IPP Paid Printing Extensions

Status: Initial

Abstract: This document defines extensions to the Internet Printing Protocol that address paid printing and printing through services.

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

This document is available electronically at:

ftp://ftp.pwg.org/pub/pwg/ipp/white/tb-ipppaid-sweet-20130314.docx
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In general, a PWG standard is a specification that is stable, well understood, and is technically competent, has multiple, independent and interoperable implementations with substantial operational experience, and enjoys significant public support.

For additional information regarding the Printer Working Group visit:

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**About the Internet Printing Protocol Work Group**

The Internet Printing Protocol (IPP) working group 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.

Table of Contents

1. Introduction 7

2. Terminology 7

2.1 Conformance Terminology 7

2.2 Other Terminology 7

2.3 Acronyms and Organizations 7

3. Requirements 8

3.1 Rationale for IPP Paid Printing Extensions 8

3.2 Use Cases 9

3.2.1 Printing at a School 9

3.2.2 Printing to a Reprographics Shop 9

3.2.3 Account Exceeded Limit Exception 9

3.3 Out of Scope 10

3.4 Design Requirements 10

4. Extensions for Paid Printing Services 11

4.1 User Accounts vs. Payment/Billing Accounts 13

4.2 PIN/Passcode Printing 13

4.3 Release Printing 13

5. HTTP Authentication - Default Username 14

6. IPP Attributes 14

6.1 Operation Attributes 14

6.1.1 charge-info-message (text) 14

6.1.2 job-authorization-uri (uri) 14

6.1.3 job-impressions-estimated (integer(1:MAX)) 14

6.1.4 profile-uri-actual (uri) 15

6.2 Job Template Attributes 15

6.2.1 print-scaling (type2 keyword) 15

6.3 Job Description Attributes 16

6.3.1 job-charge-info (text) 16

6.4 Printer Description Attributes 16

6.4.1 job-authorization-uri-supported (boolean) 16

6.4.2 jpeg-k-octets-supported (rangeOfInteger(0:MAX)) 16

6.4.3 jpeg-x-dimension-supported (rangeOfInteger(0:65535)) 16

6.4.4 jpeg-y-dimension-supported (rangeOfInteger(1:65535)) 16

6.4.5 landscape-orientation-requested-preferred (type2 enum) 16

6.4.6 pdf-k-octets-supported (rangeOfInteger(0:MAX)) 17

6.4.7 pdf-versions-supported (1setOf type2 keyword) 17

6.4.8 print-scaling-default (type2 keyword) 17

6.4.9 print-scaling-supported (1setOf type2 keyword) 17

6.4.10 printer-dns-sd-name (name(63)) 18

6.4.11 printer-kind (1setOf type2 keyword) 18

7. Additional Semantics for Existing Operations 18

7.1 Create-Job, Print-Job, and Print-URI 18

7.2 Validate-Job 18

7.2.1 Validate-Job Request 18

7.2.2 Validate-Job Response 19

8. Additional Values for Existing Attributes 19

8.1 finishings (1setOf type2 enum) 19

8.2 job-state-reasons (1setOf type2 keyword) 20

8.3 Status Codes 21

9. Conformance Requirements 22

9.1 Conformance Requirements for Clients 22

9.2 Conformance Requirements for Printers 22

10. Internationalization Considerations 23

11. Security Considerations 23

12. IANA Considerations 23

12.1 Attribute Registrations 23

12.2 Attribute Value Registrations 24

12.3 Type2 enum Attribute Value Registrations 24

12.4 Operation Registrations 25

12.5 Status Code Registrations 25

13. References 27

13.1 Normative References 27

13.2 Informative References 28

14. Author's Address 28

15. Change History 29

15.1 March 14, 2013 29

List of Figures

Figure 1 - Typical Paid Printing Sequence Diagram 12

1. Introduction

Whether provided by a third-party or an organization's infrastructure services, paid printing services are increasingly common. However, IPP currently exposes only a URI and description that a Printer is a paid service but does not allow a Client to directly participate in paid printing through IPP. This specification defines additional attributes, values, and semantics to enable a variety of paid printing services directly through IPP.

1. Terminology
	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.

* 1. Other Terminology

*Paid Imaging Services*: Printing, facsimile, and scanning performed for a fee. Facsimile, scanning, and the means of collecting payment are outside the scope of this specification.

* 1. Acronyms and Organizations

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

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

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

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

1. Requirements
	1. Rationale for IPP Paid Printing Extensions

Given the following existing specifications and the need for a standard method of supporting Paid Imaging Services without vendor-specific driver software, the IPP Paid Printing Extensions specification should:

1. Use existing the existing IPP specfications to support job submission to and monitoring of Paid Imaging Services,
2. Define HTTP authorization requirements as needed to support Paid Imaging Services,
3. Define operation attributes and amend operation semantics as needed for a Client to obtain and supply payment authorization from a Paid Imaging Service via IPP,
4. Define status code values needed for Paid Imaging Services to inform a Client when payment exceptions occur during job submission,
5. Define Job Description attributes and values needed for Paid Imaging Services to provide authorization status information to Clients, and
6. Define Job Template attributes needed to clearly express output intent to Paid Imaging Services.

The Internet Printing Protocol Version 2.0 Second Edition [PWG5100.12] defines:

1. A collection of existing IPP specifications that form the basis for IPP/2.0
2. Standard job template attributes
3. Specific interoperability requirements, such as HTTP/1.1 support with chunking and IPP collection attribute support
4. New version number and operation requirements for different classes of Imaging Devices

The IPP Job and Printer Extensions - Set 3 (JPS3) [PWG5100.13] defines attributes to indicate whether a Printer supports Paid Imaging Services.

IPP Everywhere [PWG5100.14] defines:

1. Protocols and schema to support discovery, identification, and auto-configuration of Imaging Devices,
2. A standard profile of IPP attributes, operations, and values to promote interoperability, and
3. Standard document formats for job submission.

The PWG Raster Format [PWG5102.4] defines a minimal file format for transmission of multi-page color and grayscale bitmap images

The Document management -- Portable document format -- Part 1: PDF 1.7 [ISO32000] defines:

1. A rich file format for transmission of multi-page color and grayscale vector and bitmap images
2. Standard page attributes to support page size, orientation, and duplex functionality

The JPEG File Interchange Format Version 1.02 [JFIF] defines a compact file format for transmission of photographic images

The Open XML Paper Specification [ECMA388] defines a paginated document format based on Open Packaging Conventions (OPC) [[ISO29500-2](http://standards.iso.org/ittf/PubliclyAvailableStandards/c051459_ISOIEC_29500-2_2008%28E%29.zip)], Extensible Markup Language (XML) [XML11], and standard image and font formats with device-independent color.

* 1. Use Cases
		1. Printing at a School

Jane wants to print her thesis on the laser printer in her school's computing lab. After initiating the print action in her application and selecting the laser printer, the application software validates access to the printer by providing the proposed job ticket information. The print service supporting the laser printer provides the application software an authorization code for the job submission. After Jane confirms the print action, the application software submits the print job with the authorization code to the print service. The print service then prints the job on the laser printer and includes the print job in her student activity fees.

* + 1. Printing to a Reprographics Shop

John wants to print 100 marketing booklets for a real estate conference using a local reprographics shop. John prepares the electronic files needed for the booklets and then initiates a job submission through a generic job management utility. After selecting the reprographics shop and specifying the job processing intent and delivery location, the utility software validates access to the service for the shop. The service challenges the user (via the utility software) to provide user account information. Once accepted, the service provides an authorization code to the utility software, which then submits the complete job, including the authorization code, for printing. The shop charges John's account, prints the job, and delivers the booklets to the conference.

* + 1. Account Exceeded Limit Exception

Jane wants to print flyers for a school event on the school's large format printer. After initiating the print action in her application and selecting the large format printer, the application software validates access to the printer, obtains an authorization code, and submits the job. After pre-processing the job, the print service associated with the printer determines that Jane's account lacks sufficient funds to complete the print job and stops the job from printing, adding status information to the job indicating the reason. The application software queries the print service for the job status and presents the issue to Jane. Jane then visits the web page provided by the print service to add additional printing credits to her school activity account. The print service then resumes processing of the job, printing the flyers on the large format printer.

* 1. Out of Scope

The following are considered out of scope for this specification:

1. The actual method of payment for Paid Imaging Services, and
2. Definition of new HTTP authentication methods.
	1. Design Requirements

The design requirements for the IPP Paid Printing Extension specification are:

1. Define HTTP authorization extensions and requirements;
2. Follow the naming conventions defines in IPP/1.1: Model and Semantics [RFC2911], including keyword value case (lower) and hyphenation requirements;
3. Define attributes and values to support Paid Imaging Services;
4. Amend operation semantics to support Paid Imaging Services;
5. Support printing with vender-neutral Client software from any Client to any Printer using a variety of discovey protocols, IPP for the transport, and standard document formats.

1. Extensions for Paid Printing Services

This document defines new attributes, enum values for the "finishings" Job Template attribute, keyword values for the “job-state-reasons” Job Description attribute, and status codes for the Create-Job, Print-Job, Print-URI, and Validate-Job operations that allow you to provide IPP-based paid printing services. Figure 1 shows a typical paid printing interaction between a Client and Printer.

The “printer-charge-info-uri” Printer attribute provides a URL that allows Users to manage paid printing accounts on the Printer. Typically this web page will allow new users to sign up for the paid printing service, purchase additional pages/credits for printing, manage queued jobs, and so forth.

The “job-authorization-uri” (section 6.1.2) operation attribute allows a Printer to provide an authorization code to the Client that is used in subsequent job creation requests to obtain a printout. The valid time period, number of print jobs, and/or number of pages for an authorization code is specific to the implementation. However, since there is no way for the Client to tell the Printer it will not be using the authorization code, the Printer SHOULD automatically expire the provided URI after a suitable period of time longer than 60 seconds. Printers notify Clients that they require a “job-authorization-uri” value in a print job creation request by including the attribute name in the “printer-mandatory-job-attributes” Printer attribute. Printers notify Clients that a “job-authorization-uri” value is no longer valid by returning the client-error-attributes-or-values-not-supported status code and placing the “job-authorization-uri” attribute in the unsupported attributes group of the response.

The “job-impressions-estimated” (section 6.1.3) operation attribute allows the Client to supply an estimate of the number of impressions or sides that will be submitted for printing.

The “charge-info-message” (section 6.1.1) operation attribute allows the Printer to return a localized message to the Client tailored to the requesting user. The message is typically the current status of the account (number of pages/amount of credit remaining) but can also contain account-specific error messages when the account cannot be used for printing. Once a job is created, the “job-charge-info” (section 6.3.1) Job Description attribute provides any updated account information for that job.

Account issues that are discovered at validation or job creation time are reported using the new status codes defined in section 8.3. Once a job has been created, these same issues are reported in the “job-state-reasons” (section 8.2) Job Description attribute with the corresponding keyword values.

**Client Printer**

POST Validate-Job Request ⇢

 ⇠ 401 Unauthorized

 WWW-Authenticate: Basic realm=”Example”

POST Validate-Job Request ⇢

Authentication: Basic dGVzdDp0ZXN0MTIzCg==

job-impressions-estimated=20

 ⇠ 200 OK

 Validate-Job Response = successful-ok

 charge-info-message=”14 pages in account.”

 job-authorization-uri = “urn:uuid:...”

POST Print-Job Request ⇢

Authentication: Basic dGVzdDp0ZXN0MTIzCg==

job-authorization-uri = “urn:uuid:...”

<20 page document>

 ⇠ 200 OK

 Print-Job Response = successful-ok

 charge-info-message=”14 pages in account.”

 job-id=1234

 job-state=pending

 job-state-reasons=”none”

POST Get-Job-Attributes Request ⇢

Authentication: Basic dGVzdDp0ZXN0MTIzCg==

job-id=1234

 ⇠ 200 OK

 Get-Job-Attributes Response = successful-ok

 job-charge-info=”6 pages in account.”

 job-impressions-completed=8

 job-state=processing

 job-state-reasons=”job-printing”

POST Get-Job-Attributes Request ⇢

Authentication: Basic dGVzdDp0ZXN0MTIzCg==

job-id=1234

 ⇠ 200 OK

 Get-Job-Attributes Response = successful-ok

 job-charge-info=”Need to order more pages.”

 job-impressions-completed=14

 job-state=processing-stopped

 job-state-reasons=”account-limit-reached”

... User Visits printer-charge-info-uri to order 10 more pages ...

POST Get-Job-Attributes Request ⇢

Authentication: Basic dGVzdDp0ZXN0MTIzCg==

job-id=1234

 ⇠ 200 OK

 Get-Job-Attributes Response = successful-ok

 job-charge-info=”20 pages charged.”

 job-impressions-completed=20

 job-state=completed

 job-state-reasons=”none”

Figure - Typical Paid Printing Sequence Diagram

* 1. User Accounts vs. Payment/Billing Accounts

Printers that support multiple payment or billing options for each user account can support them via the “job-account-id” and “job-accounting-user-id” Job Template attributes. Printers notify Clients that they require these values in a print job creation request by including the corresponding attribute names in the “printer-mandatory-job-attributes” Printer attribute.

* 1. PIN/Passcode Printing

Printers support PIN/passcode printing using the “job-password” and “job-password-encryption” operation attributes. Jobs created with these attributes MUST be placed in the ‘pending-held’ state with the ‘job-password-wait’ keyword added to the “job-state-reasons” Job Description attribute.

When the User later enters the PIN/passcode on the Printer, the job is placed in the ‘pending’ or ‘processing’ state and the ‘job-password-wait’ keyword is removed from the “job-state-reasons” Job Description attribute.

* 1. Release Printing

Printers can act as “release printing” services for one or more associated output devices, where print jobs are spooled and later released by the User at an output device by entering a PIN/passcode (see section 4.2), swiping an identification card, or providing other identification to the associated Printer.

Jobs submitted to such a Printer MUST be placed in the ‘pending-held’ state with the ‘job-release-wait’ keyword added to the “job-state-reasons” Job Description attribute. When the User later releases the job at an output device, the job is placed in the ‘pending’ or ‘processing’ state and the ‘job-release-wait’ keyword is removed from the “job-state-reasons” Job Description attribute.

1. HTTP Authentication - Default Username

Printers supporting Basic authentication [RFC2617] MUST support a default username specified in the WWW-Authenticate header. For example:

WWW-Authenticate: Basic realm=”Example Printer” username=”guest”

Printers supporting Digest authentication [RFC2617] MUST support a default username specified in the WWW-Authenticate header. For example:

WWW-Authenticate: Digest realm=”Example Printer” \

 nonce=”0123456789abcdefg” username=”guest”

The default username MAY be changed or disabled through the Printer’s web interface or other mechanisms.

1. IPP Attributes
	1. Operation Attributes
		1. charge-info-message (text)

The "charge-info-message" operation attribute provides a localized message concerning any paid printing charge information, typically the remaining balance on the requesting user’s account. Printers that implement paid printing services SHOULD return this attribute in response to a Create-Job, Print-Job, Print-URI, or Validate-Job request.

* + 1. job-authorization-uri (uri)

The "job-authorization-uri" operation attribute specifies an implementation-specific URI representing an authorization or reservation code for a print job creation request. It is returned by the Validate-Job operation (section 7.2) and supplied in the Create-Job, Print-Job, and Print-URI operations (section 7.1).

Printers that support this attribute MUST also support the “job-authorization-uri-supported” (section 6.4.1) Printer attribute.

* + 1. job-impressions-estimated (integer(1:MAX))

The "job-impressions-estimated" operation attribute specifies the estimated number of impressions (sides) that will be submitted in a subsequent print job creation request. It is supplied in a Validate-Job request (section 7.2) when supporting accounting or paid printing services.

* + 1. profile-uri-actual (uri)

The "profile-uri-actual" operation attribute is returned by the Validate-Job operation (section 7.2) and specifies which ICC color profile will be used by the Printer for the given Job Template attributes. This attribute MUST be supported if the "printer-icc-profiles" Printer attribute is supported.

The ICC profile can be used for Client-based color matching and soft proofing.

* 1. Job Template Attributes
		1. print-scaling (type2 keyword)

The REQUIRED "print-scaling" Job Template attribute specifies how the Printer scales the document data to fit the requested media. Standard keywords are:

'auto'; if the “ipp-attribute-fidelity” attribute is true or the document is larger than the requested media, scale the document using the 'fit' method if the margins are non-zero, otherwise scale using the 'fill' method. If the “ipp-attribute-fidelity” attribute is false or unspecified and the document is smaller than the requested media, scale using the 'none' method.

‘auto-fit’; if the “ipp-attribute-fidelity” attribute is true or the document is larger than the requested media, scale the document using the ‘fit’ method. Otherwise, scale using the ‘none’ method.

'fill'; scale the document to fill the requested media size, as would be used to produce a borderless print, preserving the aspect ratio of the document data.

'fit'; scale the document to fit the printable area of the requested media size, preserving the aspect ratio of the document data.

'none'; do not scale the document to fit the requested media size. If the document is larger than the requested media, center and clip the resulting output. If the document is smaller than the requested media, center the resulting output.

The 'auto' value is typically the default. This attribute MUST control the scaling of the supported IPP Everywhere MIME media types - "application/openxps", "application/pdf", "image/jpeg", and "image/pwg-raster" - and SHOULD control the scaling of document data in other formats.

* 1. Job Description Attributes
		1. job-charge-info (text)

The RECOMMENDED "job-charge-info" Job Description attribute provides a localized message concerning any paid printing charge information, typically the cost charged to the requesting user’s account.

* 1. Printer Description Attributes
		1. job-authorization-uri-supported (boolean)

The "job-authorization-uri-supported" Printer attribute specifies whether the “job-authorization-uri” (section 6.1.2) operation attribute is supported. This attribute is REQUIRED if the “job-authorization-uri” operation attribute is supported.

* + 1. jpeg-k-octets-supported (rangeOfInteger(0:MAX))

The "jpeg-k-octets-supported" Printer attribute specifies the upper and lower bounds of total sizes of JFIF jobs in K octets, i.e., in units of 1024 octets. The lower bound is always 0. Printers that support the "image/jpeg" MIME media type MUST support this attribute.

* + 1. jpeg-x-dimension-supported (rangeOfInteger(0:65535))

The "jpeg-x-dimension-supported" Printer attribute specifies the maximum horizontal dimension of JFIF jobs in samples per line. Persuant to the JPEG File Information Format Version 1.02 [JFIF], the lower bound is always 0. Printers that support the "image/jpeg" MIME media type MUST support this attribute.

* + 1. jpeg-y-dimension-supported (rangeOfInteger(1:65535))

The "jpeg-y-dimension-supported" Printer attribute specifies the maximum vertical dimension of JFIF jobs in lines. Persuant to the JPEG File Information Format Version 1.02 [JFIF], the lower bound is always 1. Printers that support the "image/jpeg" MIME media type MUST support this attribute.

* + 1. landscape-orientation-requested-preferred (type2 enum)

The REQUIRED "landscape-orientaiton-requested-preferred" Printer attribute specifies the preferred landscape orientation for documents, typically to account for the correct orientation of envelopes. Valid values are 4 for 90 degrees counter-clockwise and 5 for 90 degrees clockwise.

Clients SHOULD use this attribute to either provide landscape documents in the preferred orientation or provide the value of this attribute in the “orientation-requested” Job Template attribute (if supported by the Printer as indicated by the “orientation-requested-supported” attribute) at the time of job creation.

* + 1. pdf-k-octets-supported (rangeOfInteger(0:MAX))

The "pdf-k-octets-supported" Printer attribute specifies the upper and lower bounds of total sizes of PDF jobs in K octets, i.e., in units of 1024 octets. The lower bound is always 0. Printers that support the "application/pdf" MIME media type MUST support this attribute.

* + 1. pdf-versions-supported (1setOf type2 keyword)

The "pdf-versions-supported" Printer attribute specifies the supported versions of documents using the "application/pdf" MIME media type. Printers that support the "application/pdf" MIME media type MUST support this attribute.

The following keyword values are defined:

'adobe-1.3'; PDF files conforming to Adobe PDF Language Reference, Version 1.3 [ADOBEPDF1.3]

'adobe-1.4'; PDF files conforming to Adobe PDF Language Reference, Version 1.4 [ADOBEPDF1.4]

'adobe-1.5'; PDF files conforming to Adobe PDF Language Reference, Version 1.5 [ADOBEPDF1.5]

'adobe-1.6'; PDF files conforming to Adobe PDF Language Reference, Version 1.6 [ADOBEPDF1.6]

'iso-32000-1\_2008'; PDF files conforming to Document management—Portable document format—Part 1: PDF 1.7 [ISO32000-1] are supported

'none'; PDF files are not supported

'pwg-5102.3'; PDF files conforming to Portable Document Format: Image Streamable (PDF/is) [PWG5102.3]

* + 1. print-scaling-default (type2 keyword)

The REQUIRED "print-scaling-default" Printer attribute provides the default value supplied by the Printer if the Client omits the "print-scaling" (section 6.2.1) Job Template attribute from a print job creation request.

* + 1. print-scaling-supported (1setOf type2 keyword)

The REQUIRED "print-scaling-supported" Printer attribute lists the supported values for the "print-scaling" (section 6.2.1) Job Template attribute. Printers MUST support all of the listed values for the supported IPP Everywhere MIME media types - "application/openxps", "application/pdf", "image/jpeg", and "image/pwg-raster".

* + 1. printer-dns-sd-name (name(63))

The REQUIRED READ-WRITE "printer-dns-sd-name" Printer attribute provides the current Bonjour service name for the Printer. For example, if the Printer registers “Example Make and Model.\_ipp.\_tcp,\_print.local.”, this attribute would contain “Example Make and Model”.

* + 1. printer-kind (1setOf type2 keyword)

The REQUIRED "printer-kind" Printer attribute lists the kinds of printing that are supported by the Printer. The following keywords are defined:

* 1. ‘disc’; the Printer supports printing on optical discs such as printable CD-Rs and DVD-Rs
	2. ‘document’; the Printer supports standard document printing on US Letter, US Legal, US Tabloid, ISO A4, and/or ISO A3 media
	3. ‘envelope’; the Printer supports printing on envelopes
	4. ‘label’; the Printer supports printing on cut labels
	5. ‘photo’; the Printer supports printing with photographic print quality
	6. ‘receipt’; the Printer supports printing receipts on continuous rolls
	7. ‘roll’; the Printer supports printing documents or photos on continuous rolls
1. Additional Semantics for Existing Operations
	1. Create-Job, Print-Job, and Print-URI

Printers that support paid print services MAY accept the “job-authorization-uri” (section 6.1.2) operation attribute and SHOULD return the “charge-info-message” (section 6.1.1) operation attribute.

* 1. Validate-Job

The Validate-Job operation is used to validate access to the Printer, validate and resolve any conflicts in the Job Template attributes that will be used in a subsequent Create-Job or Print-Job request, and determine the optimal raster parameters for printing.

* + 1. Validate-Job Request

Printers SHOULD accept the “job-impressions-estimated” (section 6.1.3) operation attribute.

* + 1. Validate-Job Response

Printers SHOULD return the "charge-info-message" (section 6.1.1) and "job-authorization-uri" (section 6.1.2) operation attributes. Printers that support the "printer-icc-profiles" Printer attribute MUST return the "profile-uri-actual" (section 6.1.4) operation attribute in the Validate-Job response.

1. Additional Values for Existing Attributes
	1. finishings (1setOf type2 enum)

Note: These are currently implemented in the vendor space (0x40000046 to 0x40000064) by CUPS.

This specification defines the following new values for the “finishings” attribute in order to support common finishing options available in office equipment and reprographics companies:

‘punch-top-left’ (70); Punch a single hole in the top left of the media

‘punch-bottom-left’ (71); Punch a single hole in the bottom left of the media

‘punch-top-right’ (72); Punch a single hole in the top right of the media

‘punch-bottom-right’ (73); Punch a single hole in the bottom right of the media

‘punch-dual-left’ (74); Punch two holes on the left side of the media

‘punch-dual-top’ (75); Punch two holes at the top of the media

‘punch-dual-right’ (76); Punch two holes on the right side of the media

‘punch-dual-bottom’ (77); Punch two holes at the bottom of the media

‘punch-triple-left’ (78); Punch three holes on the left side of the media

‘punch-triple-top’ (79); Punch three holes at the top of the media

‘punch-triple-right’ (80); Punch three holes on the right side of the media

‘punch-triple-bottom’ (81); Punch three holes at the bottom of the media

‘punch-quad-left’ (82); Punch four holes on the left side of the media

‘punch-quad-top’ (83); Punch four holes at the top of the media

‘punch-quad-right’ (84); Punch four holes on the right side of the media

‘punch-quad-bottom’ (85); Punch four holes at the bottom of the media

'fold-accordian' (90); Accordian-fold the paper vertically into four sections

'fold-double-gate' (91); Fold the top and bottom quarters of the paper towards the midline, then fold in half vertically

'fold-gate' (92); Fold the top and bottom quarters of the paper towards the midline

'fold-half' (93); Fold the paper in half vertically

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

'fold-left-gate' (95); Fold the top quarter of the paper towards the midline

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

'fold-parallel' (97); Fold the paper in half vertically two times, yielding four sections

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

'fold-right-gate' (99); Fold the bottom quarter of the paper towards the midline

'fold-z' (100); Fold the paper vertically into three sections, forming a Z

* 1. job-state-reasons (1setOf type2 keyword)

This specification defines the following new values for the “job-state-reasons” attribute:

‘account-info-needed’; Additional information is required, such as a “job-account-id” or “job-accounting-user-id” value.

‘account-closed’; The requesting user’s account has been closed.

‘account-limit-reached’; The requesting user’s account has reached its limit and/or exhausted any balance on the account.

‘account-authorization-failed’; The “job-authorization-uri” attribute was not supplied or the value supplied is no longer valid.

‘job-release-wait’; The job is held until released for printing on a particular output device.

* 1. Status Codes

This specification defines the following new status codes that may be returned by the Create-Job, Print-Job, Print-URI, or Validate-Job operations:

Note: These are currently implemented by CUPS in the vendor space from 0x049C to 0x049F.

client-error-account-info-needed (0x41C); The request is missing required account information such as the “requesting-user-name”, “requesting-user-uri”, “job-account-id”, or “job-accounting-user-id”.

client-error-account-closed (0x41D); The requesting user’s account has been closed.

client-error-account-limit-reached (0x41E); The requesting user’s account has reached its limit or exhausted any remaining balance.

client-error-account-authorization-failed (0x41F); The print job creation request is missing the “job-authorization-uri” operation attribute or the supplied value is no longer valid.

1. Conformance Requirements

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

* 1. Conformance Requirements for Clients

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

1. The "print-scaling" (section 6.2.1) Job Template attribute
2. The "print-scaling-default" (section 6.4.8) and "print-scaling-supported" (section 6.4.9) Printer attributes
	1. Conformance Requirements for Printers

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

1. The "landscape-orientation-requested-preferred" (section 6.4.5) Printer attribute
2. The "print-scaling" (section 6.2.1) Job Template attribute
3. The "print-scaling-default" (section 6.4.8) and "print-scaling-supported" (section 6.4.9) Printer attributes
4. The "printer-dns-sd-name" (section 6.4.10) Printer attribute
5. The "printer-kind" (section 6.4.11) Printer attribute

Printers that conform to HTTP Authentication: Basic and Digest Access Authentication [RFC2617] MUST support the "username" attribute in the "WWW-Authenticate" header (section 5).

To claim conformance for the OPTIONAL "job-authorization-uri" (section 6.1.2) operation attribute, Printers MUST support the "job-authorization-uri-supported" (section 6.4.1) Printer attribute.

Printers that support the "printer-icc-profiles" Printer attribute MUST support the "profile-uri-actual" (section 6.1.4) operation attribute.

Printers that conform to the JPEG File Interchange Format Version 1.02 [JFIF] MUST support:

1. The "jpeg-k-octets-supported" (section 6.4.2) Printer attribute
2. The "jpeg-x-dimension-supported" (section 6.4.3) Printer attribute
3. The "jpeg-y-dimension-supported" (section 6.4.4) Printer attribute

Printers that conform to the Document management -- Portable document format -- Part 1: PDF 1.7 [ISO32000] MUST support:

1. The "pdf-k-octets-supported" (section 6.4.6) Printer attribute
2. The "pdf-versions-supported" (section 6.4.7) Printer attribute
3. Internationalization Considerations

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].

1. Security Considerations

The IPP extensions defined in this document require the same security considerations as defined in the IPP/1.1: Model and Semantics [RFC2911].

1. IANA Considerations

[Editor's note: Replace references to PWG5100.PAID with the actual standard number.]

* 1. Attribute Registrations

The attributes defined in this document will be published by IANA according to the procedures in IPP Model and Semantics [RFC2911] section 6.2 in the following file:

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

The registry entries will contain the following information:

Operation attributes: Reference

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charge-info-message (text) [PWG5100.PAID]

job-authorization-uri (uri) [PWG5100.PAID]

job-impressions-estimated (integer(1:MAX)) [PWG5100.PAID]

profile-uri-actual (uri) [PWG5100.PAID]

Job Template attributes: Reference

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print-scaling (type2 keyword) [PWG5100.PAID]

Job Description attributes: Reference

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job-charge-info (text) [PWG5100.PAID]

Printer Description attributes: Reference

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job-authorization-uri-supported (boolean) [PWG5100.PAID]

jpeg-k-octets-supported (rangeOfInteger(0:MAX)) [PWG5100.PAID]

jpeg-x-dimension-supported (rangeOfInteger(0:65535)) [PWG5100.PAID]

jpeg-y-dimension-supported (rangeOfInteger(1:65535)) [PWG5100.PAID]

landscape-orientation-requested-preferred (type2 enum) [PWG5100.PAID]

pdf-k-octets-supported (rangeOfInteger(0:MAX)) [PWG5100.PAID]

pdf-versions-supported (1setOf type2 keyword) [PWG5100.PAID]

print-scaling-default (type2 keyword) [PWG5100.PAID]

print-scaling-supported (1setOf type2 keyword) [PWG5100.PAID]

printer-dns-sd-name (name(63)) [PWG5100.PAID]

printer-kind (1setOf type2 keyword) [PWG5100.PAID]

* 1. 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 [RFC2911] 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

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job-state-reasons (1setOf type2 keyword) [RFC2911]

 account-info-needed [PWG5100.PAID]

 account-closed [PWG5100.PAID]

 account-limit-reached [PWG5100.PAID]

 account-authorization-failed [PWG5100.PAID]

 job-release-wait [PWG5100.PAID]

* 1. 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 [RFC2911] section 6.2 in the following file:

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

The registry entries will contain the following information:

NOTE: These values are based on the CUPS vendor-space values from 0x40000046 to 0x40000064.

Attributes (attribute syntax)

 Enum Value Enum Symbolic Name Reference

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finishings (1setOf type2 enum) [RFC2911]

 70 punch-top-left [PWG5100.PAID]

 71 punch-bottom-left [PWG5100.PAID]

 72 punch-top-right [PWG5100.PAID]

 73 punch-bottom-right [PWG5100.PAID]

 74 punch-dual-left [PWG5100.PAID]

 75 punch-dual-top [PWG5100.PAID]

 76 punch-dual-right [PWG5100.PAID]

 77 punch-dual-bottom [PWG5100.PAID]

 78 punch-triple-left [PWG5100.PAID]

 79 punch-triple-top [PWG5100.PAID]

 80 punch-triple-right [PWG5100.PAID]

 81 punch-triple-bottom [PWG5100.PAID]

 82 punch-quad-left [PWG5100.PAID]

 83 punch-quad-top [PWG5100.PAID]

 84 punch-quad-right [PWG5100.PAID]

 85 punch-quad-bottom [PWG5100.PAID]

 90 fold-accordian [PWG5100.PAID]

 91 fold-double-gate [PWG5100.PAID]

 92 fold-gate [PWG5100.PAID]

 93 fold-half [PWG5100.PAID]

 94 fold-half-z [PWG5100.PAID]

 95 fold-left-gate [PWG5100.PAID]

 96 fold-letter [PWG5100.PAID]

 97 fold-parallel [PWG5100.PAID]

 98 fold-poster [PWG5100.PAID]

 99 fold-right-gate [PWG5100.PAID]

 100 fold-z [PWG5100.PAID]

* 1. Operation Registrations

The operations defined in this document will be published by IANA according to the procedures in the IPP Model and Semantics [RFC2911] section 6.2 in the following file:

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

The registry entries will contain the following information:

Operation Name Reference

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Create-Job (extension) [PWG5100.PAID]

Print-Job (extension) [PWG5100.PAID]

Print-URI (extension) [PWG5100.PAID]

Validate-Job (extension) [PWG5100.PAID]

* 1. Status Code Registrations

The status codes defined in this document will be published by IANA according to the procedures in the IPP Model and Semantics [RFC2911] section 6.6 in the following file:

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

The registry entries will contain the following information:

Note: These values are based on the CUPS vendor space values from 0x049C to 0x049F.

Value Status Code Name Reference

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0x0400:0x04FF - Client Error:

 0x041C client-error-account-info-needed [PWG5100.PAID]

 0x041D client-error-account-closed [PWG5100.PAID]

 0x041E client-error-account-limit-reached [PWG5100.PAID]

 0x041F client-error-account-authorization-failed [PWG5100.PAID]

1. References
	1. Normative References

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[ISO29500-2] "Information technology -- Document description and processing languages -- Office Open XML File Formats -- Part 2: Open Packaging Conventions", ISO/IEC 29500-2:2012, September 2012

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[STD63] F. Yergeau, "UTF-8, a transformation format of ISO 10646", RFC 3629/STD 63, November 2003, http://www.ietf.org/rfc/rfc3629.txt

* 1. Informative References

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1. Change History
	1. March 14, 2013

Initial revision.