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Technical Brief



The Printer Working Group

IPP Paid Printing Extensions

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

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50 systems supporting them work together better. All references to the PWG in this
51 document implicitly mean “The Printer Working Group, a Program of the IEEE ISTO.” In
52 order to meet this objective, the PWG will document the results of their work as open
53 standards that define print related protocols, interfaces, procedures and conventions.
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55 interoperability provided by voluntary conformance to these standards.

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

59 For additional information regarding the Printer Working Group visit:

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67

68 About the Internet Printing Protocol Work Group

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

74 For additional information regarding IPP visit:

75 <http://www.pwg.org/ipp/>

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

79

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153 **1. Introduction**

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

159 **2. Terminology**

160 **2.1 Conformance Terminology**

161 Capitalized terms, such as MUST, MUST NOT, RECOMMENDED, REQUIRED, SHOULD,
162 SHOULD NOT, MAY, and OPTIONAL, have special meaning relating to conformance as
163 defined in Key words for use in RFCs to Indicate Requirement Levels [RFC2119]. The
164 term CONDITIONALLY REQUIRED is additionally defined for a conformance requirement
165 that applies to a particular capability or feature.

166 **2.2 Other Terminology**

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

169 **2.3 Acronyms and Organizations**

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

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

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

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

174

175 **3. Requirements**

176 **3.1 Rationale for IPP Paid Printing Extensions**

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

- 180 1. Use existing the existing IPP specifications to support job submission to and
181 monitoring of Paid Imaging Services,
- 182 2. Define HTTP authorization requirements as needed to support Paid Imaging
183 Services,
- 184 3. Define operation attributes and amend operation semantics as needed for a
185 Client to obtain and supply payment authorization from a Paid Imaging Service
186 via IPP,
- 187 4. Define status code values needed for Paid Imaging Services to inform a Client
188 when payment exceptions occur during job submission,
- 189 5. Define Job Description attributes and values needed for Paid Imaging Services
190 to provide authorization status information to Clients, and
- 191 6. Define Job Template attributes needed to clearly express output intent to Paid
192 Imaging Services.

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

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

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

202 IPP Everywhere [PWG5100.14] defines:

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

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

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

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

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

218 The Open XML Paper Specification [ECMA388] defines a paginated document format
219 based on Open Packaging Conventions (OPC) [[ISO29500-2](#)], Extensible Markup
220 Language (XML) [XML11], and standard image and font formats with device-independent
221 color.

222 **3.2 Use Cases**

223 **3.2.1 Printing at a School**

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

232 **3.2.2 Printing to a Reprographics Shop**

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

242 **3.2.3 Account Exceeded Limit Exception**

243 Jane wants to print flyers for a school event on the school's large format printer. After
244 initiating the print action in her application and selecting the large format printer, the
245 application software validates access to the printer, obtains an authorization code, and
246 submits the job. After pre-processing the job, the print service associated with the printer

247 determines that Jane's account lacks sufficient funds to complete the print job and stops
248 the job from printing, adding status information to the job indicating the reason. The
249 application software queries the print service for the job status and presents the issue to
250 Jane. Jane then visits the web page provided by the print service to add additional printing
251 credits to her school activity account. The print service then resumes processing of the job,
252 printing the flyers on the large format printer.

253 **3.3 Out of Scope**

254 The following are considered out of scope for this specification:

- 255 1. The actual method of payment for Paid Imaging Services, and
- 256 2. Definition of new HTTP authentication methods.

257 **3.4 Design Requirements**

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

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

268

269 4. Extensions for Paid Printing Services

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

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

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

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

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

299 Account issues that are discovered at validation or job creation time are reported using the
300 new status codes defined in section 8.3. Once a job has been created, these same issues
301 are reported in the "job-state-reasons" (section 8.2) Job Description attribute with the
302 corresponding keyword values.
303

```

304      Client                                Printer
305      POST Validate-Job Request →
306
307
308
309      POST Validate-Job Request →
310      Authentication: Basic dGVzdDp0ZXN0MTIzCg==
311      job-impressions-estimated=20
312
313      ← 401 Unauthorized
314      WWW-Authenticate: Basic realm="Example"
315
316      POST Validate-Job Request →
317      Authentication: Basic dGVzdDp0ZXN0MTIzCg==
318      job-authorization-uri = "urn:uuid:..."
319      <20 page document>
320
321      ← 200 OK
322      Validate-Job Response = successful-ok
323      charge-info-message="14 pages in account."
324      job-authorization-uri = "urn:uuid:..."
325
326      POST Print-Job Request →
327      Authentication: Basic dGVzdDp0ZXN0MTIzCg==
328      job-authorization-uri = "urn:uuid:..."
329      <20 page document>
330
331      ← 200 OK
332      Print-Job Response = successful-ok
333      charge-info-message="14 pages in account."
334      job-id=1234
335      job-state=pending
336      job-state-reasons="none"
337
338      POST Get-Job-Attributes Request →
339      Authentication: Basic dGVzdDp0ZXN0MTIzCg==
340      job-id=1234
341
342      ← 200 OK
343      Get-Job-Attributes Response = successful-ok
344      job-charge-info="6 pages in account."
345      job-impressions-completed=8
346      job-state=processing
347      job-state-reasons="job-printing"
348
349      POST Get-Job-Attributes Request →
350      Authentication: Basic dGVzdDp0ZXN0MTIzCg==
351      job-id=1234
352
353      ← 200 OK
354      Get-Job-Attributes Response = successful-ok
355      job-charge-info="Need to order more pages."
356      job-impressions-completed=14
357      job-state=processing-stopped
358      job-state-reasons="account-limit-reached"
359
360      ... User Visits printer-charge-info-uri to order 10 more pages ...
361
362      POST Get-Job-Attributes Request →
363      Authentication: Basic dGVzdDp0ZXN0MTIzCg==
364      job-id=1234
365
366      ← 200 OK
367      Get-Job-Attributes Response = successful-ok
368      job-charge-info="20 pages charged."
369      job-impressions-completed=20
370      job-state=completed
371      job-state-reasons="none"

```

Figure 1 - Typical Paid Printing Sequence Diagram

356 **4.1 User Accounts vs. Payment/Billing Accounts**

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

361 **4.2 PIN/Passcode Printing**

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

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

369 **4.3 Release Printing**

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

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

379

380 **5. HTTP Authentication - Default Username**

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

```
383 WWW-Authenticate: Basic realm="Example Printer" username="guest"
```

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

```
386 WWW-Authenticate: Digest realm="Example Printer" \  
387 nonce="0123456789abcdefg" username="guest"
```

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

390 **6. IPP Attributes**

391 **6.1 Operation Attributes**

392 **6.1.1 charge-info-message (text)**

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

397 **6.1.2 job-authorization-uri (uri)**

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

402 Printers that support this attribute MUST also support the "job-authorization-uri-supported"
403 (section 6.4.1) Printer attribute.

404 **6.1.3 job-impressions-estimated (integer(1:MAX))**

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

409 **6.1.4 profile-uri-actual (uri)**

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

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

415 **6.2 Job Template Attributes**

416 **6.2.1 print-scaling (type2 keyword)**

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

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

424 'auto-fit'; if the "ipp-attribute-fidelity" attribute is true or the document is larger than
425 the requested media, scale the document using the 'fit' method. Otherwise, scale
426 using the 'none' method.

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

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

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

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

438 **6.3 Job Description Attributes**

439 **6.3.1 job-charge-info (text)**

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

443 **6.4 Printer Description Attributes**

444 **6.4.1 job-authorization-uri-supported (boolean)**

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

448 **6.4.2 jpeg-k-octets-supported (rangeOfInteger(0:MAX))**

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

452 **6.4.3 jpeg-x-dimension-supported (rangeOfInteger(0:65535))**

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

457 **6.4.4 jpeg-y-dimension-supported (rangeOfInteger(1:65535))**

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

462 **6.4.5 landscape-orientation-requested-preferred (type2 enum)**

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

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

471 6.4.6 pdf-k-octets-supported (rangeOfInteger(0:MAX))

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

475 6.4.7 pdf-versions-supported (1setOf type2 keyword)

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

479 The following keyword values are defined:

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

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

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

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

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

490 'none'; PDF files are not supported

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

493 6.4.8 print-scaling-default (type2 keyword)

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

497 6.4.9 print-scaling-supported (1setOf type2 keyword)

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

502 6.4.10 printer-dns-sd-name (name(63))

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

506 6.4.11 printer-kind (1setOf type2 keyword)

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

509 'disc'; the Printer supports printing on optical discs such as printable CD-Rs and
510 DVD-Rs

511 'document'; the Printer supports standard document printing on US Letter, US
512 Legal, US Tabloid, ISO A4, and/or ISO A3 media

513 'envelope'; the Printer supports printing on envelopes

514 'label'; the Printer supports printing on cut labels

515 'photo'; the Printer supports printing with photographic print quality

516 'receipt'; the Printer supports printing receipts on continuous rolls

517 'roll'; the Printer supports printing documents or photos on continuous rolls

518 7. Additional Semantics for Existing Operations**519 7.1 Create-Job, Print-Job, and Print-URI**

520 Printers that support paid print services MAY accept the "job-authorization-uri" (section
521 6.1.2) operation attribute and SHOULD return the "charge-info-message" (section 6.1.1)
522 operation attribute.

523 7.2 Validate-Job

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

527 7.2.1 Validate-Job Request

528 Printers SHOULD accept the "job-impressions-estimated" (section 6.1.3) operation
529 attribute.

530 7.2.2 Validate-Job Response

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

535 8. Additional Values for Existing Attributes

536 8.1 finishings (1setOf type2 enum)

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

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

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

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

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

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

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

547 'punch-dual-top' (75); Punch two holes at the top of the media

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

549 'punch-dual-bottom' (77); Punch two holes at the bottom of the media

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

551 'punch-triple-top' (79); Punch three holes at the top of the media

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

553 'punch-triple-bottom' (81); Punch three holes at the bottom of the media

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

555 'punch-quad-top' (83); Punch four holes at the top of the media

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

- 557 'punch-quad-bottom' (85); Punch four holes at the bottom of the media
- 558 'fold-accordion' (90); Accordion-fold the paper vertically into four sections
- 559 'fold-double-gate' (91); Fold the top and bottom quarters of the paper towards the
560 midline, then fold in half vertically
- 561 'fold-gate' (92); Fold the top and bottom quarters of the paper towards the midline
- 562 'fold-half' (93); Fold the paper in half vertically
- 563 'fold-half-z' (94); Fold the paper in half horizontally, then Z-fold the paper vertically
564 into three sections
- 565 'fold-left-gate' (95); Fold the top quarter of the paper towards the midline
- 566 'fold-letter' (96); Fold the paper into three sections vertically; sometimes also known
567 as a C fold
- 568 'fold-parallel' (97); Fold the paper in half vertically two times, yielding four sections
- 569 'fold-poster' (98); Fold the paper in half horizontally and vertically; sometimes also
570 called a cross fold
- 571 'fold-right-gate' (99); Fold the bottom quarter of the paper towards the midline
- 572 'fold-z' (100); Fold the paper vertically into three sections, forming a Z

573 **8.2 job-state-reasons (1setOf type2 keyword)**

574 This specification defines the following new values for the "job-state-reasons" attribute:

- 575 'account-info-needed'; Additional information is required, such as a "job-account-id"
576 or "job-accounting-user-id" value.
- 577 'account-closed'; The requesting user's account has been closed.
- 578 'account-limit-reached'; The requesting user's account has reached its limit and/or
579 exhausted any balance on the account.
- 580 'account-authorization-failed'; The "job-authorization-uri" attribute was not supplied
581 or the value supplied is no longer valid.
- 582 'job-release-wait'; The job is held until released for printing on a particular output
583 device.

584 8.3 Status Codes

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

587 **Note: These are currently implemented by CUPS in the vendor space from 0x049C to**
588 **0x049F.**

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

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

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

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

599

600 **9. Conformance Requirements**

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

603 **9.1 Conformance Requirements for Clients**

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

- 606 1. The "print-scaling" (section 6.2.1) Job Template attribute
- 607 2. The "print-scaling-default" (section 6.4.8) and "print-scaling-supported" (section
608 6.4.9) Printer attributes

609 **9.2 Conformance Requirements for Printers**

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

- 611 1. The "landscape-orientation-requested-preferred" (section 6.4.5) Printer attribute
- 612 2. The "print-scaling" (section 6.2.1) Job Template attribute
- 613 3. The "print-scaling-default" (section 6.4.8) and "print-scaling-supported" (section
614 6.4.9) Printer attributes
- 615 4. The "printer-dns-sd-name" (section 6.4.10) Printer attribute
- 616 5. The "printer-kind" (section 6.4.11) Printer attribute

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

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

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

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

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

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

- 632 1. The "pdf-k-octets-supported" (section 6.4.6) Printer attribute
- 633 2. The "pdf-versions-supported" (section 6.4.7) Printer attribute

634 **10. Internationalization Considerations**

635 For interoperability and basic support for multiple languages, conforming implementations
 636 MUST support the Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8)
 637 [STD63] encoding of Unicode [UNICODE] [ISO10646] and the Unicode Format for
 638 Network Interchange [RFC5198].

639 **11. Security Considerations**

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

642 **12. IANA Considerations**

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

644 **12.1 Attribute Registrations**

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

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

648 The registry entries will contain the following information:

649	Operation attributes:	Reference
650	-----	-----
651	charge-info-message (text)	[PWG5100.PAID]
652	job-authorization-uri (uri)	[PWG5100.PAID]
653	job-impressions-estimated (integer(1:MAX))	[PWG5100.PAID]
654	profile-uri-actual (uri)	[PWG5100.PAID]
655		
656	Job Template attributes:	Reference
657	-----	-----
658	print-scaling (type2 keyword)	[PWG5100.PAID]
659		
660	Job Description attributes:	Reference
661	-----	-----
662	job-charge-info (text)	[PWG5100.PAID]
663		
664	Printer Description attributes:	Reference
665	-----	-----
666	job-authorization-uri-supported (boolean)	[PWG5100.PAID]
667	jpeg-k-octets-supported (rangeOfInteger(0:MAX))	[PWG5100.PAID]
668	jpeg-x-dimension-supported (rangeOfInteger(0:65535))	[PWG5100.PAID]

```

669         jpeg-y-dimension-supported (rangeOfInteger(1:65535))      [PWG5100.PAID]
670         landscape-orientation-requested-preferred (type2 enum)    [PWG5100.PAID]
671         pdf-k-octets-supported (rangeOfInteger(0:MAX))             [PWG5100.PAID]
672         pdf-versions-supported (1setOf type2 keyword)              [PWG5100.PAID]
673         print-scaling-default (type2 keyword)                      [PWG5100.PAID]
674         print-scaling-supported (1setOf type2 keyword)             [PWG5100.PAID]
675         printer-dns-sd-name (name(63))                             [PWG5100.PAID]
676         printer-kind (1setOf type2 keyword)                        [PWG5100.PAID]
677

```

678 12.2 Attribute Value Registrations

679 The keyword attribute values defined in this document will be published by IANA according
 680 to the procedures in the IPP Model and Semantics [RFC2911] section 6.1 in the following
 681 file:

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

683 The registry entries will contain the following information:

684	Attributes (attribute syntax)	Reference
685	Keyword Attribute Value	-----
686	-----	-----
687	job-state-reasons (1setOf type2 keyword)	[RFC2911]
688	account-info-needed	[PWG5100.PAID]
689	account-closed	[PWG5100.PAID]
690	account-limit-reached	[PWG5100.PAID]
691	account-authorization-failed	[PWG5100.PAID]
692	job-release-wait	[PWG5100.PAID]

693 12.3 Type2 enum Attribute Value Registrations

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

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

697 The registry entries will contain the following information:

698 **NOTE: These values are based on the CUPS vendor-space values from 0x40000046 to**
 699 **0x40000064.**

700	Attributes (attribute syntax)	Reference
701	Enum Value Enum Symbolic Name	-----
702	-----	-----
703	finishings (1setOf type2 enum)	[RFC2911]
704	70 punch-top-left	[PWG5100.PAID]
705	71 punch-bottom-left	[PWG5100.PAID]
706	72 punch-top-right	[PWG5100.PAID]
707	73 punch-bottom-right	[PWG5100.PAID]
708	74 punch-dual-left	[PWG5100.PAID]

709	75	punch-dual-top	[PWG5100.PAID]
710	76	punch-dual-right	[PWG5100.PAID]
711	77	punch-dual-bottom	[PWG5100.PAID]
712	78	punch-triple-left	[PWG5100.PAID]
713	79	punch-triple-top	[PWG5100.PAID]
714	80	punch-triple-right	[PWG5100.PAID]
715	81	punch-triple-bottom	[PWG5100.PAID]
716	82	punch-quad-left	[PWG5100.PAID]
717	83	punch-quad-top	[PWG5100.PAID]
718	84	punch-quad-right	[PWG5100.PAID]
719	85	punch-quad-bottom	[PWG5100.PAID]
720	90	fold-accordion	[PWG5100.PAID]
721	91	fold-double-gate	[PWG5100.PAID]
722	92	fold-gate	[PWG5100.PAID]
723	93	fold-half	[PWG5100.PAID]
724	94	fold-half-z	[PWG5100.PAID]
725	95	fold-left-gate	[PWG5100.PAID]
726	96	fold-letter	[PWG5100.PAID]
727	97	fold-parallel	[PWG5100.PAID]
728	98	fold-poster	[PWG5100.PAID]
729	99	fold-right-gate	[PWG5100.PAID]
730	100	fold-z	[PWG5100.PAID]

731 **12.4 Operation Registrations**

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

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

735 The registry entries will contain the following information:

736	Operation Name	Reference
737	-----	-----
738	Create-Job (extension)	[PWG5100.PAID]
739	Print-Job (extension)	[PWG5100.PAID]
740	Print-URI (extension)	[PWG5100.PAID]
741	Validate-Job (extension)	[PWG5100.PAID]

742 **12.5 Status Code Registrations**

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

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

746 The registry entries will contain the following information:

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

748	Value	Status Code Name	Reference
749	-----	-----	-----

750	0x0400:0x04FF - Client Error:	
751	0x041C client-error-account-info-needed	[PWG5100.PAID]
752	0x041D client-error-account-closed	[PWG5100.PAID]
753	0x041E client-error-account-limit-reached	[PWG5100.PAID]
754	0x041F client-error-account-authorization-failed	[PWG5100.PAID]

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