
  laminating-type-supported ((1setOf type2 keyword | name(MAX)))
                                                             [PWG5100.1]
    < all laminating-type values >                           [PWG5100.1]

  punching-reference-edge (type1 keyword)                    [PWG5100.1]
    bottom                                                   [PWG5100.1]
    left                                                     [PWG5100.1]
    right                                                    [PWG5100.1]
    top                                                      [PWG5100.1]
  punching-reference-edge-supported (1setOf type1 keyword)   [PWG5100.1]
    < all punching-reference-edge values >                   [PWG5100.1]

  stitching-method (type2 keyword)                           [PWG5100.1]
    auto                                                     [PWG5100.1]
    crimp                                                    [PWG5100.1]
    wire                                                     [PWG5100.1]
  stitching-method-supported (1setOf type2 keyword)          [PWG5100.1]
    < all stitching-method values >                          [PWG5100.1]

  trimming-reference-edge (type1 keyword)                    [PWG5100.1]
    bottom                                                   [PWG5100.1]
    left                                                     [PWG5100.1]
    right                                                    [PWG5100.1]
    top                                                      [PWG5100.1]
  trimming-reference-edge-supported (1setOf type1 keyword)   [PWG5100.1]
    < all trimming-reference-edge values >                   [PWG5100.1]

  trimming-type (type2 keyword | name(MAX))                  [PWG5100.1]
    draw-line                                                [PWG5100.1]
    full                                                     [PWG5100.1]
    partial                                                  [PWG5100.1]
    perforate                                                [PWG5100.1]
    score                                                    [PWG5100.1]
    tab                                                      [PWG5100.1]
  trimming-type-supported (1setOf type2 keyword)             [PWG5100.1]
    < all trimming-type values >                             [PWG5100.1]

  trimming-when (type2 keyword)                              [PWG5100.1]
    after-documents                                          [PWG5100.1]
    after-job                                                [PWG5100.1]
```

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```
    after-sheets                                    [PWG5100.1]
    after-sets                                      [PWG5100.1]
  trimming-when-supported (1setOf type2 keyword)    [PWG5100.1]
    < all trimming-when values >                    [PWG5100.1]
```

10.3 Type2 enum Attribute Value Registrations

The enumerations defined in this document will be published by IANA according to the procedures in the IPP Model and Semantics [RFC8011] section 6.2 in the following file:

http://www.iana.org/assignments/ipp-registrations

The registry entries will contain the following information:

```
Attributes (attribute syntax)
  Enum Value      Enum Symbolic Name                Reference
  ----------      ------------------                ---------
finishings (1setOf type2 enum)                      [RFC8011]
  15              coat                              [PWG5100.1]
  16              laminate                          [PWG5100.1]
  32              staple-triple-left                [PWG5100.1]
  33              staple-triple-top                 [PWG5100.1]
  34              staple-triple-right               [PWG5100.1]
  35              staple-triple-bottom              [PWG5100.1]
  70              punch-top-left                    [PWG5100.1]
  71              punch-bottom-left                 [PWG5100.1]
  72              punch-top-right                   [PWG5100.1]
  73              punch-bottom-right                [PWG5100.1]
  74              punch-dual-left                   [PWG5100.1]
  75              punch-dual-top                    [PWG5100.1]
  76              punch-dual-right                  [PWG5100.1]
  77              punch-dual-bottom                 [PWG5100.1]
  78              punch-triple-left                 [PWG5100.1]
  79              punch-triple-top                  [PWG5100.1]
  80              punch-triple-right                [PWG5100.1]
  81              punch-triple-bottom               [PWG5100.1]
  82              punch-quad-left                   [PWG5100.1]
  83              punch-quad-top                    [PWG5100.1]
  84              punch-quad-right                  [PWG5100.1]
  85              punch-quad-bottom                 [PWG5100.1]
  86              punch-multiple-left               [PWG5100.1]
  87              punch-multiple-top                [PWG5100.1]
  88              punch-multiple-right              [PWG5100.1]
  89              punch-multiple-bottom             [PWG5100.1]
  90              fold-accordion                    [PWG5100.1]
  91              fold-double-gate                  [PWG5100.1]
  92              fold-gate                         [PWG5100.1]
  93              fold-half                         [PWG5100.1]
  94              fold-half-z                       [PWG5100.1]
  95              fold-left-gate                    [PWG5100.1]
  96              fold-letter                       [PWG5100.1]
  97              fold-parallel                     [PWG5100.1]
  98              fold-poster                       [PWG5100.1]
  99              fold-right-gate                   [PWG5100.1]
```

Deleted: [RFC2911]

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```
100             fold-z                          [PWG5100.1]
101             fold-engineering-z              [PWG5100.1]
```

10.4 PWG Semantic Model Registrations

The IPP attributes and values defined in this specification and listed in the preceding sections will be added to the PWG Semantic Model XML schema using the method defined in section 21 of [PWG5108.07].

Deleted: [PWG5108.07]

11. Overview of Changes

11.1 Changes in IPP Finishings v2.1

The following changes were made for IPP Finishings v2.1:

- Added finishing enums and templates for multiple-hole punching and an engineering Z fold.
- Defined an extension naming convention for the "finishing-template" member attribute.
- Added the "media-sheets-supported" member attribute for the "finishings-col-database" and "finishings-col-ready" attributes.
- Added the "stitching-method" member attribute for the "finishings-col", "finishings-col-database", and "finishings-col-ready" attributes.
- Added the "printer-finisher-supplies" and "printer-finisher-supplies-description" attributes.

11.2 Changes in IPP Finishings v2.0

The following changes were made for IPP Finishings v2.0:

- Moved definition of PWG 5100.3 "finishings-col" attribute to this document and added new member attributes for all finishings processes.
- Added finishing enums and templates for coating, lamination, triple stapling, different kinds of punching, and common folds.
- Added the "finishings-col-database" and "job-pages-per-set" attributes.
- Added the "media-size" and "media-size-name" member attributes for the "finishings-col-database" and "finishings-col-ready" attributes.

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Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Moved down [1]: [PWG5108.07] P. Zehler, "PWG Print Job Ticket and Associated Capabilities Version 1.0 (PJT)", PWG 5108.07-2012, August 2012, http://ftp.pwg.org/pub/pwg/candidates/cs-sm20-pjt10-20120801-5108.07.pdf

Field Code Changed

Field Code Changed

Moved (insertion) [1]

Field Code Changed

Field Code Changed

Field Code Changed

Deleted: http://www.ietf.org/rfc/rfc2119.txt

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[RFC3806] R. Bergman, H. Lewis, I. McDonald, "Printer Finishing MIB", RFC 3806, June 2004, https://tools.ietf.org/html/rfc3806

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

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14. Change History

14.1 February 16, 2017

Updated to resolve editorial comments received during formal vote:

- From Mike Sweet (Apple):
  - Section 5.2.4.3 should be a level 3 heading (covering)

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- IANA considerations are missing definitions of the following finishings-col member attributes: imposition-template, media-sheets-supported, media-size, media-size-name
- IANA considerations are missing definitions of the following Printer Description attributes: printer-finisher-supplies, printer-finisher-supplies-description

- From Smith Kennedy (HP Inc.):
  - Replace all references to RFC 2910 to instead point to RFC 8010
  - Replace all references to RFC 2911 to instead point to RFC 8011
- From IPP WG meeting review 2017-03-02
  - Removed RFC 3382 references and mention since RFC 8011 deprecates it
  - Added Internationalization Considerations content from IPP3D
  - Added Security Considerations content from IPP3D where appropriate
  - Changed all IETF RFC links to use the general form "https://tools.ietf.org/html/rfc/rfcXXXX" rather than the traditional form "http://www.ietf.org/rfc/rfcXXXX.txt"

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14.2 January 17, 2017

Updated Last Call Resolved Comments draft:

- SK1: Reworded first paragraph of section 5.3 to better articulate the relationship between "copies", "job-pages-per-set" and document formats.
- JR3: From "REJECTED" to "RESOLVED (IN SPIRIT)", and also adopted the SMI vendor extension scheme from RFC 8011 draft, which will be the new PWG norm. Also fixed references cascading from new SMI vendor extension convention.
- WW1: Drop "Loosely stated" from second sentence of Section 4.

14.3 January 11, 2017

Last Call Resolved Comments draft:

- SK1: Add to the definition of "job-pages-per-set" mention that the value for this attribute MUST match "copies" if "copies" is included in the job creation / document submission operation.

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- SK2: Replace "media-source-feed-orientation" with "media-source-feed-direction" in the "job-constraints-supported" / "job-resolvers-supported" example on page 45
- JR1: Section 3.3.3 explicitly discusses ordering of options yet in 3.4 Out of Scope #1 claims the opposite.

14.4 November 9, 2016

Minor editorial changes

- Added new section 11 "Overview of Changes"
- Minor rewording of a sentence to fix Word formatting weirdness that occurs when a reference is at the start of a paragraph.

14.5 October 25, 2016

Updated as per notes from Oct. 19, 2016 IPP WG Meeting to resolve a wide range of editorial issues. No technical updates. Possibly ready for WGLC.

- Fixed ABNF / tables / examples in 6.18-6.21
- Cross-referenced "job-media-sheets-supported"
- Various editorial fixes

14.6 October 18, 2016

A variety of issues resolved following feedback and discussion in the WG meeting and on the reflector:

- Added a new "media-sheets-supported" member attribute to "finishings-col" to specify the minimum and maximum number of sheets supported by the finishing template described in the "finishings-col", because this now allows it to be specified on a per-finishing-template basis.
- Updated definition of "printer-finisher-supplies" to have correct ABNF and examples
- Added a new "printer-finisher-supplies-description" attribute to convey the localized string label for a "printer-finisher-supplies" supply.
- Add a non-normative reference to the PAPI specification.
- Fixed the structure of several of the examples to use a PAPI syntactic presentation, for consistency with other recent PWG specifications and other examples within this specification

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- Added IANA listings for 'punch-multiple-bottom', 'punch-multiple-left', 'punch-multiple-right', and 'punch-multiple-top', for completeness.

14.7 October 4, 2016

Updated following discussion on IPP reflector and other discussions:

- In section 5.3 , enhanced definition of "job-pages-per-set" to clarify that the value needs to be an exact multiple of the number of pages in all Documents in the Job, which also clarifies the expectations of how that attribute value is set in the case of a multiple document Job.
- Modified the "job-constraints-supported" attribute example at the end of section 6.9:
    - Removed mention of "media-source"='tray-2' because the input source doesn't matter.
    - Added a second value to "finishings" and "finishing-template" so that the example illustrates that attributes in a constraint can have more than one value even when the attribute itself is defined to have only one value. Also called this out with an additional sentence below the example.
    - Moved open curly braces to the same line as the equal sign to reduce number of lines used
- Modified the "job-resolvers-supported" attribute example at the end of section 6.9:
    - make the resolution either use "short-edge-feed" or to change the media source to 'manual' where the user might be instructed via a prompt to provide the needed media size and feed orientation.
    - Moved open curly braces to the same line as the equal sign to reduce number of lines used
    - Removed mention of alternate stitching angles because they don't resolve the problem

14.8 September 26, 2016

In the process of considering how the Printer can indicate the maximum number of sheets supported by one of its finisher units, a few additions were made.

- Made some modifications to the "printer-finisher" definition including updates to 'Table 2 - Keywords for "printer-finisher"'.

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- Added a new "printer-finisher-supplies" attribute that conveys the finisher unit's supplies information, which is defined in "Printer Finishing MIB" [RFC3806] but has no IPP equivalent.

- Added a comment to section 5.3 "job-pages-per-set" asking for a description of how "job-pages-per-set" would work in the case where the Job contains multiple Documents.

14.9 August 15, 2016

Updated to Stable draft status. No changes other than updating the status label and the date.

14.10 July 28, 2016

Updated to become a Prototype draft as per minutes and discussion in July 25, 2016 IPP WG meeting:

- Fix wording in section 5.1

- Fix formatting in section 5.2

- Update text in 5.2.1

- Change all double quotes around values to single quotes

- Change all uses of the word "Job" to be capitalized

- Reworded section 6.10 a bit, and fixed example for "job-constraints-supported" and "job-resolvers-supported"

- Fixed formatting of subsections of 6.18 which got messed up through the amazing powers of MS Word

- Various editorial fixes to clean up the document

14.11 July 20, 2016

Updated as per minutes from IPP Working Group meetings on May 23 and June 13, 2016 and additional email dialogs on the IPP Working Group reflector:

- Added subtype naming convention to definition of "finishing-template" to support, for instance, the Swedish "trio binding" 4-hole punch pattern without having to define a new base "finishings" enum value and "finishing-template" keyword

- Elaborated description of "finishings-col-database" to cover several needed topics

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2551 ○ Updated the example to include "punch-triple-left" and renamed "staple" to be
2552 "staple-top-left"

2553 ○ Used the example to clarify that the "finishings-col" collections each could
2554 define the details of a particular "finishing-template" keyword, and that
2555 combinatorial permutations produced by combining 2 or more keyword
2556 definitions (e.g. "staple-top-left_punch-triple-left") could not be enumerated in
2557 "finishings-col-database" or "finishings-col-ready"; a Client could be able to
2558 combine them on its own

2559 ○ Recommended the use of "job-constraints-supported" and "job-resolvers-
2560 supported" to define limitations between "finishings-col" collections and
2561 particular feed orientations or similar interactions between finishings attributes
2562 and other Job Template attributes (e.g.

2563 • Removed "feed-orientation" member attribute from "finishings-col" because this is
2564 now handled using "job-constraints-supported" and "job-resolvers-supported"

2565 • Updated Figure 1 and Figure 2 and added a new Figure 3 to show the orientation and
2566 leading edge with “feed-orientation" = 'long-edge-first'

2567 • Added a missing "fold-engineering-z" entry in section 10.2 for "finishing-template"

2568 ## 14.12 May 9, 2016

2569 Updated as per minutes from April 2016 F2F IPP WG minutes (ippv2-f2f-minutes-
2570 20160427.pdf):

2571 • Moved the new use 3.2.17 to the exceptions sub-section (3.3) and reworded

2572 • Removed "punching-hole-diameter" as a member attribute of "punching", and
2573 replaced "punching-hole-diameter-supported" with "punching-hole-diameter-
2574 configured" since at this time there are no printers with finishers that support alternate
2575 hole diameters.

2576 • Changed staple rotation back to use counter-clockwise rotation, and specified
2577 horizontal as 0º

2578 • Cleaned up IANA registration listings to remove some that are unnecessarily
2579 redundant with 5100.3

2580 • Added references to 5101.1 and RFC 20

2581

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14.13 April 18, 2016

Updated as per feedback from 2016-04-11 conference call, in preparation for April 2016 F2F.

- Updated IANA Attribute Registrations to add attribute listings new in 2.1, as well as ones in 2.0 that were missing in this section
- Fixed text for punching and stitching to simplify descriptions of location, and stopped using the term "origin"
- Added the "stitching-method" member attribute to "stitching", and the "stitching-method-supported" Printer Description attribute
- Updated references to list Finishings 2.0 as an informative reference
- Added mention of 'fold-engineering-z' in 5.2.6.4 and in 5.1.x "finishings" value listings
- Added 'draw-line' keyword to "trimming-type"

14.14 April 11, 2016

Initial revision of v2.1.

- Added statement clarifying the location of the origin (primary point of reference) of a punch hole
- Added "punching-hole-diameter" attribute to allow the punch hole's diameter to be specified, and corresponding "punching-hole-diameter-supported" Printer attribute
- Added statement clarifying the location of the origin (primary point of reference) of a stitch / staple
- Added "stitching-angle" member attribute to stitching to allow the stitch or staple's angle to be specified, and corresponding "stitching-angle-supported" Printer attribute

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

> The Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8) [STD63] encoding of Unicode [UNICODE] [ISO10646]; and
> 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 IPP Clients and subsequently storing the results (e.g., in IPP Job objects) could cause false negatives in IPP Client searches and failed access (e.g., to IPP Printers with percent-encoded UTF-8 URIs now 'hidden').

Page 68: [5] Deleted **Smith Kennedy** **2/23/17 1:04:00 PM**

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