



The Printer Working Group

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Working Draft

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## IPP Enterprise Printer Extensions (EPE)

Status: Initial

Abstract: This specification defines extensions to IPP/1.1 [STD92] for the Job Proof Print Feature and Job Storage Feature, and some similar IPP extensions to enable authenticated release workflows used in institutional IT environments serving a large number of users such as corporate businesses or universities.

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

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202 **1. Introduction**

203 This specification defines Operation attributes, Job Template attributes, and Printer  
 204 Description attributes summarized in Table 1 to add support for several new features to IPP  
 205 as an extension to IPP/1.1 [STD92].

206 **Table 1 - Summary of Attributes Defined**

<b>Attribute Name (syntax)</b>	<b>Conformance</b>
job-cancel-after (integer(1:MAX))	RECOMMENDED
job-cancel-after-default (integer(1:MAX)   no-value)	RECOMMENDED
job-cancel-after-supported (rangeOfInteger(1:MAX))	RECOMMENDED
job-password (octetString(255))	RECOMMENDED
job-password-supported (integer (0:255))	RECOMMENDED
job-password-action (type2 keyword)	RECOMMENDED
job-password-action-supported (1setOf type2 keyword)	RECOMMENDED
job-password-encryption (type2 keyword   name(MAX))	RECOMMENDED
job-password-encryption-supported (1setOf (type2 keyword   name(MAX)))	RECOMMENDED
job-password-length-supported (rangeOfInteger (0:255))	RECOMMENDED
job-password-repertoire-configured (type2 keyword)	RECOMMENDED
job-password-repertoire-supported (1setOf type2 keyword)	RECOMMENDED
job-phone-number (uri)	RECOMMENDED
job-phone-number-default (uri)	RECOMMENDED
job-phone-number-supported (boolean)	RECOMMENDED
job-recipient-name (name(MAX))	RECOMMENDED
job-recipient-name-default (name(MAX))	RECOMMENDED
job-recipient-name-supported (boolean)	RECOMMENDED
job-storage (collection)	RECOMMENDED
job-storage-access-supported (1setOf type2 keyword)	RECOMMENDED
job-storage-disposition-supported (1setOf type2 keyword)	RECOMMENDED

job-storage-group-supported (1setOf name(MAX))	RECOMMENDED
job-storage-supported (1setOf keyword)	RECOMMENDED
proof-print (collection)	REQUIRED
which-jobs-supported (1setOf type2 keyword)	REQUIRED

## 207 **2. Terminology**

208 This section defines the following additional terms that are used throughout this document.

### 209 **2.1 Conformance Terminology**

210 Capitalized terms, such as MUST, MUST NOT, RECOMMENDED, REQUIRED, SHOULD,  
 211 SHOULD NOT, MAY, and OPTIONAL, have special meaning relating to conformance as  
 212 defined in Key words for use in RFCs to Indicate Requirement Levels [RFC2119]. The term  
 213 CONDITIONALLY REQUIRED is additionally defined for a conformance requirement that  
 214 applies when a specified condition is true.

### 215 **2.2 Printing Terminology**

216 Normative definitions and semantics of printing terms are imported from IETF Printer MIB  
 217 v2 [RFC3805], IETF Finisher MIB [RFC3806], and IETF Internet Printing Protocol/1.1: Model  
 218 and Semantics [STD92].

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

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

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

226 *Output Device*: a single Logical or Physical Device

227 *Physical Device*: a hardware implementation of a endpoint device, e.g., a marking engine, a  
 228 fax modem, etc.

### 229 **2.3 Protocol Role Terminology**

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

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

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

## 237 **2.4 Job State Terminology**

238 This document defines features that influence the trajectory of a Job through the various Job  
239 states. The states defined for "job-state" [STD92] and the transitions between these states  
240 are illustrated in Figure 1.

241 *Job Not Completed*: The phase when a Job is in the 'pending', 'pending-held', 'processing',  
242 or 'processing-stopped' state.

243 *Job Retention*: The phase when a Job is in its terminal state ('canceled', 'aborted', or  
244 'completed') before it has been stripped of its Document data.

245 *Job History*: After the Job Retention phase expires for a Job, the Printer deletes the  
246 Document data for the Job and the Job becomes part of the Job History. The Printer MAY  
247 also delete any number of the Job attributes.

248 *Job Removal*: After the Job has remained in the Job History for an implementation-defined  
249 time, such as when the number of Jobs exceeds a fixed number or after a fixed time period  
250 (which MAY be zero seconds), the IPP Printer removes the Job from the system.

251 *'pending'*: The Job is a candidate to start processing but is not yet processing.

252 *'pending-held'*: The Job is not a candidate for processing for any number of reasons but will  
253 return to the 'pending' state as soon as the reasons are no longer present.

254 *'processing'*: The Job is a candidate to start processing but is not yet processing.

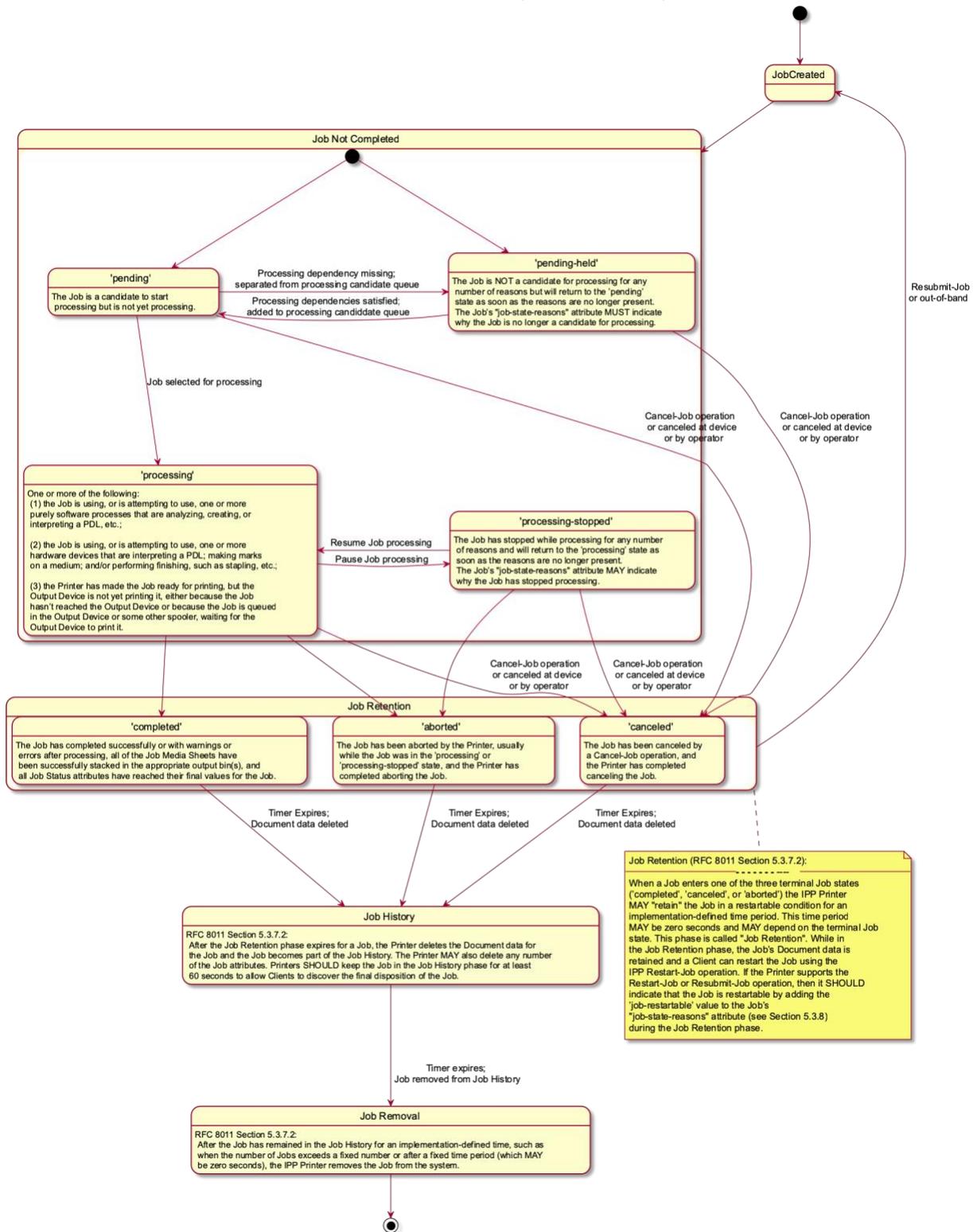
255 *'processing-stopped'*: The Job is a candidate to start processing but is not yet processing.

256 *'canceled'*: The Job has been canceled by a Cancel-Job operation or by some method out-  
257 of-band of IPP, the Printer has completed canceling the Job, and all Job Status attributes  
258 have reached their final values for the Job.

259 *'aborted'*: The Job has been aborted by the system, usually while the Job was in the  
260 'processing' or 'processing-stopped' state, the Printer has completed aborting the Job, and  
261 all Job Status attributes have reached their final values for the Job.

262 *'completed'*: The Job has completed successfully or with warnings or errors after processing,  
263 all of the Job Media Sheets have been successfully stacked in the appropriate output bin(s),  
264 and all Job Status attributes have reached their final values for the Job.

IPP Job States and State Transitions (RFC 8011 Section 5.3.7)



265

266

Figure 1 - IPP Job States and Transitions

## 267 **2.5 Other Terminology**

268 *Document Creation Operations:* The operations that create Document objects: Print-Job,  
269 Print-URI, Send-Document and Sent-URI [STD92].

270 *Job Creation operation:* One of the operations that creates a Job object: Print-Job, Print-  
271 URI and Create-Job. The Restart-Job operation [STD92] is not considered a Job Creation  
272 operation, since the Printer re-uses the existing Job object. The Validate-Job operation is  
273 not considered a Job Creation operation because no Job object is created. Therefore, when  
274 a statement also applies to either the Restart-Job and/or the Validate-Job operation, they  
275 are mentioned explicitly.

276 *Job Instructions:* Information that affects how the Job and its associated documents are to  
277 be processed. This includes the Job Template Attributes, some Operation Request  
278 Attributes, and other attributes (such as defaults) that are applied to a job.

279 *Job Submission Operations:* The Job Submission Operations are the IPP operations that  
280 create Jobs and Documents: Print-Job, Print-URI, Create-Job, Send-Document and Send-  
281 URI [STD92].

282 *Password Protected Job:* The Job that has a password permanently attached to it to  
283 authorize its printing. The Printer challenges a User to provide the matching password to  
284 authorize printing the Job. If the Job is duplicated as during a Resubmit-Job operation or  
285 control panel-initiated reprinting, the password will be included in the new Job.

286 *Precedence:* The specification of the order or ranking of a series of instructions or attributes  
287 from multiple sources referring to the same functionality. See section 4.2 of this specification  
288 for a description of the Attribute Precedence model.

289 *Print-stream pages:* The sequence of pages according to the definition of pages in the  
290 language used to express the document data defined relative to the Input Document. See  
291 section 2.5 of [PWG5100.3] for more information.

292 *Production Printer:* A Printer that produces large quantities of high-quality output, that often  
293 requires operator participation to make decisions as to the choice of job and its parameters.

294 *Proof Print Job:* A Proof Print Job is a Retained Job that the Printer retains (until removed  
295 by a Delete-Job or Purge-Jobs operation or aged out by the Printer using a different policy  
296 than for ordinary completed Jobs) after printing a proof so that a copy of it can be printed  
297 any time after it has been proofed using the Reprocess-Job or Resubmit-Job operations,  
298 rather than aging the job out after an implementation-defined period.

299 *Raster image:* A binary bitmap representation of an image.

300 *Retained Job:* A Retained Job is a job that the Printer retains in the so-called Job Retention  
301 Phase (see [STD92] section 5.3.7.2 Partitioning of Job States) in the Job's terminal state  
302 ('completed', 'aborted', or 'canceled') after processing it, for an implementation-defined

303 period (including zero seconds) or removed by an explicit Delete-Job or Purge-Jobs  
304 operation. An exact copy of a Retained Job can be processed using a Reprocess-Job  
305 operation. A modified copy of a Retained Job can be processed using a Resubmit-Job  
306 operation.

307 *RIP*: Raster Image Processor - a page description language interpreter.

308 *Stored Job*: A Stored Job is a Retained Job that has reached the 'completed' state and that  
309 has identifying characteristics marking it as a Stored Job instead of simply as a previously  
310 processed Job. The Printer retains a Stored Job indefinitely, unless otherwise configured,  
311 so that it can be listed and selected for reprinting at some time in the future.

## 312 **2.6 Acronyms and Organizations**

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

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

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

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

## 317 **3. Requirements**

### 318 **3.1 Rationale for IPP Enterprise Printer Extensions**

319 IETF and PWG IPP printing standards define:

320 (a) A rationale for an abstract model of printing (to support alternate encodings and  
321 protocols) in section 3 of the IETF IPP Rationale [RFC2568];

322 (b) A set of design goals for submitting and canceling Jobs in a printing protocol in section  
323 3.1.4 'Submitting a Print Job', section 3.1.6 'Canceling a Print Job' (for End User), and  
324 section 3.2.2 'Changing Print and Job Status' (for Operator) of the IETF IPP Design  
325 Goals [RFC2567];

326 (c) An abstract model of a Print Service (i.e., ISO DPA Logical Printer) and a Print Device  
327 (i.e., ISO DPA Physical Printer) in section 3.1 of IETF IPP/1.1 [STD92];

328 (d) A set of abstract operations for canceling or deleting Print Jobs in section 4.3.3  
329 'Cancel-Job Operation' (for End User) and section 4.2.9 'Purge-Jobs Operation' (for  
330 Operator) of IETF IPP/1.1 [STD92] and section 4.2 'Cancel-Current-Job Operation'  
331 (for Job Owner or Operator) of IETF IPP Job and Printer Administrative Operations  
332 [RFC3998];

333 (e) A set of abstract operations for reprinting Print Jobs in section 4.3.7 'Restart-Job  
334 Operation' (same job-id, overwrites accounting data) of IETF IPP/1.1 [STD92] and  
335 section 4.1 'Reprocess-Job Operation' (new job-id, original processing instructions)  
336 of IETF IPP Job and Printer Administrative Operations [RFC3998];

337 (f) A set of abstract operations for controlling Print Jobs in section 3.3.5 'Hold-Job  
338 Operation' (Job Owner and Operator) and section 3.3.6 'Release-Job Operation' (Job  
339 Owner and Operator) of IETF IPP/1.1 [STD92] and section 4.3.1 'Suspend-Current-  
340 Job Operation' (Job Owner and Operator) and section 4.3.2 'Resume-Job Operation'  
341 (Job Owner and Operator) of IETF IPP Job and Printer Administrative Operations  
342 [RFC3998]; and

343 (g) A set of abstract attributes for production printing features in PWG IPP Production  
344 Printing Attributes - Set1 [PWG5100.3].

345 Some IPP Printers already support proofing, saving, and reprinting of large Print Jobs as  
346 well as canceling of sets of selected Print Jobs via vendor proprietary operations and  
347 attributes.

348 Therefore, this IPP Enterprise Printer Extensions specification should:

349 (1) Support proofing Jobs using IPP Job Creation operations;

350 (2) Support storing Jobs using IPP Job Creation operations;

351 (3) Support reprinting stored or proofed Jobs with different processing  
352 instructions;

353 (4) Support canceling multiple Jobs in single IPP operations;

354 (5) Support the management, configuration, and maintenance of these extended  
355 IPP Printers;

356 (6) Encourage adoption of modern IPP-based printing infrastructures; and

357 (7) Discourage the proliferation of vendor proprietary IPP operations and  
358 attributes that damage IPP interoperability by duplicating IETF or PWG IPP  
359 standard operations and attributes.

## 360 **3.2 Use Cases**

### 361 **3.2.1 Password Protected Job**

362 Frank works in a sales office that is large enough for him to have privacy concerns, but not  
363 so large that the printers are integrated into the IT infrastructure in a sophisticated manner.  
364 He is editing a sensitive business report that contains financial data. He wants to make sure  
365 that, if he prints it to the office's MFD printer, he can be confident he will be the only one that

366 will be able to pick it up or re-print it. The MFD supports Password Protected Jobs, so Frank  
367 provides a "Job Password" when he prints it. The MFD waits to print the Job until someone  
368 has provide the matching password. Frank goes to the MFD, finds the held job, enters the  
369 matching password at the prompt, and the Job is printed.

### 370 **3.2.2 Authenticated Job Release**

371 James works in a large law office where the printers are integrated into the IT AAA  
372 infrastructure. He is editing a set of documents for a client. He wants to make sure that, if he  
373 prints it to the office's MFD printer, he can be confident he will be the only one that will be  
374 able to pick it up or re-print it. The MFD supports Authenticated Job Release, so James  
375 selects "Authenticated Release" when he prints it. The Printer challenges James' laptop for  
376 authentication credentials, and James provides them to the Client. MFD waits to print the  
377 Job until someone has provide the matching password. Frank goes to the MFD, finds the  
378 held job, enters the matching password at the prompt, and the Job is printed.

### 379 **3.2.3 Proof Print**

380 Alice, Bob, and Charlie work in the system engineering department of a large software  
381 vendor. They collaborate to find, describe, and evaluate software feature requirements for  
382 financial management tools in their requirements database.

383 Alice is an artist and chooses their standard fonts and writes style sheets and layout guides  
384 for their software requirements specifications. Bob is a quiet, steady worker and an excellent  
385 proofreader. Charlie is a good talker who does the interviewing of the marketers and  
386 engineers.

387 Once a month, Charlie extracts from their database all of the detailed software requirements  
388 for each project into a spreadsheet. He also extracts all the high-level software requirements  
389 into a word processing document. Charlie then submits a single Print Job with two  
390 Documents [PWG5100.5] (the spreadsheet and the word processing document) for a proof  
391 print of 3 copies (single-sided and portrait).

392 Alice searches for layout and visual content errors, while Bob looks for typos and missing  
393 words. Charlie commits their fixes to the database, regenerates the source documents, and  
394 does another cycle of proof print.

395 Finally, Charlie wants to produce 60 copies (2-up, two-sided, and landscape) of the retained  
396 proof Print Job. So, he reprints the saved Print Job (without sending the document data  
397 again) but specifying overrides of some processing instructions.

### 398 **3.2.4 Job Storage**

399 Vincent is an administrative assistant for a school. The school provides its teachers with  
400 paper forms for documenting their class assignments and attendance. Vincent makes these  
401 forms available on the school's web site and also on the school's primary printer / copier  
402 multi-function device (MFD) as a Stored Job accessible by any accounts in the Faculty user

403 group. He sends an email to the school faculty letting them know that the Stored Job is  
404 available for reprinting.

405 Lily is a teacher. She has run out of her supply of the assignment tracking form. She goes  
406 to the school's office, logs in using her faculty account, and selects Stored Jobs. Among the  
407 Jobs visible to her account, she finds and chooses the assignment tracking form from the  
408 MFD's Stored Jobs list on its control panel, chooses to have 30 copies made, and taps Print.  
409 The copies are printed, and she returns to her classroom.

### 410 **3.3 Exceptions**

#### 411 **3.3.1 Password Protected Job**

412 Velma is one of Frank's co-workers. She is very competitive and also has questionable  
413 business ethics. She goes to the department's MFD to see if she can re-print any of Frank's  
414 reports. She finds his latest draft report and tries to re-print it. The Job Velma selected is a  
415 Password Protected Job. The MFD presents a password challenge UI to request the Job  
416 Password. Velma doesn't know it, so she clicks "Cancel" and goes to the break room to  
417 brood.

### 418 **3.4 Out of Scope**

419 The following are considered out of scope for this document:

- 420 1. How the Printer manages its storage for stored jobs or pending jobs
- 421 2. How the Printer implements authentication and authorization

### 422 **3.5 Design Requirements**

423 This IPP Enterprise Printer Extensions design should:

- 424 (1) Follow the naming conventions defined in IETF IPP/1.1 [STD92], including  
425 keyword value (lowercase) and hyphenation requirements;
- 426 (2) Optimize compatibility with existing IETF and PWG IPP operations when  
427 making design decisions in defining new operations and attributes;
- 428 (3) Define new attributes in support of the Password Protected Job feature;
- 429 (4) Define new attributes in support of the Job Storage feature;
- 430 (5) Define new attributes in support of the Proof Print feature;
- 431 (6) Define additional attributes .
- 432

## 433 4. Semantics Common to More Than One Attribute

### 434 4.1 Overview

435

	"job-password"	"job-storage"	"proof-print"	"job-retain-until"
"job-password"	n/a	Yes	Yes	
"job-storage"				
"proof-print"				

436

### 437 4.2 Password Protected Job Feature

438 The Password Protected Job Feature enables a user to protect a Job with a password that  
 439 is required for authorizing printing or reprinting the Job. The password is permanently  
 440 attached to the Job and persists in the Job until it enters the Job History phase. If the Job is  
 441 copied, the password is preserved in the new copy. This feature can be combined with the  
 442 Job Storage Feature or the Proof Print feature.

### 443 4.3 Proof Print Feature

#### 444 4.3.1 Original

445 The Proof Print Feature enables a User to print a Proof Print Job and to save it as part of  
 446 job processing in such a way that users can submit a request to print a copy of the Proof  
 447 Print Job at a later time. A Client requests a Printer to print and save a Proof Print Job by  
 448 supplying the "proof-print" Job Template attribute (section 6.5) when submitting the job. In  
 449 this case, the Printer retains the Proof Print Job indefinitely in the so-called Job Retention  
 450 Phase (see [STD92] section 5.3.7.2 Partitioning of Job States) in the job's terminal state  
 451 ('completed', 'aborted', or 'canceled') after processing it, rather than aging the job out after  
 452 an implementation-defined period. In other words, a Proof Print Job is just a Retained Job  
 453 that the Printer is retaining indefinitely. A Client can then request the Printer to reprint a copy  
 454 of the Proof Print Job using the Resubmit-Job operation [PWG5100.7]. See section 12.5  
 455 Conformance Requirements for the REQUIRED "proof-print" Job Template attribute for  
 456 additional conformance requirements for Clients and Printers.

**457 4.3.2 New**

458 The Proof Print Feature enables a User to print a first copy of a Proof Print Job, and then  
459 moves the Job to the 'pending-held' state. If the User finds the output of that first copy to be  
460 satisfactory, the User can release the Job to complete its processing to produce the  
461 remaining number of copies.

**462 4.4 Job Storage Feature**

463 The Job Storage Feature enables a User to "store" a Job and its Documents in their originally  
464 submitted and unprocessed form, so that the Job might be selected for reprinting at a later  
465 time. A Stored Job's visibility will depend on its access settings; it might be visible to all  
466 users, or might only be visible to the originating user, or a particular group. A Client requests  
467 a Job be treated as a Stored Job by supplying the "job-storage" Job Template attribute  
468 (section XXX) when submitting the Job Creation operation.

469 As with the Job Save and Reprint Feature, the Printer retains the Job indefinitely in the Job  
470 Retention Phase (see [STD92] section 5.3.7.2 "Partitioning of Job States") in the job's  
471 terminal state ('completed', 'aborted', or 'canceled') after processing it, rather than aging the  
472 job out after an implementation-defined period.

**473 4.4.1 Creating Stored Jobs**

474 A Job becomes a Stored Job when the "job-storage" Job Template is specified in its creation  
475 and it has reached the 'completed' state.

**476 4.4.2 Identifying and Listing Stored Jobs**

477 A Job indicates its Job Storage status using one of the "job-state-reasons" keywords for the  
478 Job Storage Feature defined in section 9.3.2. A Client can get a listing of Stored Jobs by  
479 specifying either the 'stored-public' or 'stored-owner' keyword for the "which-jobs" attribute  
480 (section 9.1) in a Get-Jobs operation [STD92].

**481 4.4.3 Reprinting Stored Jobs**

482 This section defines the method by which to reprint a copy of the Saved Job using the  
483 Resubmit-Job operation. The Reprocess-Job operation, defined in [RFC3998], has been  
484 deprecated. The Resubmit-Job operation is defined in this document and operates on any  
485 Retained Job.

**486 4.4.3.1 Reprinting Stored Jobs using the Resubmit-Job operation**

487 The Resubmit-Job operation [PWG5100.7] re-processes a copy of any Retained Job with  
488 the ability to supply additional operation and Job Template attributes that will affect the  
489 processing of that copy of the Job by either overriding the values of existing attributes or  
490 providing additional attributes. The Resubmit-Job operation has the same structure as the

491 Print-URI operation (see [STD92] section 4.2.2) except that the “job-id” (integer(1:MAX))  
492 operation attribute MUST take the place of the “document-uri” (uri) operation attribute.

#### 493 **4.4.3.2 Reprinting Stored Jobs using the Printer Control Panel**

494 Stored Jobs can be reprinted using the Printer's control panel (control console). The details  
495 of the user experience and presentation are beyond the scope of this document, but ought  
496 to reflect the semantics of the Job Storage feature defined in this IPP Enterprise Printer  
497 Extensions specification.

## 498 **5. New Operation Attributes for Existing Operations**

499 This section defines additional Operation attributes for existing IPP operations.

### 500 **5.1 job-password (octetString(255)) for Job Creation operations**

501 This operation attribute allows a User to specify a password for that Job, causing the Job to  
502 become a Password Protected Job. The Printer will only print a Password Protected Job  
503 after the same password value has been entered into the Printer's control panel.

504 The Client encrypts the password acquired by the job submitting application using one of  
505 the methods specified by the "job-password-encryption-supported" attribute. The encrypted  
506 password value is sent to the Printer as the value of the "job-password" attribute. If a "job-  
507 password" value is provided, other than a zero-length string, the Printer MUST disposition  
508 the Job according to the "job-password-action" operation attribute; if the "job-password-  
509 action" attribute is absent, the Printer MUST put the Job in the 'pending-held' state and add  
510 the 'job-password-wait' value to the Job's "job-state-reason" attribute.

511 The Printer uses the same encryption method specified in the "job-password-encryption"  
512 attribute on this password. When the locally-supplied encrypted password matches the value  
513 of the Job's "job-password" attribute, the Job removes the 'job-password-wait' value from its  
514 "job-state-reasons" attribute to indicate that that condition is no longer preventing  
515 processing. The method in which the password is entered and validated at the Printer is  
516 implementation dependent. If the Password Protected Job is released by the User while  
517 another Job is printing, the Password Protected Job SHOULD be the next Job printed after  
518 the current Job, unless the Printer has another Job which has a higher priority than the  
519 Password Protected Job as determined by the "job-priority" attribute.

520 This Operation attribute may OPTIONALLY be included in the request of the following Job  
521 Creation operations: Print-Job, Print-URI, and Create-Job.

522 The "job-password" attribute value MUST NOT be returned in a Get-Job-Attributes response  
523 or be provided via any non-IPP protocol.

524 The Job MUST preserve its "job-password" attribute, if it has one, for its entire lifespan. If a  
525 copy of a Job is created by a Resubmit-Job operation or via some mechanism out-of-band

526 of IPP, the new copy MUST have a copy of the "job-password" attribute so that it is also a  
527 Password Protected Job.

## 528 **5.2 job-password-action (type2 keyword)**

529 The "job-password-action" operation attribute specifies how a Job is processed when the  
530 "job-password" operation attribute (section 5.1) is included in a Job Creation request. If the  
531 Client supplies the "job-password" attribute but does not supply the "job-password-action"  
532 attribute, the Client and the Printer MUST assume the value is 'hold-job', to preserve  
533 backward compatibility with the earlier definition of "job-password" [PWG5100.11]. The  
534 value specified by this operation attribute MUST be one of the values specified by the  
535 Printer's "job-password-action-supported" attribute (section 8.3).

536 Standard keyword values include:

- 537 • 'hold-job': The Job is placed in the 'pending-held' state and is released when the "job-  
538 password" value is entered at the Printer's console. The Job MUST NOT be retained  
539 once it has reached its terminal state ('completed', aborted' or 'canceled'). This is the  
540 semantic originally specified for the "job-password" operation attribute (section 5.1).
- 541 • 'process-and-retain': The Job is placed in the 'pending' state and it scheduled for  
542 processing without waiting for the User to enter the "job-password" value at the  
543 Printer's console.
- 544 • 'retain-only': The Job is placed in the 'completed' state as soon as all Documents are  
545 received by the Printer. The Printer will require a matching password for all reprints.

546 Once in a terminating state, the Job is retained according to the current value of its "job-  
547 retain-until-xxx" attributes.

## 548 **5.3 job-password-encryption (type2 keyword | name(MAX)) for Job** 549 **Creation operations**

550 The "job-password-encryption" Operation attribute specifies the type of encryption used to  
551 create the value specified by the "job-password" operation attribute in the request of the  
552 following Job Creation operations: Print-Job, Print-URI, and Create-Job. The Client MUST  
553 supply this operation attribute whenever the "job-password" attribute is supplied. The value  
554 MUST be one of the values specified in the Printer's "job-password-encryption-supported"  
555 attribute (section 8.3).

## 556 **6. Job Template Attributes**

557 Job Template attributes describe job processing behavior and conform to a set of rules. See  
558 [STD92] for the complete text of the rules that apply to each Job Template attribute called  
559 "xxx".

## 560 **6.1 job-cancel-after (integer(1:MAX))**

561 This Job Template attribute specifies the maximum number of seconds that are allowed for  
562 processing a Job. The cancel timer does not begin until the Job enters the 'processing' state.  
563 If the Job is canceled because of this timer, the Printer MUST add the 'job-canceled-after-  
564 timeout' keyword (section 9.3.1) to the "job-state-reasons" Job Status attribute.

## 565 **6.2 job-phone-number (uri)**

566 This Job Template attribute contains the contact telephone number for the Job. If supported,  
567 the Printer MUST accept the 'tel:' URI scheme [RFC2806] and MAY accept other schemes,  
568 such as the 'fax:' scheme [RFC2806]. Any processing by the Printer of the "job-phone-  
569 number" attribute is implementation-dependent.

## 570 **6.3 job-recipient-name (name(MAX))**

571 This Job Template attribute contains the name of the person that is to receive the output of  
572 the Job. The value of the "job-recipient-name" attribute is commonly printed on job sheets  
573 printed with the job. An example of another use of the "job-recipient-name" attribute is if the  
574 Printer accesses a database to get job delivery instructions for the recipient of a job. A zero-  
575 length value indicates that there is no job recipient name.

576 If the Client omits this attribute in a Job Creation request, the Printer MAY use the "job-  
577 recipient-name-default" attribute value, unless it has not been configured by the  
578 administrator, or MAY use the "authenticated user" name (see [MOD1.1] section 8.3),  
579 depending on implementation.

## 580 **6.4 job-storage (collection)**

581 The "job-storage" Job Template attribute is a collection whose members specify how a  
582 Printer processes a Job to become a Stored Job. See section 4.4 for a full description of the  
583 Job Storage Feature.

584 This attribute MAY be used with the "job-password" attribute for a Password Protected Job  
585 that is also a Stored Job.

### 586 **6.4.1 job-storage-access (type2 keyword)**

587 The "job-storage-access" member attribute specifies the access restrictions on the Stored  
588 Job. The value MUST be one of the keywords specified by the Printer's "job-storage-access-  
589 supported" Printer Description attribute (section 8.13). The "job-storage-access" member  
590 attribute MUST be preserved by the Job as a member of the "job-storage" Job Status  
591 attribute (section 7.1).

## 592 6.4.2 job-storage-disposition (type2 keyword)

593 The "job-storage-disposition" member attribute specifies how the Job is to be handled by the  
594 Printer during the 'processing' state. The value MUST be one of the values specified by the  
595 Printer's "job-storage-disposition-supported" Printer Description attribute (section 8.15).

596 The "job-storage-disposition" member attribute MUST NOT be preserved by the Job as a  
597 member of the "job-storage" Job Status attribute (section 7.1).

## 598 6.4.3 job-storage-group (name(MAX))

599 This member attribute specifies the group, if any, in which the Stored Job is listed. The value  
600 specified by the "job-storage-access" attribute (section 6.4.1) coordinates with the value of  
601 this attribute. If the "job-storage-access" attribute is 'group', then the value of this attribute  
602 MUST be one of the values specified by the Printer's "job-storage-group-supported" Printer  
603 Description attribute (section 8.16).

## 604 6.5 proof-print (collection)

605 This Job Template attribute indicates to the Printer that this Job is a Proof Print Job. This  
606 attribute allows a user to specify the attributes of the proof print(s) of the job that are to be  
607 printed prior to the printing the full run of the job. After the proof prints have been produced,  
608 the Printer MUST retain the completed job as a Proof Print Job for a period of time sufficient  
609 to allow users to proof the job, rather than aging it out after an implementation-defined period  
610 which SHOULD be longer than the period for ordinary completed Jobs (see Job Retention  
611 phase in [STD92] section 5.3.7.2 Partitioning of Job States). When a Proof Print Job is  
612 reprinted using any of the operations that reprint a Retained Job (e.g., Reprocess-Job or  
613 Resubmit-Job), the Printer MUST NOT copy the "proof-print" attribute from the Proof Print  
614 Job to the copy of the Proof Print Job so that the job is not re-proofed again. Only if the  
615 Resubmit-Job operation supplies its own "proof-print" attribute, will the copied job be  
616 proofed.

617 A Client MUST be able to supply and a Printer MUST support this attribute in order to claim  
618 support of this IPP Enterprise Printer Extensions Specification, respectively. See section  
619 12.5 Conformance Requirements for the REQUIRED "proof-print" Job Template attribute for  
620 additional conformance requirements for Clients and Printers.

621 Table 2 lists the member attributes of the "proof-print" collection attribute.

622 **Table 2 - "proof-print" member attributes**

Member Attribute Name	Request	Printer Support
proof-print-copies	MUST	MUST
media		MUST

media-col	MUST be one or the other, but NOT both	MAY
-----------	--	-----

### 623 **6.5.1 proof-print-copies (integer (0:MAX))**

624 The "proof-print-copies" member attribute specifies the number of copies the Printer MUST  
625 produce in the proof job. The proof print(s) are produced using the Job Template attributes  
626 specified with the Job, except any overridden by member attributes in this collection.

627 If the "proof-print-copies" value is 0, then no proof prints are produced.

628 After the requested number of proof prints have been successfully produced by the Printer,  
629 then the Printer transitions the job to the 'completed' state and retains the job for a period of  
630 time that is long enough for the users to proof the output of the Proof Print Job, rather than  
631 aging the job out.

### 632 **6.5.2 media (type2 keyword | name(MAX)) or media-col (collection)**

633 Either the "media" (see [STD92]) or the "media-col" member attribute is used to indicate the  
634 media that the Printer MUST use for the specified "proof-print-copies" of the Proof Job. The  
635 member attributes are the same as those for the "media-col" attribute defined in  
636 [PWG5100.3] and in section 11.5 of this specification.

637 The Client MUST supply either the "media" or the "media-col" member attribute, but NOT  
638 both. If the Client supplies such a malformed request by supplying neither or both, the Printer  
639 MUST (depending on implementation) either (1) reject the request and return the 'client-  
640 error-bad-request' status code (see [STD92]) or (2) use either the "media" or the "media-col"  
641 member attribute, independent of the value of the "ipp-attribute-fidelity" attribute supplied by  
642 the Client.

643 Since this "media" member attribute has the same name as the "media" Job Template  
644 attribute (defined [STD92]), the "media-supported" (1setOf (type2 keyword | name(MAX)))  
645 Printer attribute identifies the values of this "media" member attribute (as well as the values  
646 of the "media" Job Template attribute) that the Printer supports, i.e., the names of the  
647 supported media. A value that is provided for the "media" member attribute in the collection  
648 would have the same effect as if the job were submitted with that value as the value of the  
649 "media" Job Template attribute.

650 Since this "media-col" member attribute has the same name as the "media-col" Job  
651 Template attribute (defined in [PWG5100.3] and in section 11.5 of this specification), the  
652 "media-col-supported" Printer attribute identifies the keyword names of the member  
653 attributes supported in this "media-col" member attribute (as well as the keyword names of  
654 the "media-col" Job Template attribute), i.e., the names of the member attributes that the  
655 Printer supports.

## 656 **7. Job Status Attributes**

### 657 **7.1 job-storage (collection)**

658 The "job-storage" Job Status attribute labels the Job as a Stored Job and specifies the  
659 storage handling requirements the Printer MUST follow. All the members of this Job Storage  
660 attribute are the same as those specified for the "job-storage" Job Template attribute (section  
661 6.4).

## 662 **8. Printer Description Attributes**

### 663 **8.1 job-cancel-after-default (integer(1:MAX) | no-value)**

664 This Printer Description attribute provides the default value of the "job-cancel-after" Job  
665 Template attribute (section 6.1).

### 666 **8.2 job-cancel-after-supported (rangeOfInteger(1:MAX))**

667 This Printer Description attribute provides the allowed range of values for the "job-cancel-  
668 after" Job Template attribute (section 6.1).

### 669 **8.3 job-password-action-supported (type2 keyword)**

670 The "job-password-action-supported" Printer Description attribute specifies the Printer's  
671 supported password actions. A password action defines how a Job is processed when the  
672 "job-password" operation attribute (section 5.1) is included in a Job Creation request.

673 Standard password action keyword values include:

- 674 • 'hold-job': The Job is placed in the 'pending-held' state and is released when the "job-  
675 password" value is entered at the Printer's console. The Job MUST NOT be retained  
676 once it has reached its terminal state ('completed', aborted' or 'canceled'). This is the  
677 semantic originally specified for the "job-password" operation attribute (section 5.1).
- 678 • 'process-and-retain': The Job is placed in the 'pending' state and it scheduled for  
679 processing without waiting for the User to enter the "job-password" value at the  
680 Printer's console.
- 681 • 'retain-only': The Job is placed in the 'completed' state as soon as all Documents are  
682 received by the Printer. The Printer will require a matching password for all reprints.

683 Once in a terminating state, the Job is retained according to the current value of its "job-  
684 retain-until" and/or "job-retain-until-time" attributes.

685 **8.4 job-password-encryption-supported (1setOf (type2 keyword |**  
 686 **name(MAX)))**

687 The "job-password-encryption-supported" Printer Description attribute specifies which  
 688 encryption methods the Printer supports for Secure Print.

689 If the "job-password" operation attribute is supported, then this attribute MUST be supported.  
 690 Standard keyword values are in Table 3. The 'md2', 'md4', 'md5', and 'sha' keywords have  
 691 been DEPRECATED. Others may be deprecated in the future as the state of the art of  
 692 cryptography evolves.

693 **Table 3 - Standard keywords for "job-password-encryption-supported"**

Keyword	Description
'none'	The "job-password" attribute value is passed in the clear. No encryption has been applied. This value might also be used when the entire Operation is sent over a secure connection.
'md2'	The encryption method uses the MD2 hash algorithm defined in RFC 1319. <b>[1]</b>
'md4'	The encryption method uses the MD4 hash algorithm defined in RFC 1320. <b>[1]</b>
'md5'	The encryption method uses the MD5 hash algorithm defined in RFC 1321. <b>[1]</b>
'sha'	The encryption method uses the Secure Hash Algorithm 1 defined by the National Institute of Standards and Technology. <b>[1]</b>
'sha2-224'	The encryption method uses the Secure Hash Algorithm 2 defined by the National Institute of Standards and Technology, with an output size of 224 bits.
'sha2-256'	The encryption method uses the Secure Hash Algorithm 2 defined by the National Institute of Standards and Technology, with an output size of 256 bits.
'sha2-384'	The encryption method uses the Secure Hash Algorithm 2 defined by the National Institute of Standards and Technology, with an output size of 384 bits.
'sha2-512'	The encryption method uses the Secure Hash Algorithm 2 defined by the National Institute of Standards and Technology, with an output size of 512 bits.

'sha2-512_224'	The encryption method uses the Secure Hash Algorithm 2 defined by the National Institute of Standards and Technology, with an output size of 512 bits, truncated to 224 bits.
'sha2-512_256'	The encryption method uses the Secure Hash Algorithm 2 defined by the National Institute of Standards and Technology, with an output size of 512 bits, truncated to 256 bits.
'sha3-224'	The encryption method uses the Secure Hash Algorithm 3 defined by the National Institute of Standards and Technology, with an output size of 224 bits.
'sha3-256'	The encryption method uses the Secure Hash Algorithm 3 defined by the National Institute of Standards and Technology, with an output size of 256 bits.
'sha3-384'	The encryption method uses the Secure Hash Algorithm 3 defined by the National Institute of Standards and Technology, with an output size of 384 bits.
'sha3-512'	The encryption method uses the Secure Hash Algorithm 3 defined by the National Institute of Standards and Technology, with an output size of 512 bits.
'sha3-512_224'	The encryption method uses the Secure Hash Algorithm 3 defined by the National Institute of Standards and Technology, with an output size of 512 bits, truncated to 224 bits.
'sha3-512_256'	The encryption method uses the Secure Hash Algorithm 3 defined by the National Institute of Standards and Technology, with an output size of 512 bits, truncated to 256 bits.
'shake-128'	The encryption method uses the SHAKE128 method defined by the National Institute of Standards and Technology, with an output size of 128 bits.
'shake-256'	The encryption method uses the SHAKE256 method defined by the National Institute of Standards and Technology, with an output size of 256 bits.

694 [1] - Deprecated

## 695 **8.5 job-password-length-supported (rangeOfInteger (0:255))**

696 The 4.1 "job-password-length-supported" Printer Description attribute specifies the minimum  
697 and maximum supported length of the unencrypted password, measured in characters. The

698 character set encoding is specified by the "job-password-repertoire-configured" attribute  
 699 (Section XX). The Printer is configured to accept an empty password if the range's minimum  
 700 value is 0 (zero).

701 This attribute complements the existing "job-password-supported" attribute [PWG5100.11],  
 702 which specifies the maximum password length supported before encryption, measured in  
 703 octets.

## 704 **8.6 job-password-repertoire-supported (1setOf (type2 keyword))**

705 The "job-password-repertoire-supported" attribute enumerates the job password repertoires  
 706 (allowable characters, character sets and encodings) the Printer can be configured to use.

707 The keywords are named according to a 'REGISTRY\_ENCODING\_RANGE' naming  
 708 structure convention. Table 4 lists the standard keywords. Vendor repertoire keywords,  
 709 prefixed with "vendor\_" to indicate a vendor-specific registry, may also be used. Vendor  
 710 repertoire keywords SHOULD be registered with the PWG to achieve interoperability. As  
 711 an example, a vendor may choose to register the 'vendor\_us-ascii\_lowercase' keyword to  
 712 specify a repertoire limited to using only lowercase characters from the US ASCII encoding.

713 The "utf-8" encoding name indicates the use of Network Unicode [RFC5198].

714 **Table 4 - job-password-repertoire-supported keyword definitions**

<i>Keyword</i>	<i>Description</i>
<i>'iana_us-ascii_digits'</i>	Value must consist of only ASCII digits (0x30-0x39)
<i>'iana_us-ascii_letters'</i>	Value must consist of only US ASCII letters (0x41-0x5A, 0x61-0x7A)
<i>'iana_us-ascii_complex'</i>	Value must consist of US ASCII letters and numbers, with at least one uppercase letter, one lowercase letter, and one digit (0x30-0x39, 0x41-0x5A, 0x61-0x7A)
<i>'iana_us-ascii_any'</i>	Value must consist of US ASCII printable characters (0x20-0x7e)
<i>'iana_utf-8_digits'</i>	Value must consist of only UTF-8 numerical digits
<i>'iana_utf-8_letters'</i>	Value must consist of UTF-8 letters
<i>'iana_utf-8_any'</i>	Value must consist of UTF-8 printable characters

## 715 **8.7 job-password-repertoire-configured (type2 keyword)**

716 The "job-password-repertoire-configured" attribute indicates the password repertoire  
717 currently configured for this Printer. The value of this attribute MUST be one of the values  
718 specified in the Printer's "job-password-repertoire-supported" attribute (section XX). A  
719 supporting Client can use this attribute's value to limit User input so that the value in "job-  
720 password" will comply with the configured password repertoire.

## 721 **8.8 job-password-supported (integer(0:255))**

722 The "job-password-supported" Printer Description attribute indicates the maximum length  
723 that the Printer will accept for the unencrypted password which the Client will encrypt as the  
724 value of the "job-password" Operation Attribute. A conforming Printer MUST be able to  
725 accept 255 octets without truncation. However, a Printer MAY be implemented as a gateway  
726 to another print system that cannot accept the full 255-octet range, in which case the Client  
727 MUST NOT allow an unencrypted password greater than the length specified by this  
728 attribute.

## 729 **8.9 job-phone-number-default (uri)**

730 The default value supplied by the Printer if the Client omits the 'job-phone-number' Job  
731 Template attribute. This attribute SHOULD use the 'tel:' scheme [RFC2806].

## 732 **8.10 job-phone-number-supported (boolean)**

733 A true value indicates that the Printer accepts the "job-phone-number" attribute.

## 734 **8.11 job-recipient-name-default (name(MAX))**

735 The default value supplied by the Printer if the Client omits the 'job-recipient-name' Job  
736 Template attribute.

## 737 **8.12 job-recipient-name-supported (boolean)**

738 This attribute indicates whether the Printer accepts the "job-recipient-name" attribute.

## 739 **8.13 job-storage-supported (1setOf keyword)**

740 This attribute indicates whether the Printer supports the Job Storage feature, and what  
741 members are supported by the Printer.

742 **8.14 job-storage-access-supported (1setOf type2 keyword)**

743 This attribute specifies the Job Storage access modes supported by the Printer. Standard  
744 keywords for the "job-storage-access" attribute are listed in Table 5.

745 **Table 5 - Standard keywords for "job-storage-access-supported"**

<i>Keyword</i>	<i>Meaning</i>
<i>"group"</i>	Visible to only the group to which the submitting most authenticated user is a member
<i>"owner"</i>	Visible to only the submitting most authenticated user
<i>"public"</i>	Visible to all users (may still be password protected)

746

747 **8.15 job-storage-disposition-supported (1setOf type2 keyword)**

748 This attribute specifies the Job Storage dispositions supported by the Printer. Standard  
749 keywords for the "job-storage-access" attribute are listed in Table 6.

750 **Table 6 - Standard keywords for "job-storage-disposition-supported"**

<i>Keyword</i>	<i>Meaning</i>
<i>"none"</i>	The Printer MUST print the Job. The Printer MUST NOT retain the Job in the Job Retention phase; it MUST move it immediately to the Job History phase.
<i>"print-and-store"</i>	The Printer MUST print the Job. If the Job reaches the 'completed' state, it MUST retain the Job in the Job Retention phase.
<i>"store-only"</i>	The Printer MUST NOT print the Job. The Printer MUST retain the Job in the Job Retention phase.

751 **8.16 job-storage-group-supported (1setOf name(MAX))**

752 This attribute specifies the user groups to which a Stored Job could be made visible when it  
753 is stored, using the "job-storage-group" member (section 6.4.3) of the "job-storage" attribute  
754 (section 6.4). The value of this attribute will list different values if returned in an authenticated  
755 Get-Printer-Attributes or Get-User-Printer-Attributes response.

756 **8.17 proof-print-default (collection)**

757 This attribute specifies the default value of "proof-print" MUST use when not supplied in a  
758 request. A Printer MUST support the same member attributes for this default collection as it  
759 supports for the corresponding "proof-print" Job Template attribute.

760 **8.18 proof-print-supported (1setOf type2 keyword)**

761 This attribute specifies which member attributes of "proof-print" the Printer supports.

762 **9. Additional Values and Semantics for Existing IPP Attributes**

763 This section defines additional values for existing attributes. The existing text for those  
764 attributes is not reproduced here in order to prevent deviations.

765 **9.1 job-hold-until (type2 keyword | name(MAX))**

766 This IPP Enterprise Printer Extensions specification defines additional keyword values for  
767 the "job-hold-until" Job Template attribute [STD92] to support

768 **Table 7 - Additional Keywords for "job-hold-until"**

<b>Keyword</b>	<b>Description</b>
'owner-authorized'	Hold the Job until the Owner has authorized it to be released. The Printer MAY challenge the User for credentials to have the Job released. This provides functionality similar to the "job-password" operation attribute (section 5.1). Whereas the "job-password" attribute causes the Printer to challenge the User for the Job's password to release the Job to processing, this causes the Printer to challenge the User for authenticating credentials for a user account that is authorizes the Job to be released to processing.
'button-press'	Hold the Job until a button press on the Output Device's control panel authorizes it to be released to processing.

769 **9.2 which-jobs (type2 keyword) and which-jobs-supported (1setOf type2  
770 keyword)**

771 This IPP Enterprise Printer Extensions specification defines additional keyword values for  
772 the IPP "which-jobs" operation attribute of the Get-Jobs operation [STD92] and the "which-

773 jobs-supported” Printer Description attribute [PWG5100.7] to support filtering for Proof Print  
774 Jobs and Stored Jobs.

775 **Table 8 - Additional Keywords for "which-jobs" and "which-jobs-supported"**

Keyword	Description
'proof-print'	Proof Print Jobs, i.e., Jobs that have been submitted using the "proof-print" Job Template attribute and which are in the 'completed', 'canceled', or 'aborted' state. If the "proof-print" Job Template attribute is supported, this value MUST be supported.
'stored-public'	Public Stored Jobs, i.e., Jobs that have been stored using the "job-storage " Job Template attribute where the "job-storage-access" member attribute specifies 'public', and which are in the 'completed' state. If the "job-storage" Job Template attribute is supported, this value MUST be supported.
'stored-owner'	Private Stored Jobs, i.e., Jobs that have been stored using the "job-storage " Job Template attribute where the "job-storage-access" member attribute specifies 'owner', and which have reached the 'completed' state. If the "job-storage" Job Template attribute is supported, this value MUST be supported.

776 A Client that specifies the 'stored-owner' keyword MUST be prepared for an authentication  
777 challenge from the Printer.

### 778 **9.3 job-state-reasons (1setOf type2 keyword) Job Description attribute**

#### 779 **9.3.1 Additional Semantics for "job-state-reasons" attribute for "job-cancel-after"** 780 **attribute**

781 This section adds additional semantics to the 'job-hold-until-specified' value defined in  
782 support of the "job-cancel-after" attribute (section 6.1):

783 **Table 9 - Additional Keywords for "job-state-reasons" supporting "job-cancel-after"**

Keyword	Description
'job-canceled-after-timeout'	The Job was canceled because the timer with a duration specified by the "job-cancel-after" attribute (section 7.4) to the "job-state-reasons" Job Status attribute..

784 **9.3.2 Additional Semantics for "job-state-reasons" attribute for the "job-storage"**  
 785 **attribute**

786 This section defines additional values that are defined in support of the "job-storage" attribute  
 787 (section 6.4).

788 Many of the existing "job-state-reasons" attribute values can apply to a 'save-only' Job as  
 789 well as a Job submitted for printing. If the value of the "job-storage-disposition" attribute is  
 790 store-only', the "job-state-reasons" attribute MAY be set with existing values such as 'job-  
 791 incoming', 'resources-are-not-ready' (such as a font), 'job-interpreting', and 'job-queued'.  
 792 Likewise, errors that occur on a Stored Job MAY have existing "job-state-reasons" attribute  
 793 values such as 'job-data-insufficient', 'document-access-error', 'submission-interrupted', 'job-  
 794 canceled-by-user', 'aborted-by-system', etc.

795 There are also new four new "job-state-reasons" keyword values REQUIRED that support a  
 796 Stored Job: 'job-storing', 'job-stored-successfully', 'job-stored-with-warnings', and 'job-  
 797 stored-with-errors'. The existing 'job-completed-successfully', 'job-completed-with-warnings',  
 798 and 'job-completed-with-errors' values are also clarified in the list above for implementations  
 799 that support the "job-save-disposition" Job Template attribute, in such a way that these  
 800 values remain compatible with Printers and Clients that do not support job saving. Table 10  
 801 defines the meanings of these 4 new "job-state-reasons" keywords.

802 **Table 10 - Additional Keywords for "job-state-reasons" supporting "job-storage"**

Keyword	Meaning
'job-stored-successfully'	The job was successfully saved. The Printer MUST also supply 'job-completed-successfully', except when "job-storage-disposition" = 'store-only'. If the "job-storage" Job Template attribute is supported, this value MUST be supported.
'job-stored-with-errors'	The job did not save successfully (whether or not it was printed successfully, printed with warnings, printed with errors, or not printed). The Printer MUST ensure that none of the saved job is accessible, if it was unable to successfully save all of the job. If the "job-storage" Job Template attribute is supported, this value MUST be supported.
'job-stored-with-warnings'	The job was saved with warnings. If the "job-storage" Job Template attribute is supported, this value MUST be supported.
'job-storing'	The Printer is transmitting the job to the save location. This is similar to the 'job-printing' value. If the "job-storage" Job Template attribute is supported, this value MUST be supported.

803

804 Table 11 enumerates the possible combinations of print and save success, warning, and  
 805 error conditions. Note that two values occur only when there are print warnings/errors and a  
 806 save error.

807 **Table 11 - Values of "job-state-reasons" attribute for various job conditions**

	Not storing	Store was successful	Store was unsuccessful
Not printing	<not possible>	'job-completed-successfully'	'job-stored-with-errors'
Print successful	'job-completed-successfully'	'job-completed-successfully'	'job-stored-with-errors'
Print warnings	'job-completed-with-warnings'	'job-completed-with-warnings'	'job-completed-with-warnings', 'job-stored-with-errors'
Print errors	'job-completed-with-errors'	'job-completed-with-errors'	'job-completed-with-errors', 'job-stored-with-errors'
Print warnings and errors	'job-completed-with-errors'	'job-completed-with-errors'	'job-completed-with-errors', 'job-stored-with-errors'

808 **10. Conformance Requirements**

809 This section summarizes the Conformance Requirements detailed in the definitions in this  
810 document for Client and Printer objects (servers or devices).

811 **10.1 Conformance Requirements for this specification**

812 In order for a client and a Printer to claim conformance to this IPP Enterprise Printer  
813 Extensions Specification, a Client MUST be able to supply and a Printer MUST support the  
814 following:

- 815 1. The Cancel-Jobs operation (section 5.1)
- 816 2. The Cancel-My-Jobs operation (section 5.2)
- 817 3. The Close-Job operation (section 5.3)
- 818 4. The Resubmit-Job operation (section 5.4)
- 819 5. The Reprocess-Job operation [RFC3998]
- 820 6. The "job-ids" Operation attribute (section 6.3) in the Get-Jobs operation [RFC2911]  
821 (section 3.2.6)
- 822 7. The "job-ids" Operation attribute (section 6.3) in the Purge-Jobs operation [RFC2911]  
823 (section 3.2.9), if Purge-Jobs operation is supported (section 6.4)

- 824 8. The "proof-print" Job Template attribute (sections 7.11). See also section 12.5  
825 Conformance Requirements for the REQUIRED "proof-print" Job Template attribute
- 826 9. The "job-ids-supported" Printer Description attribute (section 10.2)
- 827 10. The "which-jobs-supported" Printer Description attribute (see section 10.9 for which  
828 values)
- 829 The other attributes defined in this specification are OPTIONAL for a client to be able to  
830 supply and for a Printer to support.

## 831 10.2 Conditional Conformance Requirements for Printers

832 The following conditional conformance requirements are defined:

If the Printer supports:	then the Printer MUST also support:
"job-hold-until-time" Job Template attribute in Job Creation operations	<ul style="list-style-type: none"> <li>• "job-hold-until" Job Template attribute ([STD92])</li> <li>• Hold-Job operation with the "job-hold-until" ([STD92]) and "job-hold-until-time" (section <b>Error! Reference source not found.</b>) Operation attributes</li> <li>• Release-Job operation [STD92].</li> </ul>
"job-delay-output-until-time" Job Template attribute in Job Creation operations	<ul style="list-style-type: none"> <li>• "job-delay-output-until" Job Template attribute (section 6.1)</li> <li>• Set-Job-Attributes operation (section <b>Error! Reference source not found.</b>)</li> </ul>
"job-delay-output-until" Job Template attribute in Job Creation operations	Set-Job-Attributes operation (section <b>Error! Reference source not found.</b> )

833

834

## 835 11. Internationalization Considerations

836 For interoperability and basic support for multiple languages, conforming implementations  
837 MUST support the Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8)  
838 [RFC3629] encoding of Unicode [UNICODE] [ISO10646] and the Unicode Format for  
839 Network Interchange [RFC5198].

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

- 842 • Unicode Bidirectional Algorithm [UAX9] – left-to-right, right-to-left, and vertical
- 843 • Unicode Line Breaking Algorithm [UAX14] – character classes and wrapping
- 844 • Unicode Normalization Forms [UAX15] – especially NFC for [RFC 5198]
- 845 • Unicode Text Segmentation [UAX29] – grapheme clusters, words, sentences
- 846 • Unicode Identifier and Pattern Syntax [UAX31] – identifier use and normalization
- 847 • Unicode Collation Algorithm [UTS10] – sorting
- 848 • Unicode Locale Data Markup Language [UTS35] – locale databases

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

- 851 • Unicode Character Encoding Model [UTR17] – multi-layer character model
- 852 • Unicode in XML and other Markup Languages [UTR20] – XML usage
- 853 • Unicode Character Property Model [UTR23] – character properties
- 854 • Unicode Conformance Model [UTR33] – Unicode conformance basis

## 855 **12. Security Considerations**

856 In addition to the security considerations described in the IPP/1.1: Model and Semantics  
857 [STD92], implementations of this specification SHOULD conform to the following standards  
858 on processing of human-readable Unicode text strings:

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

## 861 **13. IANA Considerations**

### 862 **13.1 IPP Attribute and Keyword Value Registrations**

863 This section contains the exact registration information for IANA to update according to the  
864 procedures defined in [STD92].

865 The registry entries will contain the following information:

866 Job Template attributes:	Reference
867 -----	-----
868 job-cancel-after (integer(1:MAX))	[IPPEPE]

869	job-phone-number (uri)	[ IPPEPE]
870	job-recipient-name (name(MAX))	[ IPPEPE]
871	job-storage (collection)	[ IPPEPE]
872	job-storage-access (type2 keyword)	[ IPPEPE]
873	job-storage-disposition (type2 keyword)	[ IPPEPE]
874	job-storage-group (name(MAX))	[ IPPEPE]
875	storage-access (type2 keyword)	[ IPPEPE]
876	proof-print (collection)	[ IPPEPE]
877	media (type2 keyword   name(MAX))	[ IPPEPE]
878	media-col (collection)	[ IPPEPE]
879	proof-print-copies (integer (0:MAX))	[ IPPEPE]
880		
881		
882	Operation attributes:	Reference
883	-----	-----
884	job-password (octetString(255))	[ IPPEPE]
885	job-password-action (type2 keyword)	[ IPPEPE]
886	job-password-encryption (type2 keyword   name(MAX))	[ IPPEPE]
887		
888		
889	Job Status attributes:	Reference
890	-----	-----
891	job-save-printer-make-and-model (text(127))	[ IPPEPE]
892		
893		
894	Printer Description attributes:	Reference
895	-----	-----
896	job-cancel-after-default (integer(1:MAX))	[ IPPEPE]
897	job-password-action-supported (1setOf (type2 keyword))	[ IPPEPE]
898	job-password-encryption-supported (1setOf (type2 keyword   name(MAX)))	[ IPPEPE]
899	job-password-repertoire-configured (1setOf (type2 keyword   name(MAX)))	[ IPPEPE]
900	job-password-repertoire-supported (1setOf (type2 keyword   name(MAX)))	[ IPPEPE]
901	job-password-supported (integer(0:255))	[ IPPEPE]
902	job-phone-number-default (uri)	[ IPPEPE]
903	job-phone-number-supported (boolean)	[ IPPEPE]
904	job-print-password-supported (octetString(256))	[ IPPEPE]
905	job-print-password-encryption-supported (type2 keyword)	[ IPPEPE]
906	job-print-password-repertoire-supported (type2 keyword)	[ IPPEPE]
907	job-recipient-name-default (name(MAX))	[ IPPEPE]
908	job-recipient-name-supported (boolean)	[ IPPEPE]
909	printer-detailed-status-messages (1setOf text(MAX))	[ IPPEPE]
910	proof-print-default (collection)	[ IPPEPE]
911	proof-print-supported (1setOf type2 keyword)	[ IPPEPE]
912	save-disposition-supported (1setOf (type2 keyword))	[ IPPEPE]
913	save-document-format-default (mimeMediaType)	[ IPPEPE]
914	save-document-format-supported (1setOf mimeMediaType)	[ IPPEPE]
915	save-location-default (uri)	[ IPPEPE]
916	save-location-supported (1setOf uri)	[ IPPEPE]
917	save-name-subdirectory-supported (boolean)	[ IPPEPE]
918	save-name-supported (boolean)	[ IPPEPE]
919	which-jobs-supported (1setOf type2 keyword)	[ IPPEPE]

## 920 13.2 Attribute Value Registrations

921 The attributes defined in this specification will be published by IANA according to the  
 922 procedures in IPP/1.1 Model and Semantics [STD92] section 7.1 in the following file:

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

924 The registry entries will contain the following information:

925	Attribute (attribute syntax)		Reference
926	Keyword Attribute Value		
927	-----		-----
928	job-hold-until (type2 keyword)		[IPPEPE]
929	job-hold-until-supported (1setOf (type2 keyword))		[IPPEPE]
930	owner-authorized		[IPPEPE]
931	button-press		[IPPEPE]
932			
933	job-password-action (type2 keyword)		[IPPEPE]
934	job-password-action-supported (1setOf (type2 keyword))		[IPPEPE]
935	hold-job		[IPPEPE]
936	process-and-retain		[IPPEPE]
937	retain-only		[IPPEPE]
938			
939	job-password-encryption (type2 keyword   name(MAX))		[IPPEPE]
940	job-password-encryption-supported (1setOf (type2 keyword   name(MAX)))		[IPPEPE]
941	md2		[IPPEPE]
942	md4		[IPPEPE]
943	md5		[IPPEPE]
944	none		[IPPEPE]
945	sha		[IPPEPE]
946	sha2-224		[IPPEPE]
947	sha2-256		[IPPEPE]
948	sha2-384		[IPPEPE]
949	sha2-512		[IPPEPE]
950	sha2-512_224		[IPPEPE]
951	sha2-512_256		[IPPEPE]
952	sha3-224		[IPPEPE]
953	sha3-256		[IPPEPE]
954	sha3-384		[IPPEPE]
955	sha3-512		[IPPEPE]
956	sha3-512_224		[IPPEPE]
957	sha3-512_256		[IPPEPE]
958	shake-256		[IPPEPE]
959	shake-512		[IPPEPE]
960			
961	job-save-disposition-supported (1setOf type2 keyword)		[IPPEPE]
962	save-disposition		[IPPEPE]
963	save-info		[IPPEPE]
964			
965	job-spooling-supported (type2 keyword)		[IPPEPE]
966	automatic		[IPPEPE]
967	spool		[IPPEPE]
968	stream		[IPPEPE]
969			
970	job-state-reasons (type2 keyword)		[IPPEPE]
971	job-delay-output-until-specified		[IPPEPE]
972	job-password-wait		[IPPEPE]
973	job-printed-successfully		[IPPEPE]
974	job-printed-with-errors		[IPPEPE]
975	job-printed-with-warnings		[IPPEPE]
976	job-resuming		[IPPEPE]
977	job-retain-until-specified		[IPPEPE]
978	job-saved-successfully		[IPPEPE]
979	job-saved-with-errors		[IPPEPE]
980	job-saved-with-warnings		[IPPEPE]
981	job-saving		[IPPEPE]
982	job-spooling		[IPPEPE]
983	job-streaming		[IPPEPE]
984	job-suspended-by-operator		[IPPEPE]

985	job-suspended-by-system	[ IPPEPE]
986	job-suspended-by-user	[ IPPEPE]
987	job-suspending	[ IPPEPE]
988		
989	job-storage-supported (type2 keyword)	[ IPPEPE]
990	job-storage-access	[ IPPEPE]
991	job-storage-disposition	[ IPPEPE]
992	job-storage-group	[ IPPEPE]
993		
994	proof-print-supported (1setOf type2 keyword)	[ IPPEPE]
995	media	[ IPPEPE]
996	media-col	[ IPPEPE]
997	proof-print-copies	[ IPPEPE]
998		
999	which-jobs (type2 keyword)	[ IPPEPE]
1000	proof-print	[ IPPEPE]
1001	stored	[ IPPEPE]

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## 1119 **16. Change History**

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1121 Initial revision based on an abandoned update to JPS2v2 and discussions on the IPP WG  
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