



The Printer Working Group

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Working Draft

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IPP Enterprise Printer Extensions v2.0 (EPX)

Status: Interim

Abstract: This specification defines extensions to IPP/1.1 [STD92] to support the IPP Job Proof JobPrint Feature, Job Storage Feature and ~~Password Protected~~ Job Protection Feature, to better enable authenticated release workflows that are used in institutional IT environments such as corporate businesses ~~or universities~~. ~~These features replace the deprecated Job Save and Proof Print features defined in "Internet Printing Protocol (IPP): Job and Printer Extensions – Set 2 (JPS2)" [PWG5100.11], governments or universities.~~

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91 substantial operational experience, and enjoys significant public support.

92 For additional information regarding the Printer Working Group visit:

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94 Contact information:

95 The Printer Working Group
96 c/o The IEEE Industry Standards and Technology Organization
97 445 Hoes Lane
98 Piscataway, NJ 08854
99 USA

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227 1. Introduction

228 This specification defines extensions to IPP/1.1 [STD92] to support the IPP Proof Job
229 Feature, Job Storage Feature and ~~Password-Protected-Job~~ Protection Feature, to better
230 enable authenticated release workflows that are used in institutional IT environments such
231 as corporate businesses or universities.

232 The Proof Print, Job Save and Secure Print features defined in "Internet Printing Protocol
233 (IPP): Job and Printer Extensions – Set 2 (JPS2)" [PWG5100.11] were not interoperable
234 with one another, and were not defined in such a way that they could interoperate in practice.
235 The Proof Print and Job Save features are deprecated, to be replaced by Job Proof Print
236 Feature and Job Storage Feature. The Secure Print feature has been refactored and
237 extended to become the ~~Password-Protected-Job~~ Protection Feature, which can interoperate
238 with the Job Proof Print Feature and Job Storage Feature to enable more complex print
239 workflow solutions to be created.

240 2. Terminology

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

242 2.1 Conformance Terminology

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

248 2.2 Printing Terminology

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

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

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

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

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

260 *Physical Device*: a hardware implementation of [aan](#) endpoint device, e.g., a marking engine,
261 a fax modem, etc.

262 2.3 Protocol Role Terminology

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

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

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

270 2.4 Job State Terminology

271 This document defines features that influence the trajectory of a Job through the various Job
272 states. The states defined for "job-state" [STD92] and the transitions between these states
273 are illustrated in Figure 1. **THIS SUB-SECTION SHOULD BE REMOVED BEFORE FINAL**
274 **PUBLICATION.**

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

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

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

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

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

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

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

289 ~~*'processing'*: One or more of the following: (1) the Job is using, or is attempting to use, one~~
290 ~~or more purely software processes that are analyzing, creating, or interpreting a PDL, etc.;~~
291 ~~(2) the Job is using, or is attempting to use, one or more hardware devices that are~~
292 ~~interpreting a PDL; making marks on a medium; and/or performing finishing, such as~~

293 stapling, etc.: (3) the Printer has made the Job ready for printing, but the Output Device is
294 not yet printing it, either because the Job hasn't reached the Output Device or because the
295 Job is queued in the Output Device or some other spooler, waiting for the Output Device to
296 print it.

297 'processing-stopped': The Job ~~is a candidate to start processing but is not yet processing~~has
298 stopped while processing for any number of reasons and will return to the 'processing' state
299 as soon as the reasons are no longer present.

300 'canceled': The Job has been canceled by a User-initiated action such as a Cancel-Job
301 operation or some non-IPP method, the Printer has completed canceling the Job, and all
302 Job Status attributes have reached their final values for the Job.

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

306 'completed': The Job has completed successfully or with warnings or errors after processing,
307 all of the Job Media Sheets have been successfully stacked in the appropriate output bin(s),
308 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)

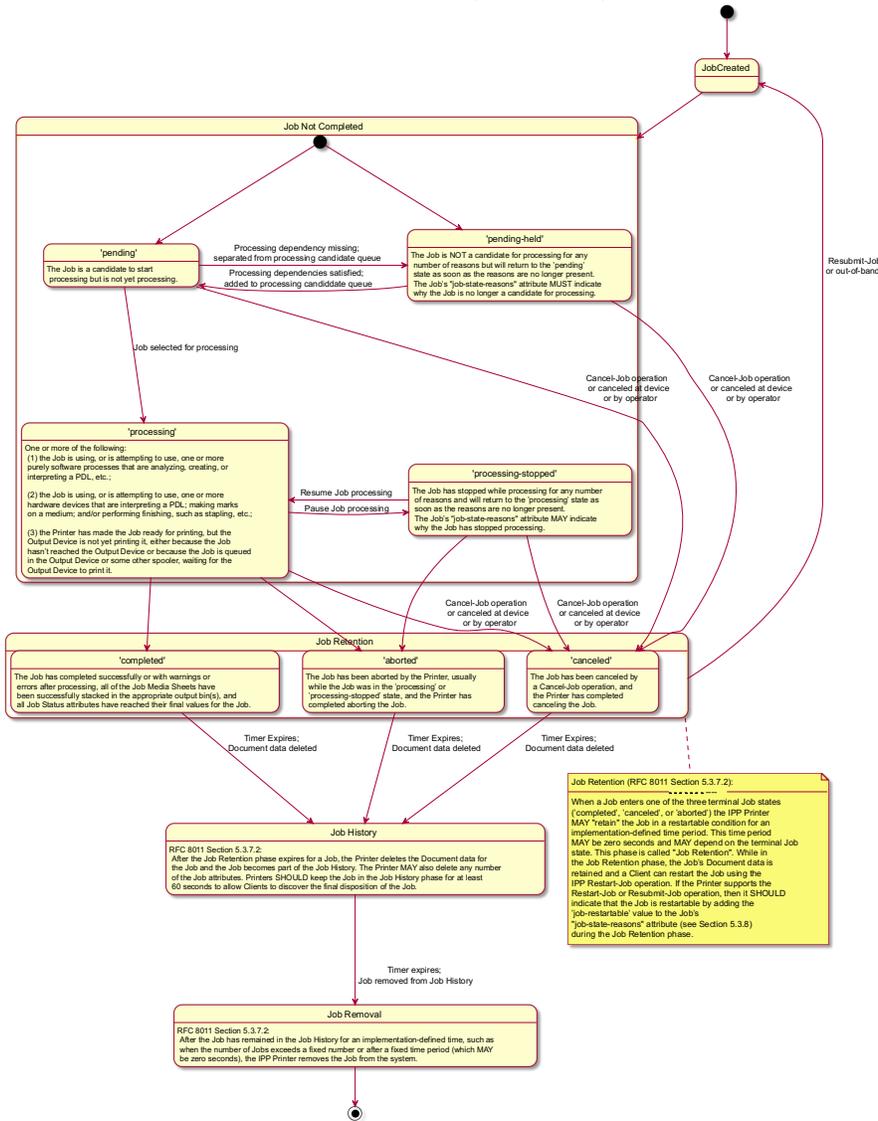


Figure 1 - IPP Job States and Transitions

309

310

311 2.5 Other Terminology

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

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

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

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

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

328 *Password Protected Job:* The Job that has a password permanently attached to it that must
329 be provided to the Printer to authorize its printing. If the Job is duplicated, either via an IPP
330 Reprocess-Job or Resubmit-Job operation, or out of band of IPP via control panel-initiated
331 reprinting or some other method, the password is included in the new Job to require
332 authorization for the new Job.

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

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

338 ~~*Proof Job:* A Proof Job is a Job that has multiple collated copies, where Job is moved to the
339 'processing-stopped' state once the first copy is printed, to allow review by the User before
340 the remaining number of copies are printed.~~

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

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

347 *Retained Job*: A ~~Retained Job is a job~~ that the Printer retains in the so-called Job Retention
348 Phase (see [STD92] section 5.3.7.2 Partitioning of Job States) in the Job's terminal state
349 ('completed', 'aborted', or 'canceled') after processing it, for an implementation-defined
350 period (including zero seconds). An exact copy of a Retained Job can be created using a
351 Reprocess-Job operation. A modifiable copy of a Retained Job can be created using a
352 Resubmit-Job operation.

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

354 *Stored Job*: A ~~Stored Job is a~~ Retained Job that has reached the 'completed' state and that
355 has identifying characteristics marking it as a Stored Job instead of simply as a previously
356 processed Job. The Documents in a Stored Job are maintained in their originally submitted
357 state and format. The Printer retains a Stored Job indefinitely, unless otherwise configured,
358 so that it can be listed and selected for reprinting at some time in the future.

359 2.6 Acronyms and Organizations

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

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

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

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

364 3. Requirements

365 3.1 Rationale for IPP Enterprise Printer Extensions v2.0

366 IETF and PWG IPP printing standards define an abstract model of a Print Service (i.e., ISO
367 DPA Logical Printer) and a Print Device (i.e., ISO DPA Physical Printer) in section 3.1 of
368 IETF IPP/1.1 [STD92]. Some IPP Printers already support proofing, saving, and reprinting
369 of large Print Jobs via vendor proprietary operations and attributes.

370 Therefore, this IPP Enterprise Printer Extensions v2.0 specification should:

- 371 1. Support Proof Jobs using IPP Job Creation operations;
- 372 2. Support Stored Jobs using IPP Job Creation operations;
- 373 3. Support ~~reprinting~~creating new Jobs from stored ~~or proofed~~ Jobs, with ~~possibly~~
374 different processing instructions;
- 375 4. Support Password Protected Jobs using IPP Job Creation operations;
- 376 5. Support interoperability between Proof Jobs, Stored Jobs and Password
377 Protected Jobs such that a single Job can be any combination of the 3 including
378 all 3 (e.g. a "Password Protected Stored Proof Job").

Commented [KS(&SA1)]: Does this fit the new "Proof Job" notion? Or is this a holdover from the old "Proof Print Job"

379 3.2 Use Cases

380 3.2.1 Job Protection Via a Job Password Protected Job

381 Frank works in a sales office that is large enough for him to have privacy concerns, but not
382 so large that the printers are integrated into the IT infrastructure in a sophisticated manner.
383 He is editing a sensitive business report that contains financial data. He wants to make sure
384 that, if he prints it to the office's workgroup printer, he can be confident only people with the
385 original password can pick it up or re-print it. Frank sees that the workgroup printer supports
386 Password Protected Jobs, so he specifies a "Job Password" when he prints it. The
387 workgroup printer delays printing the Job until someone first provides the matching
388 password. Frank goes to the workgroup printer, observes that his Password Protected Job
389 is listed on the control panel, selects it, and enters the job's password at the prompt. The
390 printer prints the Password Protected Job, and Frank can relax knowing the printed Job was
391 safe from others' view.

392 3.2.2 Authenticated Job Release

393 3.2.2 Job Protection Via User Authentication

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

403 3.2.3 Job Storage

404 Vincent is an administrative assistant for a school. The school provides its teachers with
405 paper forms for documenting their class assignments and attendance. Vincent makes these
406 forms available on the school's web site and also on the school's workgroup printer as a
407 Stored Job accessible by any accounts in the Faculty user group. He sends an email to the
408 school faculty letting them know that the Stored Job is available for reprinting.

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

414 **3.2.33.2.4 Proof Print**

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

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

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

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

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

433 **3.2.41.1.1 Job Storage**

434 ~~Vincent is an administrative assistant for a school. The school provides its teachers with
435 paper forms for documenting their class assignments and attendance. Vincent makes these
436 forms available on the school's web site and also on the school's workgroup printer as a
437 Stored Job accessible by any accounts in the Faculty user group. He sends an email to the
438 school faculty letting them know that the Stored Job is available for reprinting.~~

439 ~~Lily is a teacher. She has run out of her supply of the assignment tracking form. She goes
440 to the school's office, logs in using her faculty account, and selects Stored Jobs. Among the
441 Jobs visible to her account, she finds and chooses the assignment tracking form from the
442 workgroup printer's Stored Jobs list on its control panel, chooses to have 30 copies made,
443 and taps Print. The copies are printed, and she returns to her classroom.~~

444 **3.3 Exceptions**445 **3.3.1 Unauthorized Access Job Protection Using a Job Password Protected Job**

446 Velma is one of Frank's co-workers. She is very competitive and also has questionable
447 business ethics. She goes to the department's workgroup printer to see if she can re-print
448 any of Frank's reports. She finds his latest draft report and tries to re-print it. The Job Velma
449 selected is a Password Protected Job. The workgroup printer presents a password

450 challenge UI to request the Job Password. Velma doesn't know it, so she clicks "Cancel"
451 and goes to the break room to brood.

452 3.4 Out of Scope

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

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

456 3.5 Design Requirements

457 This IPP Enterprise Printer Extensions v2.0 design should:

- 458 (1) Follow the naming conventions defined in IETF IPP/1.1 [STD92], including
459 keyword value (lowercase) and hyphenation requirements;
- 460 (2) Optimize compatibility with existing IETF and PWG IPP operations when
461 making design decisions in defining new operations and attributes;
- 462 (3) Define new attributes in support of the ~~Password-Protected-Job~~
463 ~~feature~~Protection Feature;
- 464 (4) Define new attributes in support of the Job Storage feature;
- 465 (5) Define new attributes in support of the Job Proof Print ~~feature~~Feature;
- 466 (6) Define additional attributes .
- 467

468 4. Semantics Common to More Than One Attribute

469 4.1 Overview

470

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

471

472 4.2 Authenticated Release Feature

473 The Authenticated Release Feature enables a Client to provide authentication credentials
 474 at Job Creation Time, and request that the Job be held by the Printer until matching
 475 credentials are provided at the Printer to authorize the Job's release.

476 This feature provides functionality similar to the Job Protection Feature (section 4.4). It differs
 477 mainly in the nature of the credential used to release the Job; whereas the Job Protection
 478 Feature uses a "job password", this feature uses user credentials to release the Job to
 479 processing. The Client uses this feature by specifying "job-hold-until" = 'owner-authorized'.

480 4.2.3 Job Storage Feature

481 The Job Storage Feature enables a UserClient to "store" a Job and its Documents in their
 482 originally submitted and unprocessed form, ~~so that the Job might be selected to make it~~
 483 available for reprinting at a later time. A Stored Job's ~~visibility~~discoverability will depend on
 484 its access settings; it might be ~~visible~~discoverable to all users, ~~or might to~~ only ~~be visible to~~
 485 the originating user, or to users that are part of a particular group. A Client requests a Job
 486 be treated as a Stored Job by supplying the "job-storage" Job Template attribute (section
 487 6.5) when submitting the Job Creation operation.

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

492 **4.2.14.3.1 Creating Stored Jobs**

493 A Job becomes a Stored Job when the "job-storage" Job Template attribute is specified in
494 ~~its creation~~the Job Creation operation, and ~~that Job~~ has reached the 'completed' state.

495 **4.2.24.3.2 Identifying and Listing Stored Jobs**

496 A Job ~~indicates~~is a Stored Job if its ~~Job Storage status using one of the~~ "job-state-reasons"
497 Job Status attribute includes one of the keywords for the Job Storage Feature defined in
498 section 0. A Client can get a listing of Stored Jobs by specifying either the 'stored-public' or
499 'stored-owner' keyword for the "which-jobs" attribute (section 10.1) in a Get-Jobs operation
500 request [STD92].

501 **4.2.34.3.3 Reprinting Stored Jobs**

502 ~~This section defines the method by which~~ There are two methods defined to reprint a copy
503 of the Saved Job: using the Resubmit-Job operation: [PWG5100.7]; and by direct interaction
504 with the Printer's control panel. The Reprocess-Job operation, ~~defined in~~ [RFC3998], has
505 been deprecated. ~~The Resubmit-Job operation is defined in this document and operates on~~
506 ~~any Retained Job.~~

507 **4.2.3-14.3.3.1 Reprinting Stored Jobs using the Resubmit-Job operation**

508 The Resubmit-Job operation [PWG5100.7] re-processes a copy of any Retained Job with
509 the ability to supply additional operation and Job Template attributes that will affect the
510 processing of that copy of the Job by either overriding the values of existing attributes or
511 providing additional attributes. The Resubmit-Job operation has the same structure as the
512 Print-URI operation (see [STD92] section 4.2.2) except that the "job-id" (integer(1:MAX))
513 operation attribute MUST take the place of the "document-uri" (uri) operation attribute.

514 **4.2.3-24.3.3.2 Reprinting Stored Jobs using the Printer Control Panel**

515 Stored Jobs can be reprinted using the Printer's control panel (control console). The details
516 of the user experience and presentation are beyond the scope of this document, but ought
517 to reflect the semantics of the Job Storage feature defined in this IPP Enterprise Printer
518 Extensions v2.0 specification.

519 **4.34.4 Password Protected Job Protection Feature**

520 The ~~Password Protected~~ Job Protection Feature enables a userUser to protect a Job with a
521 password that is required for authorizing printing or reprinting the Job. A Client requests a
522 Job be treated as a Password Protected Job by supplying the "job-password", "job-
523 password-action" and "job-password-encryption" Job Template attributes (sections 5.1, 5.2,
524 and 5.3) when submitting the Job Creation operation.

525 The password is permanently attached to the Job and persists with the Job until it enters the
526 Job History phase [STD92]. If the Job is copied, as in the case of reprinting a Stored Job,

527 the password is preserved in the new copy. This feature can be combined with the Job
528 Storage Feature and/or the [Job Proof Print feature](#).

529 **4.4.5 Job Proof Print Feature**

530 **4.4.1 Original**

531 The [Job Proof Print Feature](#) enables a User to print a Proof Job and to save it as part of job
532 processing in such a way that users can submit a request to print a copy of the Proof Job at
533 a later time. A Client requests a Printer to print and save a Proof Job by supplying the "proof-
534 print" Job Template attribute (section 6.6) when submitting the job. In this case, the Printer
535 retains the Proof Job indefinitely in the so-called Job Retention Phase (see [STD92] section
536 5.3.7.2 Partitioning of Job States) in the job's terminal state ('completed', 'aborted', or
537 'canceled') after processing it, rather than aging the job out after an implementation-defined
538 period. In other words, a Proof Job is just a Retained Job that the Printer is retaining
539 indefinitely. A Client can then request the Printer to reprint a copy of the Proof Job using the
540 Resubmit-Job operation [PWG5100.7]. See section 12.5 Conformance Requirements for the
541 REQUIRED "proof-print" Job Template attribute for additional conformance requirements for
542 Clients and Printers.

543 **4.4.2 New**

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

548 **5. New Operation Attributes for Existing Operations**

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

550 **5.1 job-password (octetString(255)) for Job Creation operations**

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

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

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

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

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

574 The Job MUST preserve its "job-password" attribute, if it has one, for its entire lifespan. If a
 575 copy of a Job is created by a Resubmit-Job operation or via some mechanism out-of-band
 576 of IPP, the new copy MUST have a copy of the "job-password" attribute so that **that new**
 577 **copy** is also a Password Protected Job.

578 5.2 job-password-action (type2 keyword)

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

586 Standard keyword values include:

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

Commented [KS&SA2]: 'hold-and-retain'? This seems a bit too close to the "print-and-store" semantic of the "job-storage-disposition" member of "job-storage". It seems like the choice should be either 'hold' (password applies to the first printing only), 'retain' (password required for all reprints but does not apply to the first printing) or 'hold-and-retain' (password required for all printings)

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

598 **5.3 job-password-encryption (type2 keyword) for Job Creation** 599 **operations**

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

606 **6. Job Template Attributes**

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

610 **6.1 job-cancel-after (integer(1:MAX))**

611 This Job Template attribute specifies the maximum number of seconds that are allowed for
612 processing a Job. The cancel timer does not begin until the Job enters the 'processing' state.
613 If the Job is canceled because of this timer, the Printer MUST add the 'job-canceled-after-
614 timeout' keyword (~~section-Error! Reference source not found.~~) to the "job-state-reasons"
615 Job Status attribute. (section 1.1).

616 **6.2 job-pause-after (integer(1:MAX))**

617 This Job Template attribute specifies after how many pages the Printer should pause
618 processing a Job.

619 **6.26.3 job-phone-number (uri)**

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

624 **6.36.4 job-recipient-name (name(MAX))**

625 This Job Template attribute contains the name of the person that is to receive the output of
626 the Job. The value of the "job-recipient-name" attribute is commonly printed on job sheets
627 printed with the job. An example of another use of the "job-recipient-name" attribute is if the

Commented [KS(&SA3): I removed the " | name(MAX)" because that seems superfluous. Vendor extension keywords can be supported without having to have these two syntaxes. Or am I missing something?

Commented [KS(&SA4): No need for site-local encryption types, so having the "name(MAX)" syntax alternative doesn't provide any value

Commented [KS(&SA5): Do we want to keep this? I'm thinking not...it might have been tied to the HP Proof and Hold feature, which we have abandoned.

628 Printer accesses a database to get job delivery instructions for the recipient of a job. A zero-
629 length value indicates that there is no job recipient name.

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

634 **6.4.6.5 job-storage (collection)**

635 The "job-storage" Job Template attribute is a collection whose members specify how a
636 Printer processes a Job to become a Stored Job. See section 4.2 for a full description of the
637 Job Storage Feature.

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

640 **6.4.16.5.1 job-storage-access (type2 keyword)**

641 The "job-storage-access" member attribute specifies the access restrictions on the Stored
642 Job. The value MUST be one of the keywords specified by the Printer's "job-storage-access-
643 supported" Printer Description attribute (section 8.14). The "job-storage-access" member
644 attribute MUST be preserved by the Job as a member of the "job-storage" Job Status
645 attribute (section 7.1).

646 **6.4.26.5.2 job-storage-disposition (type2 keyword)**

647 The "job-storage-disposition" member attribute specifies how the Job is to be handled by the
648 Printer during the 'processing' state. The value MUST be one of the values specified by the
649 Printer's "job-storage-disposition-supported" Printer Description attribute (section 8.16).

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

652 **6.4.36.5.3 job-storage-group (name(MAX))**

653 This member attribute specifies the group, if any, in which the Stored Job is listed. The value
654 specified by the "job-storage-access" attribute (section 6.5.1) coordinates with the value of
655 this attribute. If the "job-storage-access" attribute is 'group', then the value of this attribute
656 MUST be one of the values specified by the Printer's "job-storage-group-supported" Printer
657 Description attribute (section 8.17).

658 **6.56.6 proof-print (collection)**

659 This Job Template attribute indicates to the Printer that this Job is a Proof Job. This attribute
660 allows a user to specify the attributes of the proof print(s) of the job that are to be printed

661 prior to the printing the full run of the job. After the proof prints have been produced, the
 662 Printer MUST retain the completed job as a Proof Job for a period of time sufficient to allow
 663 users to proof the job, rather than aging it out after an implementation-defined period which
 664 SHOULD be longer than the period for ordinary completed Jobs (see Job Retention phase
 665 in [STD92] section 5.3.7.2 Partitioning of Job States). When a Proof Job is reprinted using
 666 any of the operations that reprint a Retained Job (e.g., Reprocess-Job or Resubmit-Job),
 667 the Printer MUST NOT copy the "proof-print" attribute from the Proof Job to the copy of the
 668 Proof Job so that the job is not re-proofed again. Only if the Resubmit-Job operation supplies
 669 its own "proof-print" attribute, will the copied job be proofed.

670 A Client MUST be able to supply and a Printer MUST support this attribute in order to claim
 671 support of this IPP Enterprise Printer Extensions v2.0 Specification, respectively. See
 672 section 12.5 Conformance Requirements for the REQUIRED "proof-print" Job Template
 673 attribute for additional conformance requirements for Clients and Printers.

674 This attribute MAY be used with the "job-password" attribute for a Password Protected Job
 675 that is also a Proof Job. A Printer indicates its support for this by listing "job-password" and
 676 "job-password-encryption" in its "proof-print-supported" Printer Description attribute (section
 677 8.19).

Commented [KS(&SA6): Does this cause normative problems? Do we need to define "proof-print-job-password-supported (boolean)" and if absent then proof-print and job-password are incongruent as per 5100.11? But we WANT to enable this with this specification.

678 Table 1 lists the member attributes of the "proof-print" collection attribute.

679 **Table 1 - "proof-print" member attributes**

Member Attribute Name	Request	Printer Support
proof-print-copies	MUST	MUST
media	MUST be one or the other, but NOT both	MUST
media-col		MAY

680 **6.5.16.6.1 proof-print-copies (integer (0:MAX))**

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

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

Commented [KS(&SA7): Is it required that zero be supported?

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

689 6.5.26.6.2 media (type2 keyword | name(MAX)) or media-col (collection)

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

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

700 Since this "media" member attribute has the same name as the "media" Job Template
701 attribute (defined [STD92]), the "media-supported" (1setOf (type2 keyword | name(MAX)))
702 Printer attribute identifies the values of this "media" member attribute (as well as the values
703 of the "media" Job Template attribute) that the Printer supports, i.e., the names of the
704 supported media. A value that is provided for the "media" member attribute in the collection
705 would have the same effect as if the job were submitted with that value as the value of the
706 "media" Job Template attribute.

707 Since this "media-col" member attribute has the same name as the "media-col" Job
708 Template attribute (defined in [PWG5100.3] and in section 11.5 of this specification), the
709 "media-col-supported" Printer attribute identifies the keyword names of the member
710 attributes supported in this "media-col" member attribute (as well as the keyword names of
711 the "media-col" Job Template attribute), i.e., the names of the member attributes that the
712 Printer supports.

713 7. Job Status Attributes**714 7.1 job-storage (collection)**

715 The "job-storage" Job Status attribute labels the Job as a Stored Job and specifies the
716 storage handling requirements the Printer MUST follow. All the members of this Job Storage
717 attribute are the same as those specified for the "job-storage" Job Template attribute (section
718 6.5).

719 8. Printer Description Attributes**720 8.1 job-cancel-after-default (integer(1:MAX) | no-value)**

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

723 8.2 job-cancel-after-supported (rangeOfInteger(1:MAX))

724 This **Printer-Description** attribute provides the allowed range of values the Printer will accept
725 for the "job-cancel-after" Job Template attribute (section 6.1).

726 8.3 job-password-action-supported (type2 keyword)

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

730 Standard password action keyword values include:

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

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

742 8.4 job-password-encryption-supported (1setOf (type2 keyword | 743 name(MAX)))

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

746 If the "job-password" operation attribute is supported, then this attribute MUST be supported.
747 Standard keyword values are in Table 2. The 'md2', 'md4', 'md5', and 'sha' keywords have
748 been DEPRECATED. Others may be deprecated in the future as the state of the art of
749 cryptography evolves.

750 **Table 2 - Standard keywords for "job-password-encryption-supported"**

Keyword	Description
---------	-------------

Commented [KS(&SA8): 'hold-and-retain'?

Commented [KS(&SA9): 'hold-and-retain'? I'm a little unclear how this would work.

'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. [1]
'md4'	The encryption method uses the MD4 hash algorithm defined in RFC 1320. [1]
'md5'	The encryption method uses the MD5 hash algorithm defined in RFC 1321. [1]
'sha'	The encryption method uses the Secure Hash Algorithm 1 defined by the National Institute of Standards and Technology. [1]
'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.

Commented [KS(&SA10)]: Is it time for us to deprecate this?

Commented [KS(&SA11)]: Suggest we remove this...

'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.

751 [1] - Deprecated

752 8.5 job-password-length-supported (rangeOfInteger (0:255))

753 The 4.1 "job-password-length-supported" Printer Description attribute specifies the minimum
 754 and maximum supported length of the unencrypted password, measured in characters. The
 755 character set encoding is specified by the "job-password-repertoire-configured" attribute
 756 (Section XX). The Printer is configured to accept an empty password if the range's minimum
 757 value is 0 (zero).

758 This attribute complements the existing "job-password-supported" attribute [\[PWG5100.11\]](#),
 759 which specifies the maximum password length supported before encryption, measured in
 760 octets.

761 8.6 job-password-repertoire-supported (1setOf (type2 keyword))

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

764 The keywords are named according to a 'REGISTRY_ENCODING_RANGE' naming
 765 structure convention. Table 3 lists the standard keywords. Vendor repertoire keywords,

766 prefixed with "vendor_" to indicate a vendor-specific registry, may also be used. Vendor
 767 repertoire keywords SHOULD be registered with the PWG to achieve interoperability. As
 768 an example, a vendor may choose to register the 'vendor_us-ascii_lowercase' keyword to
 769 specify a repertoire limited to using only lowercase characters from the US ASCII encoding.

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

771 **Table 3 - job-password-repertoire-supported keyword definitions**

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

772 8.7 job-password-repertoire-configured (type2 keyword)

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

778 8.8 job-password-supported (integer(0:255))

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

8.9 job-pause-after-supported (1setOf type2 keyword)

This attribute lists the

8.98.10 job-phone-number-default (uri)

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

8.108.11 job-phone-number-supported (boolean)

A true value indicates that the Printer accepts the “job-phone-number” attribute.

8.118.12 job-recipient-name-default (name(MAX))

The default value supplied by the Printer if the Client omits the ‘job-recipient-name’ Job Template attribute.

8.128.13 job-recipient-name-supported (boolean)

This attribute indicates whether the Printer accepts the “job-recipient-name” attribute.

8.138.14 job-storage-supported (1setOf keyword)

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

The Printer indicates support for Stored Jobs that are also Protected Jobs by including both "job-password" and "job-password-encryption" in the set of keywords. If the Printer lists these two attribute name keywords, it MUST accept "job-password" and "job-password-encryption" with "job-storage". If "job-password" and "job-password-encryption" are both specified for the Job, the Job MUST NOT return these attributes in a Get-Job-Attributes request. The Printer MUST preserve the "job-password" and "job-password-encryption" Job Status attributes in all copies of the original Job to maintain Job Protection.

8.148.15 job-storage-access-supported (1setOf type2 keyword)

This attribute specifies the Job Storage access modes supported by the Printer. Standard keywords for the “job-storage-access” attribute are listed in Table 4.

Table 4 - Standard keywords for "job-storage-access-supported"

<i>Keyword</i>	<i>Meaning</i>
----------------	----------------

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

812

813 **8-158.16 job-storage-disposition-supported (1setOf type2 keyword)**

814 This attribute specifies the Job Storage dispositions supported by the Printer. Standard
815 keywords for the "job-storage-access" attribute are listed in Table 5.

816 **Table 5 - Standard keywords for "job-storage-disposition-supported"**

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

817 **8-168.17 job-storage-group-supported (1setOf name(MAX))**

818 This attribute specifies the user groups to which a Stored Job could be made visible when it
819 is stored, using the "job-storage-group" member (section 6.5.3) of the "job-storage" attribute
820 (section 6.5). The value of this attribute will list different values if returned in an authenticated
821 Get-Printer-Attributes or Get-User-Printer-Attributes response.

822 **8-178.18 proof-print-default (collection)**

823 This attribute specifies the default value of "proof-print" **MUST**the Printer will use when **not**
824 **supplied**the Client doesn't specify the "proof-print" Job Template attribute in a Job Creation
825 request. A Printer MUST support the same member attributes for this default collection as it
826 supports for the corresponding "proof-print" Job Template attribute.

8.188.19 proof-print-supported (1setOf type2-keyword)

This attribute ~~specifies which lists the~~ member attributes of "proof-print" ~~that~~ the Printer supports.

~~The Printer indicates support for Proof Print Jobs that are also Protected Jobs by including both "job-password" and "job-password-encryption" in the set of keywords. If the Printer lists these two attribute name keywords, it MUST accept "job-password" and "job-password-encryption" with "proof-print". If "job-password" and "job-password-encryption" are both specified for the Job, the Job MUST NOT return these attributes in a Get-Job-Attributes request. The Printer MUST preserve the "job-password" and "job-password-encryption" Job Status attributes in all copies of the original Job to maintain Job Protection.~~

8.20 proof-print-copies-supported (rangeOfInteger(0:MAX))

~~This attribute specifies the range of values the Printer supports for the "proof-print-copies" member attribute of the "proof-print" Job Template attribute (section 6.6.1).~~

9. Additional Semantics for Existing Operations

9.1 Create-Job, Print-Job, and Print-URI Operations: "job-password" and "job-password-encryption"

~~A Printer that supports the "job-password" operation attribute (section 5.1) and "job-password-encryption" operation attribute (section 5.3) MUST validate the values supplied and return the 'client-error-bad-request' status code if the values are invalid or not supported. A Printer MUST NOT return the "job-password" or "job-password-encryption" attributes in the Unsupported Attributes Group to prevent the leaking of security information.~~

9.2 Validate-Job Operation: "job-password" and "job-password-encryption"

~~A Client MUST NOT send the "job-password" operation attribute (section 5.1) or "job-password-encryption" operation attribute (section 5.3) in a Validate-Job request. Printers MUST reject a Validate-Job request containing either a "job-password" or "job-password-encryption" operation attribute and return the 'client-error-bad-request' status code.~~

9-10. Additional Values and Semantics for Existing IPP Attributes

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

§58 **10.1 ipp-features-supported (1setOf type2 keyword)**

§59 This IPP Enterprise Printer Extensions v2.0 specification defines the 'authenticated-release',
 §60 'job-protection', 'job-storage' and 'proof-print' keywords for the "ipp-features-supported"
 §61 Printer Description attribute [PWG5100.13] to let the Printer to indicate its support for one or
 §62 more of the major features defined in this specification.

§63 **9-4-10.2 job-hold-until (type2 keyword | name(MAX))**

§64 This IPP Enterprise Printer Extensions v2.0 specification defines additional keyword values
 §65 for the "job-hold-until" Job Template attribute [STD92] to support workflow features specified
 §66 elsewhere in this document. Table 6 lists the new values and their uses.

§67 **Table 6 - Additional Keywords for "job-hold-until"**

Keyword	Description
'owner-authorized'	Hold the Job until the Owner has authorized it to be released. The A supporting Printer MAY challenge the UserClient for authentication 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. A supporting Client MUST expect an authentication challenge from 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.

Commented [KS(&SA12): Minutes from April 2019 F2F said to drop this. But how should we then support the use case where a user's account credentials are used to hold the job?

§68 ~~**9.21.1 which-jobs (type2 keyword) and which-jobs-supported (1setOf**~~
 §69 ~~**type2 keyword)**~~

§70 ~~This IPP Enterprise Printer Extensions specification defines additional keyword values for~~
 §71 ~~the IPP "which-jobs" operation attribute of the Get-Jobs operation [STD92] and the "which-~~
 §72 ~~jobs-supported" Printer Description attribute [PWG5100.7] to support filtering for Proof Jobs~~
 §73 ~~and Stored Jobs.~~

§74 ~~**Table 7—Additional Keywords for "which-jobs" and "which-jobs-supported"**~~

Keyword	Description
--------------------	------------------------

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'proof-print'	Proof 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.

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

877 **9.310.3 job-state-reasons (1setOf type2 keyword) Job Description**
878 **attribute**

879 This section adds additional keywords to the "job-cancel-after" attribute (section 6.1) in
880 support of the Job Storage Feature, (section 4.2), the Password Protected Job Protection
881 Feature, (section 4.4) and the Job Proof Print Feature: (section 4.5).

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

889 There are also new four new "job-state-reasons" keyword values REQUIRED that support a
890 Stored Job: 'job-storing', 'job-stored-successfully', 'job-stored-with-warnings', and 'job-
891 stored-with-errors'. The existing 'job-completed-successfully', 'job-completed-with-warnings',
892 and 'job-completed-with-errors' values are also clarified in the list above for implementations
893 that support the "job-save-disposition" Job Template attribute, in such a way that these
894 values remain compatible with Printers and Clients that do not support job saving. Table 7
895 defines the meanings of these 4 new "job-state-reasons" keywords.

896 **Table 7 - Additional Keywords for "job-state-reasons"**

Keyword	Description
Page 32 of 51 Copyright © 2019 The Printer Working Group. All rights reserved.	

'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.
'job-awaiting-password'	The Job is in the 'pending-held' state awaiting a password to be entered to allow it to be released to processing.
'job-awaiting-proof-release'	The Job is in the 'processing-stopped' state following the printing of the first copy, awaiting a signal of approval to allow the remaining copies to be produced.
'job-password-timeout'	The Job is in the 'aborted' state being retained and stored by the Printer, ready to be duplicated to produce a new reprint Job.
'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.

897 ~~Table 8 Many of the existing "job-state-reasons" attribute values can apply to a 'save-only'~~
 898 ~~Job as well as a Job submitted for printing. If the value of the "job-storage-disposition"~~
 899 ~~attribute is 'store-only', the "job-state-reasons" attribute MAY be set with existing values such~~
 900 ~~as 'job-incoming', 'resources-are-not-ready' (such as a font), 'job-interpreting', and 'job-~~
 901 ~~queued'. Likewise, errors that occur on a Stored Job MAY have existing "job-state-reasons"~~
 902 ~~attribute values such as 'job-data-insufficient', 'document-access-error', 'submission-~~
 903 ~~interrupted', 'job-canceled-by-user', 'aborted-by-system', etc.~~

904 ~~There are also new four new "job-state-reasons" keyword values REQUIRED that support a~~
 905 ~~Stored Job: 'job-storing', 'job-stored-successfully', 'job-stored-with-warnings', and 'job-~~
 906 ~~stored-with-errors'. The existing 'job-completed-successfully', 'job-completed-with-warnings',~~
 907 ~~and 'job-completed-with-errors' values are also clarified in the list above for implementations~~

~~that support the "job save disposition" Job Template attribute, in such a way that these values remain compatible with Printers and Clients that do not support job saving. **Error! Reference source not found.** defines the meanings of these 4 new "job-state-reasons" keywords.~~

Table 9 enumerates the possible combinations of print and save success, warning, and error conditions. Note that two values occur only when there are print warnings/errors and a save error.

Table 8 - 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'

10.4 which-jobs (type2 keyword) and which-jobs-supported (1setOf type2 keyword)

This IPP Enterprise Printer Extensions v2.0 specification defines additional keyword values for the IPP "which-jobs" operation attribute of the Get-Jobs operation [STD92] and the "which-jobs-supported" Printer Description attribute [PWG5100.7] to support filtering for Proof Jobs and Stored Jobs. Table 9 lists the new values and their uses.

Table 9 - Additional Keywords for "which-jobs" and "which-jobs-supported"

<u>Keyword</u>	<u>Description</u>
<u>'proof-print'</u>	<u>Proof 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.</u>

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'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.

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'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.

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923 A Client that specifies the 'stored-owner' keyword for "which-jobs" MUST be prepared to
 924 handle an authentication challenge from the Printer.

925 **11. Obsolete Attributes and Values**

926 **11.1 Obsolete Attributes**

927 Table 10 lists the attributes that are OBSOLETE.

928 **Table 10 - Obsolete Attributes**

Attribute	Explanation
job-save-disposition	The Job Save and Reprint Feature [PWG5100.11] has been deprecated
pages-per-subset	Redundant with "job-pages-per-set" [PWG5100.1]
sheet-collate	

929 **11.2 Obsolete Values**

930 Table 11 lists the values that are OBSOLETE.

931 **Table 11 - Obsolete Values**

Attribute	Value	Explanation
job-state-reasons	'job-saved-successfully'	The Job Save and Reprint Feature [PWG5100.11] has been deprecated

job-state-reasons	'job-saved-with-errors'	The Job Save and Reprint Feature [PWG5100.11] has been deprecated
job-state-reasons	'job-saved-with-warnings'	The Job Save and Reprint Feature [PWG5100.11] has been deprecated
job-state-reasons	'job-saving'	The Job Save and Reprint Feature [PWG5100.11] has been deprecated
which-jobs	'saved'	The Job Save and Reprint Feature [PWG5100.11] has been deprecated

932 **10.12. Conformance Requirements**

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

935 **12.1 Authenticated Release Feature**

936 **10.12.1.1 Printer Conformance Requirements for this specification**

937 In order for a ~~client and a~~ Printer to claim conformance ~~to this IPP Enterprise Printer~~
938 ~~Extensions Specification, a Client MUST be able to supply and with the Authenticated~~
939 ~~Release Feature defined in this specification, a Printer MUST support the following:~~

- 940 1. ~~The Cancel-Jobs operation (section 5.1)~~
- 941 2. ~~The Cancel-My-Jobs operation (section 5.2)~~
- 942 3. ~~The Close-Job operation (section 5.3)~~
- 943 4. ~~The Resubmit-Job operation (section 5.4)~~
- 944 1. ~~The "job-ids" Operationhold-until" attribute (section 6.3) undefined in [STD92].~~
- 945 2. ~~The required operations defined in section Error! Reference source not~~
946 ~~found.;~~
- 947 3. ~~The additional semantics defined in section Error! Reference source not~~
948 ~~found.;~~
- 949 4. ~~The additional values defined in section Error! Reference source not found.;~~
- 950 5. ~~The status codes defined in section Error! Reference source not found.;~~

Commented [KS(&SA13)]: Not updated yet - want to finalize attributes first, then will update this

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- 951 6. The internationalization considerations defined in section **Error! Reference**
- 952 **source not found.; and**
- 953 7. The security considerations defined in section **Error! Reference source not**
- 954 **found..**

955 **12.1.2 Client Conformance Requirements**

956 5. ~~In order for a Client to claim conformance with the Get-Jobs operation [RFC2911]~~
957 ~~(section 3.2.6)Authenticated Release Feature defined in this specification, a Client MUST~~
958 ~~support:~~

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- 959 1. The "job-ids" Operation attribute (The required attributes and values defined in
- 960 section 6.3) in the Purge-Jobs operation[RFC2911] (Error! Reference source
- 961 not found.;
- 962 2. The required operations defined in section 3.2.9), if Purge-Jobs operation is
- 963 supported (Error! Reference source not found.;
- 964 6.3. The additional semantics defined in section 6.4)Error! Reference source
- 965 not found.;
- 966 4. The "proof-print" Job Template attribute (sections 7.11). See alsoadditional
- 967 values defined in section 4.5Error! Reference source not found.;
- 968 5. The status codes defined in section Error! Reference source not found.;
- 969 6. The internationalization considerations defined in section Error! Reference
- 970 source not found.; and
- 971 7. The security considerations defined in section Error! Reference source not
- 972 found..

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973 **12.2 Job Protection Feature**

974 **12.2.1 Printer Conformance Requirements**

- 975 ~~7. In order for the REQUIRED "proof-print" Job Template attribute~~
- 976 ~~8. The "job-ids-supported" Printer Description attribute (section 10.2)~~
- 977 ~~9. The "which-jobs-supported" a Printer Description attribute (see section 10.9 for which~~
- 978 ~~values)~~

979 ~~The other attributes to claim conformance with the Job Protection Feature defined in this~~
980 ~~specification are OPTIONAL for a client to be able to supply and for a Printer toMUST~~
981 ~~support.;~~

- 982 1. ConditionalThe required attributes and values defined in section Error!
- 983 Reference source not found.;
- 984 2. The required operations defined in section Error! Reference source not
- 985 found.;
- 986 3. The additional semantics defined in section Error! Reference source not
- 987 found.;

- 4. The additional values defined in section **Error! Reference source not found.**;
- 5. The status codes defined in section **Error! Reference source not found.**;
- 6. The internationalization considerations defined in section **Error! Reference source not found.**; and
- 7. The security considerations defined in section **Error! Reference source not found.**

12.2.2 Client Conformance Requirements

10.2 In order for Printers a Client to claim conformance with the Job Protection Feature defined in this specification, a Client MUST support:

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- 1. The following conditional required attributes and values defined in section **Error! Reference source not found.**;
- 2. The required operations defined in section **Error! Reference source not found.**;
- 3. The additional semantics defined in section **Error! Reference source not found.**;
- 4. The additional values defined in section **Error! Reference source not found.**;
- 5. The status codes defined in section **Error! Reference source not found.**;
- 6. The internationalization considerations defined in section **Error! Reference source not found.**; and
- 7. The security considerations defined in section **Error! Reference source not found.**

12.3 Job Storage Feature

12.3.1 Printer Conformance Requirements

In order for a Printer to claim conformance requirements are defined with the Job Storage Feature defined in this specification, a Printer MUST support:

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

"job-delay-output-until" Job Template attribute in Job Creation operations	Set Job-Attributes operation (section Error! Reference source not found.)
--	---

1013

1014

- 1015 1. The required attributes and values defined in section **Error! Reference source not found.**;
- 1016 2. The required operations defined in section **Error! Reference source not found.**;
- 1017 3. The additional semantics defined in section **Error! Reference source not found.**;
- 1018 4. The additional values defined in section **Error! Reference source not found.**;
- 1019 5. The status codes defined in section **Error! Reference source not found.**;
- 1020 6. The internationalization considerations defined in section **Error! Reference source not found.**; and
- 1021 7. The security considerations defined in section **Error! Reference source not found.**.

1022 **12.3.2 Client Conformance Requirements**

1023 In order for a Client to claim conformance with the Job Storage Feature defined in this specification, a Client MUST support:

- 1030 1. The required attributes and values defined in section **Error! Reference source not found.**;
- 1031 2. The required operations defined in section **Error! Reference source not found.**;
- 1032 3. The additional semantics defined in section **Error! Reference source not found.**;
- 1033 4. The additional values defined in section **Error! Reference source not found.**;
- 1034 5. The status codes defined in section **Error! Reference source not found.**;
- 1035 6. The internationalization considerations defined in section **Error! Reference source not found.**; and
- 1036 7. The security considerations defined in section **Error! Reference source not found.**.

1037 **41-13. Internationalization Considerations**

1043 For interoperability and basic support for multiple languages, conforming implementations
 1044 MUST support the Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8)
 1045 [RFC3629] encoding of Unicode **[UNICODE]**[UNICODE] [ISO10646] and the Unicode
 1046 Format for Network Interchange [RFC5198].

1047 Implementations of this specification SHOULD conform to the following standards on
1048 processing of human-readable Unicode text strings, see:

- 1049 • Unicode Bidirectional Algorithm [UAX9] – left-to-right, right-to-left, and vertical
- 1050 • Unicode Line Breaking Algorithm [UAX14] – character classes and wrapping
- 1051 • Unicode Normalization Forms [UAX15] – especially NFC for [RFC 5198]
- 1052 • Unicode Text Segmentation [UAX29] – grapheme clusters, words, sentences
- 1053 • Unicode Identifier and Pattern Syntax [UAX31] – identifier use and normalization
- 1054 • Unicode Collation Algorithm [UTS10] – sorting
- 1055 • Unicode Locale Data Markup Language [UTS35] – locale databases

1056 Implementations of this specification are advised to also review the following informational
1057 documents on processing of human-readable Unicode text strings:

- 1058 • Unicode Character Encoding Model [UTR17] – multi-layer character model
- 1059 • Unicode in XML and other Markup Languages [UTR20] – XML usage
- 1060 • Unicode Character Property Model [UTR23] – character properties
- 1061 • Unicode Conformance Model [UTR33] – Unicode conformance basis

1062 **12.14. Security Considerations**

1063 In addition to the security considerations described in the IPP/1.1: Model and Semantics
1064 [STD92], implementations of this specification SHOULD conform to the following standards
1065 on processing of human-readable Unicode text strings:

- 1066 • Unicode Security Mechanisms [UTS39] – detecting and avoiding security attacks
- 1067 • Unicode Security FAQ [UNISECFAQ] – common Unicode security issues

1068 **13.15. IANA Considerations**

1069 **13.15.1 IPP Attribute and Keyword Value Registrations**

1070 This section contains the exact registration information for IANA to update according to the
1071 procedures defined in [STD92].

1072 The registry entries will contain the following information:

1073	Job Template attributes:	Reference
1074	-----	-----
1075	job-cancel-after (integer(1:MAX))	
1076	[IPPPEEIPPEPX]	
1077	job-phone-number (uri)	
1078	[IPPPEEIPPEPX]	
1079	job-recipient-name (name(MAX))	
1080	[IPPPEEIPPEPX]	
1081	job-storage (collection)	
1082	[IPPPEEIPPEPX]	
1083	job-storage-access (type2 keyword)	
1084	[IPPPEEIPPEPX]	
1085	job-storage-disposition (type2 keyword)	
1086	[IPPPEEIPPEPX]	
1087	job-storage-group (name(MAX))	
1088	[IPPPEEIPPEPX]	
1089	 storage-access (type2 keyword)	{IPPEPE}
1090	proof-print (collection)	
1091	[IPPPEEIPPEPX]	
1092	media (type2 keyword name(MAX))	
1093	[IPPPEEIPPEPX]	
1094	media-col (collection)	
1095	[IPPPEEIPPEPX]	
1096	proof-print-copies (integer (0:MAX))	
1097	[IPPPEEIPPEPX]	
1098		
1099		
1100	Operation attributes:	Reference
1101	-----	-----
1102	job-password (octetString(255))	
1103	[IPPPEEIPPEPX]	
1104	job-password-action (type2 keyword)	
1105	[IPPPEEIPPEPX]	
1106	job-password-encryption (type2 keyword name(MAX))	
1107	[IPPPEEIPPEPX]	
1108		
1109		
1110	Job Status attributes:	Reference
1111	-----	-----
1112	job-save-printer-make-and-model (text(127))	{IPPEPE}
1113	job-storage (collection)	{IPPEPX}
1114		
1115		
1116	Printer Description attributes:	Reference
1117	-----	-----
1118	job-cancel-after-default (integer(1:MAX))	
1119	[IPPPEEIPPEPX]	
1120	job-password-action-supported (1setOf (type2 keyword))	
1121	[IPPPEEIPPEPX]	
1122	job-password-encryption-supported (1setOf (type2 keyword name(MAX)))	
1123	[IPPPEEIPPEPX]	
1124	job-password-repertoire-configured (1setOf (type2 keyword name(MAX)))	
1125	[IPPPEEIPPEPX]	
1126	job-password-repertoire-supported (1setOf (type2 keyword name(MAX)))	
1127	[IPPPEEIPPEPX]	
1128	job-password-supported (integer(0:255))	
1129	[IPPPEEIPPEPX]	
1130	job-phone-number-default (uri)	
1131	[IPPPEEIPPEPX]	
1132	job-phone-number-supported (boolean)	
1133	[IPPPEEIPPEPX]	

```

1134 job-print-password-supported (octetString(256))
1135 [IPPPEEIPPPEPX]
1136 job-print-password-encryption-supported (type2 keyword)
1137 [IPPPEEIPPPEPX]
1138 job-print-password-repertoire-supported (type2 keyword)
1139 [IPPPEEIPPPEPX]
1140 job-recipient-name-default (name(MAX))
1141 [IPPPEEIPPPEPX]
1142 job-recipient-name-supported (boolean)
1143 [IPPPEEIPPPEPX]
1144 job-storage-access-supported (1setOf type2 keyword) [IPPEPX]
1145 job-storage-disposition-supported (1setOf type2 keyword) [IPPEPX]
1146 job-storage-group-supported (1setOf type2 keyword) [IPPEPX]
1147 job-storage-supported (1setOf type2 keyword) [IPPEPX]
1148 printer-detailed-status-messages (1setOf text(MAX))
1149 [IPPPEEIPPPEPX]
1150 proof-print-default (collection)
1151 [IPPPEEIPPPEPX]
1152 proof-print-supported (1setOf type2 keyword)
1153 [IPPPEEIPPPEPX]
1154 save-disposition-supported (1setOf (type2 keyword)) [IPPEPE]
1155 save-document-format-default (mimeMediaType) [IPPEPE]
1156 save-document-format-supported (1setOf mimeMediaType) [IPPEPE]
1157 save-location-default (uri) [IPPEPE]
1158 save-location-supported (1setOf uri) [IPPEPE]
1159 save-name-subdirectory-supported (boolean) [IPPEPE]
1160 save-nameproof-print-copies-supported (boolean)
1161 [IPPPEErangeOfInteger(0:MAX)] [IPPEPX]
1162 which-jobsproof-print-password-supported (1setOf type2 keyword)
1163 [IPPPEEIPPEPX]

```

1164 **43.215.2 Attribute Value Registrations**

1165 The attributes defined in this specification will be published by IANA according to the
 1166 procedures in IPP/1.1 Model and Semantics [STD92] section 7.1 in the following file:

1167 <http://www.iana.org/assignments/ipp-registrations>
 1168 <http://www.iana.org/assignments/ipp-registrations>

1169 The registry entries will contain the following information:

Attribute (attribute syntax)	Keyword Attribute Value	Reference

ipp-features-supported (1setOf (type2 keyword))	authenticated-release	[PWG5100.13]
	job-protection	[IPPEPX]
	job-storage	[IPPEPX]
	proof-print	[IPPEPX]

job-hold-until (type2 keyword)		
	owner-authorized	[IPPEPERFC8011]
job-hold-until-supported (1setOf (type2 keyword))	button-press	[IPPEPERFC8011]
		[IPPEPX]
		[IPPEPX]

```

1188 job-password-action (type2 keyword)
1189 [IPPEPEIPPEPX]
1190 job-password-action-supported (1setOf (type2 keyword))
1191 [IPPEPEIPPEPX]
1192   hold-job
1193 [IPPEPEIPPEPX]
1194   process-and-retain
1195 [IPPEPEIPPEPX]
1196   retain-only
1197 [IPPEPEIPPEPX]
1198
1199 job-password-encryption (type2 keyword | name(MAX))
1200 [IPPEPEIPPEPX]
1201 job-password-encryption-supported (1setOf (type2 keyword | name(MAX)))
1202 [IPPEPEIPPEPX]
1203   md2
1204 [IPPEPEIPPEPX]
1205   md4
1206 [IPPEPEIPPEPX]
1207   md5
1208 [IPPEPEIPPEPX]
1209   none
1210 [IPPEPEIPPEPX]
1211   sha
1212 [IPPEPEIPPEPX]
1213   sha2-224
1214 [IPPEPEIPPEPX]
1215   sha2-256
1216 [IPPEPEIPPEPX]
1217   sha2-384
1218 [IPPEPEIPPEPX]
1219   sha2-512
1220 [IPPEPEIPPEPX]
1221   sha2-512_224
1222 [IPPEPEIPPEPX]
1223   sha2-512_256
1224 [IPPEPEIPPEPX]
1225   sha3-224
1226 [IPPEPEIPPEPX]
1227   sha3-256
1228 [IPPEPEIPPEPX]
1229   sha3-384
1230 [IPPEPEIPPEPX]
1231   sha3-512
1232 [IPPEPEIPPEPX]
1233   sha3-512_224
1234 [IPPEPEIPPEPX]
1235   sha3-512_256
1236 [IPPEPEIPPEPX]
1237   shake-256
1238 [IPPEPEIPPEPX]
1239   shake-512
1240 [IPPEPEIPPEPX]
1241
1242 job-job-storage-access-supported (1setOf type2 keyword) [IPPEPX]
1243 save-disposition-supported (1setOf type2 keyword) [IPPEPE]
1244 [IPPEPX]
1245 save-disposition [IPPEPE]
1246 save-info
1247 [IPPEPEIPPEPX]
1248

```

```

1249 job-spoolingstorage-disposition-supported (1setOf type2 keyword)
1250 [+IPPEPE[IPPEPX]
1251   —automatic [IPPEPE]
1252   —spool [IPPEPE]
1253   —stream [IPPEPE]
1254
1255   save-disposition [IPPEPX]
1256   save-info [IPPEPX]
1257
1258 job-storage-group-supported (1setOf type2 keyword) [IPPEPX]
1259   save-disposition [IPPEPX]
1260   save-info [IPPEPX]
1261
1262 job-storage-supported (1setOf type2 keyword) [IPPEPX]
1263   save-disposition [IPPEPX]
1264   save-info [IPPEPX]
1265
1266 job-state-reasons (type2 keyword)
1267 [+PPEPERFC8011]
1268   job-delay-output-until-specified
1269 [+IPPEPEIPPEPX]
1270   job-password-wait
1271 [+IPPEPEIPPEPX]
1272   job-printed-successfully
1273 [+IPPEPEIPPEPX]
1274   job-printed-with-errors
1275 [+IPPEPEIPPEPX]
1276   job-printed-with-warnings
1277 [+IPPEPEIPPEPX]
1278   job-resuming
1279 [+IPPEPEIPPEPX]
1280   job-retain-until-specified
1281 [+IPPEPEIPPEPX]
1282   job-saved-successfully
1283 [+IPPEPEIPPEPX]
1284   job-saved-with-errors
1285 [+IPPEPEIPPEPX]
1286   job-saved-with-warnings
1287 [+IPPEPEIPPEPX]
1288   job-saving
1289 [+IPPEPEIPPEPX]
1290   job-spooling
1291 [+IPPEPEIPPEPX]
1292   job-streaming
1293 [+IPPEPEIPPEPX]
1294   job-suspended-by-operator
1295 [+IPPEPEIPPEPX]
1296   job-suspended-by-system
1297 [+IPPEPEIPPEPX]
1298   job-suspended-by-user
1299 [+IPPEPEIPPEPX]
1300   job-suspending
1301 [+IPPEPEIPPEPX]
1302
1303 job-storage-supported (type2 keyword)
1304 [+IPPEPEIPPEPX]
1305   job-storage-access
1306 [+IPPEPEIPPEPX]
1307   job-storage-disposition
1308 [+IPPEPEIPPEPX]
1309   job-storage-group
1310 [+IPPEPEIPPEPX]

```

1311
 1312 proof-print-supported (1setOf type2 keyword)
 1313 [~~IPPPEEIPPEPX~~]
 1314 media
 1315 [~~IPPPEEIPPEPX~~]
 1316 media-col
 1317 [~~IPPPEEIPPEPX~~]
 1318 proof-print-copies
 1319 [~~IPPPEEIPPEPX~~]
 1320
 1321 which-jobs (type2 keyword)
 1322 [~~IPPEPERFC8011~~]
 1323 proof-print
 1324 [~~IPPPEEIPPEPX~~]
 1325 stored
 1326 [~~IPPPEEIPPEPX~~]

1327 **44-16. References**

1328 **44-16.1 Normative References**

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1479 **15-17. Authors' Addresses**

1480
1481 Smith Kennedy
1482 HP Inc.
1483 11311 Chinden Blvd.
1484 Boise ID 83714
1485 smith.kennedy@hp.com
1486 [USA](#)

1487
1488 Michael Sweet
1489 Apple Inc.
1490 One Apple Park Way
1491 M/S 111-HOMC
1492 Cupertino, CA 95014
1493 USA
1494 msweet@apple.com

1495 [Send comments to the PWG IPP Mailing List:](#)

1496 ipp@pwg.org (subscribers only)

1497 [To subscribe, see the PWG IPP workgroup web page:](#)

1498 <https://www.pwg.org/ipp/>

1499 Implementers of this specification document are encouraged to join the IPP Mailing List in
1500 order to participate in any discussions of clarification issues and review of registration
1501 proposals for additional attributes and values.

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1505 Chris Rizzo Xerox

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1506 **16-18. Change History**

1507 **18.1 October 10, 2019**

1508 Updated as per brief review from 2019-09-26 and from other sources:

- 1509 • Moved "Additional Semantics for Existing Operations" subsections relating to "job-
1510 password" from JPS3v2 to new section 9 / 9.1 / 9.2
- 1511 • Updated IANA Considerations section with many editorial fixes
- 1512 • Expanded the "Authorized Release Feature" feature description

1513 **18.2 September 11, 2019**

1514 Added definition of the 'enterprise' keyword for "ipp-features-supported" as per agenda for
1515 2019-09-12 IPP WG meeting and added reference to PWG 5100.13. Also made all URLs in
1516 references use the "https" scheme.

1517 **18.3 September 3, 2019**

1518 Updated as per feedback from the July 18 IPP Workgroup teleconference review and other
1519 feedback:

- 1520 • Added version number ("v2.0") to title and name
- 1521 • Updated abstract and other references to use new feature names
- 1522 • Restored IPP Proof Print from 5100.11 and "rebranded" it as the Job Proof Print
1523 Feature in this document. Abandoned the proposed new Proof Print feature from HP.

- 1524 • Removed the "| name(MAX)" from the syntax definition for job-password-encryption,
- 1525 since site-defined localized strings in that context would seem to be unlikely and of
- 1526 limited value

- 1527 • Added "job-pause-after" and then questioned whether we ought to be adding it

- 1528 • Added a MAY statement allowing "job-password" to be used with "proof-print", with
- 1529 corresponding conditional requirements, so that the Job Proof Print Feature and Job
- 1530 Protection Feature can be used with a single Job to make a Protected Proof Print
- 1531 Job.

- 1532 • Added "proof-print-password-supported" and "proof-print-copies-supported"

- 1533 • Various questions still to be resolved are in comments

1534 **16.118.4 June 14, 2019**

1535 Updated to resolve issues identified in the April 2019 PWG F2F and to align with IPP Job
1536 Extensions v2.0.

1537 **16.218.5 March 27, 2019**

1538 Initial revision based on an abandoned update to JPS2v2 and discussions on the IPP WG
1539 reflector.