The Printer Working Group

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9   **IPP Job Extensions v2.0**
10   **(JOBEXT)**

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13   Status: Stable

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15 Abstract: This specification defines the "media-col" Job Template attribute and extends the
16 Job management, monitoring, and processing capabilities of IPP.

17 This is a PWG Working Draft. For a definition of a "PWG Working Draft", see:

18   https://ftp.pwg.org/pub/pwg/general/pwg-process30.pdf

19 This specification is available electronically at:

20   https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippjobext20-20190510.docx
21   https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippjobext20-20190510.pdf
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The Printer Working Group (or PWG) is a Program of the IEEE Industry Standards and Technology Organization (ISTO) with member organizations including printer manufacturers, print server developers, operating system providers, network operating system providers, network connectivity vendors, and print management application developers. The PWG is chartered to make printers and the applications and operating systems supporting them work together better. All references to the PWG in this document implicitly mean "The Printer Working Group, a Program of the IEEE ISTO."

To meet this objective, the PWG documents the results of their work as open standards that define print related protocols, interfaces, procedures, and conventions. A PWG standard is a stable, well understood, and technically competent specification that is widely used with multiple independent and interoperable implementations. Printer manufacturers and vendors of printer related software benefit from the interoperability provided by voluntary conformance to these standards.

For additional information regarding the Printer Working Group visit:

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1. Introduction

This specification defines the "media-col" Job Template attribute and extends the Job management, monitoring, and processing capabilities of IPP. This specification obsoletes portions of the previous version of this specification [PWG5100.7-2003] - a list of changes can be found in section 15. This specification also incorporates portions of the IPP Production Printing Attributes - Set 1 [PWG5100.3-2001], obsolete IPP Job and Printer Extensions - Set 2 [PWG5100.11-2010], and IPP Job and Printer Extensions - Set 3 (JPS3) [PWG5100.13-2012] specifications.

1.1 Document Natural Language and Character Set

Certain Document formats are ambiguous about the natural language and character set used in a file. The Internet Printing Protocol/1.1 [STD92] defines the "document-natural-language" operation attribute to specify the natural language in Document Creation operations, but does not provide a way to specify the character set. In addition, there is no way for a Client to discover which languages and character sets are supported by a Printer for a given Document format. This specification defines attributes for specifying and discovering supported languages and character sets.

1.2 Attribute Fidelity

The Internet Printing Protocol/1.1 [STD92] defines the "ipp-attribute-fidelity" operation attribute to enforce the fidelity of all attributes in the Job Creation request. This specification defines an operation attribute to enforce the fidelity of a subset of attributes in the Job Creation request.

1.3 Rendering Optimizations

Most Printers are able to optimize output for different kinds of Document data, for example using a higher resolution for black text and lines, however the Internet Printing Protocol/1.1 [STD92] only defines the "print-quality" and "printer-resolution" Job Template attributes that specify the overall quality and resolution of the output. This specification defines an attribute with corresponding values for specifying the type of optimizations to perform.

1.4 Printing on a Specific Output Device

The Internet Printing Protocol/1.1 [STD92] defines the "output-device-assigned" Job Status attribute but does not define corresponding Job Template or Printer Description attributes for specifying which Output Device to use for a Job.

324   ## 1.5 Results of Job/Document Processing

325   The Internet Printing Protocol/1.1 [STD92] defines some Job Status attributes and values
326   but none of them provide information about processing issues that do not prevent a Job or
327   Document from being printed. This specification defines attributes and values for discovering
328   those processing issues.

329   ## 1.6 Job Scheduling and Lifecycle

330   The Internet Printing Protocol/1.1 [STD92] defines the "job-hold-until (keyword |
331   name(MAX))" Job Template attribute to hold a Job for processing until a named time period.
332   This specification defines an additional Job Template attribute that holds the Job for
333   processing until the specified date and time.

334   This specification also includes the "job-delay-output-until (keyword | name(MAX))" and "job-
335   delay-output-until-time (dateTime)" Job Template attributes [PWG5100.11-2010] that delay
336   output of a Job until the specified time.

337   In addition, this specification defines Job Template attributes to schedule when a pending
338   Job is canceled automatically, Job Template attributes to specify when a Job should
339   transition from the retained phase to the history phase, and Printer Description attributes to
340   specify how long a Job stays in the history phase.

341   ## 1.7 Job Operations

342   The Internet Printing Protocol/1.1 [STD92] defines many operations that operate on a single
343   Job object. This specification defines new operations that:

344   • Cancel all Jobs on a given Printer;

345   • Cancel all Jobs owned by a User on a given Printer;

346   • Close a Job in the 'pending' state that is still open for additional Document
347   submissions; and

348   • Resubmit an existing Job for processing as a new Job, potentially with different Job
349   Template attributes and values.

350   This specification also extends the Get-Jobs operation to support additional values for the
351   "which-jobs" operation attribute.

352   ## 1.8 Obsolete Attributes and Values

353   The original version of this specification [PWG5100.7-2003] defines several attributes and
354   values that have proven problematic from an interoperability and privacy standpoint. This
355   specification obsoletes these attributes and values.

2. Terminology

2.1 Conformance Terminology

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

The term DEPRECATED is used for previously defined and approved protocol elements that SHOULD NOT be used or implemented. The term OBSOLETE is used for previously defined and approved protocol elements that MUST NOT be used or implemented.

2.2 Printing Terminology

Normative definitions and semantics of printing terms are imported from the Internet Printing Protocol/1.1 [STD92].

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

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

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

Output Device: a single Logical or Physical Device

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

2.3 Protocol Role Terminology

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

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

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

387   ## 2.4 Other Terminology

388   *Completed Job*: a Job in the 'aborted', 'canceled', or 'completed' state.

389   *Document Creation Operation*: operations that accept Document Content. Specifically:
390   Print-Job, Print-URI, Send-Document and Send-URI. Note: Print-Job and Print-URI are
391   both Job Creation and Document Creation operations.

392   *Job Creation Operation*: operations that create Job objects, specifically: Print-Job, Print-URI,
393   and Create-Job [STD92].

394   *Not Completed Job*: a Job in the 'pending', 'pending-held', 'processing', or 'processing-
395   stopped' state.

396   *Retained Job*: a Completed Job whose attributes and Document data are still available to
397   the Printer.

398   ## 2.5 Acronyms and Organizations

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

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

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

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

403   # 3. Requirements

404   ## 3.1 Rationale

405   The Internet Printing Protocol/1.1 [STD92] defines many attributes and values for specifying
406   how Jobs and Documents are processed by a Printer. Given the need for managing Jobs,
407   specifying Job processing options, and retrieving processing status information, this
408   specification should:

409   1. Define attributes and values that specify detailed media requirements;
410   2. Define attributes that specify Job accounting identifiers;
411   3. Define attributes and values that specify the Document character set and
412   rendering optimizations;
413   4. Define an attribute for doing selective fidelity enforcement;
414   5. Define a media size for automatically printing Documents on the correct size;
415   6. Define attributes and values that allow a Client to discover the results of
416   Document processing;
417   7. Define attributes for delaying the output from a Job until a specified time period;
418   8. Define attributes for holding a Job until a specified date and time;

419   9. Define attributes for retaining a Job for a specified time period;

420   10. Define attributes for configuring the Job history attributes and time period;

421   11. Define attributes for automatically canceling a Job after a specified time period;

422   12. Define operations for managing one or more Jobs; and

423   13. Define values that allow a Client to monitor specific groups of Jobs.

424   Rationale for the changes from the previous versions of this specification can be found in
425   section 15.

3.2 Use Cases

3.2.1 Print a Plain Text File

428   Jane has a plain text file report using a character set other than UTF-8 that she would like
429   to print. She submits the file for printing using her Client software, which allows her to specify
430   the exact character set used for the report.

3.2.2 Print a Document Using a Matching Size

432   John is viewing a document in a web browser and decides to print it. He submits the file for
433   printing from the browser which specifies the output should be formatted for US Letter or
434   ISO A4 media, as available on the printer.

3.2.3 Force a Document to Print on a Specific Media Size

436   Elizabeth has a contract that must be printed on US Legal media. She uses her Client
437   software to submit the print job, specifying that US Legal size must be used with no
438   substitutions.

3.2.4 Print a Presentation with Best Quality

440   Bob wants to print a presentation. He submits the presentation for printing using his Client
441   software, specifying that the output should be optimized for text and graphics.

3.2.5 Print Using a Specific Output Device

443   Sally needs to print a poster on a specific output device. She uses her Client software to
444   select the large format printer associated with the local print service and submit the poster
445   for printing.

3.2.6 Print Using Loaded Media

447   User is viewing a photo and would like to print the photo on the largest borderless
448   photographic media loaded on her Printer.

449   After the User initiates a print from the phone and selects a Printer, the Client automatically
450   selects the largest borderless photographic media loaded on the Selected Printer and the

451 highest print quality. The User selects additional processing intent for the Job and confirms
452 the print action. The Client sends a print job request to the Printer with the Job Ticket and
453 local photo. The Printer validates the Job Ticket and document data and then prints the
454 photo.

455 Preconditions: Printer can report loaded media information such as size, type, coating, and
456 weight. This may be detected automatically or manually entered by the User or Operation
457 when loading the media.

458 **3.2.7 Print on a Roll**

459 Mike has a series of photos to print on a roll of photo media. Mike submits a multi-document
460 job for printing and specifies that the roll be cut between each document in the job.

461 **3.2.8 Manual Duplex Printing**

462 Larry has a long whitepaper he would like to print 2-sided on an entry-level laser printer
463 without an automatic duplexer accessory. Larry submits the document for printing and
464 specifies 2-sided printing. The Client software queries the Printer to determine the page
465 stacking order and delivery order for both the input and output trays and then sends the even
466 numbered pages in the correct order to the Printer. When those pages have been printed,
467 the Client software instructs Larry to insert the pages back in the input tray in the correct
468 orientation. Once the pages are loaded in the input tray, the Client software sends the odd
469 numbered pages to the Printer.

470 **3.2.9 Monitor Whether Jobs are Printed Correctly**

471 Mary is the administrator for the office printers and wants to know whether users are having
472 difficulty printing their documents. She uses Client software to query the history of jobs on
473 each printer, including any errors or warnings that were encountered during processing.

474 **3.2.10 Hold a Job Until a Specific Date and Time**

475 John wants to withhold printing of a weekly newsletter until Monday morning. He uses his
476 Client software to submit the print job with the correct date and time.

477 **3.2.11 Delay Output Until a Specific Time Period**

478 Bob has a large print job he would like printed overnight. He uses his Client software to
479 submit the job for printing, specifying that output should not begin until 6pm.

480 **3.2.12 Submit a Variable Number of Documents in a Job**

481 Elizabeth has a print job that contains a variable number of documents for printing. She uses
482 her Client software to create a new job and then add each document to the job. When she
483 is sure she has all of the documents for the job, she uses her Client software to close the
484 job so that the printer can begin processing the documents for printing.

485 **3.2.13 Cancel a Job After a Specific Time Period**

486 Sally operates a high-volume printer for her company. She configures the printer to
487 automatically cancel any jobs that take longer than four hours to print so as to maintain the
488 availability of the printer to other users.

489 **3.2.14 Cancel Multiple Jobs**

490 Bob needs to cancel a group of jobs that were incorrectly submitted to a printer. He uses his
491 Client software to send a request to cancel a list of those jobs. The printer then cancels the
492 jobs all at once.

493 **3.2.15 Resubmit a Job**

494 Mary needs to reprint a job with different settings. She uses her Client software to pick a
495 retained job on the printer, chooses the settings to use for the reprint, and submits the reprint
496 request. The printer then makes a copy of the original job, substituting any new settings for
497 the copied job.

498 **3.2.16 Retain Jobs for a Specific Time Period**

499 John's company needs to retain all print jobs for at least one year for legal reasons. He
500 configures the printer with a default retention policy of one year, allowing users to specify
501 longer periods of time as needed.

502 **3.2.17 Keep Job History Information for a Specific Time Period**

503 Bob's company needs to keep an accounting history of all print jobs for at least one year.
504 He configures the printer to keep the job history for at least one year, including the job
505 identifier, owner, name, and number of pages.

506 ## 3.3 Exceptions

507 **3.3.1 Too Many Jobs on a Printer**

508 Jane has several documents to print for a meeting. While submitting the documents for
509 printing from her Client software, the printer responds that there are too many queued jobs.

510 **3.3.2 Too Many Documents in a Job**

511 Bob is submitting multiple documents in a single job. While submitting the documents from
512 his Client software, the printer responds that there are too many documents in the job.

513 ## 3.4 Out of Scope

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

515   1. Definition of new file formats; and
516   2. Definition of new protocol bindings.

3.5 Design Requirements

518 The design requirements for this specification are:

519   1. Define attributes for supported languages and character sets in Document data;
520   2. Define attributes and values to describe the kind of processing optimizations that
521   should be performed on Document data;
522   3. Define an attribute to specify fidelity requirements;
523   4. Define attributes to select an Output Device for printing;
524   5. Define attributes and values to report processing errors and warnings;
525   6. Define attributes to hold Jobs until a specific date and time;
526   7. Define attributes to cancel Jobs after a specific time period;
527   8. Define attributes and values to retain Jobs for a specific time period;
528   9. Define an operation to close an open Job;
529   10. Define attributes and operations to cancel groups of Jobs;
530   11. Define an operation to resubmit a Job with new Job Template attributes; and
531   12. Define sections to register all attributes, values, and operations with IANA.

532

533 4. New Operations

534 4.1 Cancel-Jobs

535 This REQUIRED operation allows the Operator or Administrator for the Printer to cancel a
536 list of Not Completed Jobs or *all* Not Completed Jobs on the Printer. This operation works
537 like the Cancel-Job operation [STD92] except that it works on a number of Jobs at once. If
538 the Printer cannot cancel all of the requested Jobs successfully, it MUST NOT cancel any
539 and MUST return an error code along with the list of offending "job-id" values.

540 Access Rights: The authenticated user [STD92] performing this operation must be an
541 Operator or Administrator of the Printer. Otherwise, the Printer MUST reject the operation
542 and return 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-
543 authorized' as appropriate.

544 4.1.1 Cancel-Jobs Request

545 The following groups of attributes are part of a Cancel-Jobs request.

546 Group 1: Operation Attributes

547 "attributes-charset" (charset) and
548 "attributes-natural-language" (naturalLanguage):

549 The Client MUST supply and the Printer MUST support both of these
550 attributes.

551 "printer-uri" (uri):

552 The Client MUST supply and the Printer MUST support the "printer-uri"
553 operation attribute which is the target Printer for the operation.

554 "job-ids" (1setOf integer(1:MAX)):

555 The Client MAY supply and the Printer MUST support this operation attribute
556 which specifies the target Job(s) for the operation.

557 "requesting-user-name" (name(MAX)) and
558 "requesting-user-uri" (uri):

559 The Client SHOULD supply and the Printer MUST support these attributes.

560 "message" (text(127)):

561 The Client MAY supply and the Printer MAY support this attribute, which
562 provides a message to the Operator. How or where to display this message
563 to the Operator (if at all) is an implementation decision.

564   **4.1.2 Cancel-Jobs Response**

565   The following groups of attributes are part of Cancel-Jobs response.

566   Group 1: Operation Attributes

567   "attributes-charset" (charset) and
568   "attributes-natural-language" (naturalLanguage):

569   The Printer MUST return both of these attributes.

570   "status-message" (text(255)) and/or
571   "detailed-status-message" (text(MAX)):

572   The Printer MAY return one or both of these attributes.

573   Group 2: Unsupported Attributes

574   See [STD92] for details on returning Unsupported Attributes.

575   ## 4.2 Cancel-My-Jobs

576   This REQUIRED operation allows a User to cancel a list of Not Completed Jobs or *all* their
577   own Not Completed Jobs on the Printer. This operation works like the Cancel-Job operation
578   [STD92] except that it works on a number of Jobs at once. If the Printer cannot cancel all of
579   the requested Jobs successfully, it MUST NOT cancel any and MUST return an error code
580   along with the list of offending "job-id" values.

581   Access Rights: The authenticated user [STD92] performing this operation must be the Job
582   owner. Otherwise, the Printer MUST reject the operation and return 'client-error-forbidden',
583   'client-error-not-authenticated', or 'client-error-not-authorized' as appropriate.

584   **4.2.1 Cancel-My-Jobs Request**

585   The following groups of attributes are part of a Cancel-My-Jobs request.

586   Group 1: Operation Attributes

587   "attributes-charset" (charset) and
588   "attributes-natural-language" (naturalLanguage):

589   The Client MUST supply and the Printer MUST support both of these
590   attributes.

591   "printer-uri" (uri):

592   The Client MUST supply and the Printer MUST support the "printer-uri"
593   operation attribute which is the target Printer for the operation.

594   "job-ids" (1setOf integer(1:MAX)):

595   The Client MAY supply and the Printer MUST support this operation attribute
596   which specifies the target Job(s) for the operation.

597   "requesting-user-name" (name(MAX)) and
598   "requesting-user-uri" (uri):

599   The Client SHOULD supply and the Printer MUST support these attributes.

600   "message" (text(127)):

601   The Client MAY supply and the Printer MAY support this attribute, which
602   provides a message to the Operator. How or where to display this message
603   to the Operator (if at all) is an implementation decision.

4.2.2 Cancel-My-Jobs Response

605   The following groups of attributes are part of a Cancel-My-Jobs response.

606   Group 1: Operation Attributes

607   "attributes-charset" (charset) and
608   "attributes-natural-language" (naturalLanguage):

609   The Printer MUST return both of these attributes.

610   "status-message" (text(255)) and/or
611   "detailed-status-message" (text(MAX)):

612   The Printer MAY return one or both of these attributes.

613   Group 2: Unsupported Attributes

614   See [STD92] for details on returning Unsupported Attributes.

4.3 Close-Job

616   This REQUIRED operation allows a Client to close a Job that was created using the Create-
617   Job [STD92] operation. It is semantically similar to a Send-Document [STD92] operation
618   with the "last-document" operation attribute supplied with a 'true' value with no Document
619   data, except that the Printer MUST NOT add an additional Document object when accepting
620   a Close-Job operation.

621   A Client SHOULD check whether the Printer supports the Close-Job operation by querying
622   the values of the "operations-supported" [STD92] Printer Description attribute.

623   Access Rights: The authenticated user [STD92] performing this operation must be either the
624   Job owner or an Operator or Administrator of the Printer. Otherwise, the Printer MUST reject
625   the operation and return 'client-error-forbidden', 'client-error-not-authenticated', or 'client-
626   error-not-authorized' as appropriate.

627   **4.3.1 Close-Job Request**

628   The following attributes are part of a Close-Job request.

629   Group 1: Operation Attributes

630   "attributes-charset" (charset) and
631   "attributes-natural-language" (naturalLanguage):

632   The Client MUST supply and the Printer MUST support both of these
633   attributes.

634   "printer-uri" (uri) and "job-id" (integer(1:MAX)):

635   The Client MUST supply and the Printer MUST support the "printer-uri" and
636   "job-id" operation attributes which are the target Job for the operation.

637   "requesting-user-name" (name(MAX)) and
638   "requesting-user-uri" (uri):

639   The Client SHOULD supply and the Printer MUST support these attributes.

640   **4.3.2 Close-Job Response**

641   The following attributes are part of a Close-Job response.

642   Group 1: Operation Attributes

643   "attributes-charset" (charset) and
644   "attributes-natural-language" (naturalLanguage):

645   The Printer MUST return both of these attributes.

646   "status-message" (text(255)) and/or
647   "detailed-status-message" (text(MAX)):

648   The Printer MAY return one or both of these attributes.

649   Group 2: Unsupported Attributes

650   See [STD92] for details on returning Unsupported Attributes.

651   Group 3: Job Attributes

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652   "job-state" (type1 enum):

653   The Printer MUST return the Job's REQUIRED "job-state" attribute. The
654   value of this attribute along with the value of the "job-state-reasons" attribute
655   is a "snapshot" of the new Job's state when the Printer returns the response.

656   "job-state-reasons" (1setOf type2 keyword):

657   The Printer MUST return the Job's REQUIRED "job-state-reasons" attribute.

658   "job-state-message" (text(MAX)):

659   The Printer SHOULD return the Job's RECOMMENDED "job-state-message"
660   attribute. If the Printer supports this attribute, then it MUST be returned in the
661   response. If this attribute is not returned in the response, the Client can
662   assume that the "job-state-message" attribute is not supported and will not
663   be returned in a subsequent Job query.

664   "number-of-intervening-jobs" (integer(0:MAX)):

665   The Printer SHOULD return the Job's RECOMMENDED "number-of-
666   intervening-jobs" attribute. If the Printer supports this attribute, then it MUST
667   be returned in the response. If this attribute is not returned in the response,
668   the Client can assume that the "number-of-intervening-jobs" attribute is not
669   supported and will not be returned in a subsequent Job query.

670   4.4 Resubmit-Job

671   This RECOMMENDED operation allows a Client to create a copy of a Retained Job and
672   change or add attributes for the new Job. Once accepted, a Printer MUST create a new Job
673   object and assign a unique "job-id" and "job-uri" value for the new Job, just as if the Client
674   had sent a Create-Job request. Operation and Job Template attributes from the original Job
675   are copied to the new Job unless overridden in the Resubmit-Job request. If any of the
676   Documents in the Job were passed by reference (Print-URI or Send-URI), the Printer MUST
677   re-fetch the data.

678   Printers MUST reject a Resubmit-Job request if the Job is not retained or is in the 'pending',
679   'pending-held', 'processing', or 'processing-stopped' states with the status 'client-error-not-
680   possible'. Otherwise, the Printer returns a status code as defined for the Print-Job [STD92]
681   operation.

682   Access Rights: The authenticated user [STD92] performing this operation must be either the
683   Job owner or an Operator or Administrator of the Printer. Otherwise, the Printer MUST reject
684   the operation and return 'client-error-forbidden', 'client-error-not-authenticated', or 'client-
685   error-not-authorized' as appropriate.

686   **4.4.1 Resubmit-Job Request**

687   The following attributes are part of a Resubmit-Job request.

688   Group 1: Operation Attributes

689   "attributes-charset" (charset) and
690   "attributes-natural-language" (naturalLanguage):

691   The Client MUST supply and the Printer MUST support both of these
692   attributes.

693   "printer-uri" (uri) and "job-id" (integer(1:MAX)):

694   The Client MUST supply and the Printer MUST support the "printer-uri" and
695   "job-id" operation attributes which are the target Job for the operation.

696   "requesting-user-name" (name(MAX)) and
697   "requesting-user-uri" (uri):

698   The Client SHOULD supply and the Printer MUST support these attributes.

699   "ipp-attribute-fidelity" (boolean) or "job-mandatory-attributes" (1setOf keyword):

700   The Client MAY supply and the Printer MUST support either of these
701   attributes.

702   Group 2: Job Template Attributes

703   The Client MAY supply and the Printer MUST support Job Template attributes to
704   apply to the newly created Job. The 'delete-attribute' out-of-band value MAY be
705   used to remove an attribute that was specified in the original Job.

706   **4.4.2 Resubmit-Job Response**

707   The following attributes are part of a Close-Job response.

708   Group 1: Operation Attributes

709   "attributes-charset" (charset) and
710   "attributes-natural-language" (naturalLanguage):

711   The Printer MUST return both of these attributes.

712   "status-message" (text(255)) and/or
713   "detailed-status-message" (text(MAX)):

714   The Printer MAY return one or both of these attributes.

715   Group 2: Unsupported Attributes

716   See [STD92] for details on returning Unsupported Attributes.

717   Group 3: Job Attributes

718   "job-id" (integer(1:MAX)):

719   The Printer MUST return the new Job's "job-id" attribute.

720   "job-state" (type1 enum):

721   The Printer MUST return the Job's REQUIRED "job-state" attribute. The
722   value of this attribute along with the value of the "job-state-reasons" attribute
723   is a "snapshot" of the new Job's state when the Printer returns the response.

724   "job-state-reasons" (1setOf type2 keyword):

725   The Printer MUST return the Job's REQUIRED "job-state-reasons" attribute.

726   "job-state-message" (text(MAX)):

727   The Printer SHOULD return the Job's RECOMMENDED "job-state-message"
728   attribute. If the Printer supports this attribute, then it MUST be returned in the
729   response. If this attribute is not returned in the response, the Client can
730   assume that the "job-state-message" attribute is not supported and will not
731   be returned in a subsequent Job query.

732   "job-uri" (uri):

733   The Printer MUST return the new Job's "job-uri" attribute.

734   "number-of-intervening-jobs" (integer(0:MAX)):

735   The Printer SHOULD return the Job's RECOMMENDED "number-of-
736   intervening-jobs" attribute. If the Printer supports this attribute, then it MUST
737   be returned in the response. If this attribute is not returned in the response,
738   the Client can assume that the "number-of-intervening-jobs" attribute is not
739   supported and will not be returned in a subsequent Job query.

5. Attributes

5.1 Operation Attributes

5.1.1 document-format-details (collection)

This DEPRECATED attribute specifies details about the source of the Document data and can be included in any Job or Document Creation request. The values supplied by a Client are purely informational and MUST NOT be used for access control, accounting, or policy enforcement. Table 1 lists the member attributes.

Note: The previous version of this document [PWG5100.7-2003] allowed Clients to send multiple values for this attribute in order to support "packaging" MIME media types. However, since such formats are not used for IPP printing, Clients MUST NOT send and Printers MUST NOT accept multiple values for "document-format-details".

Table 1 - "document-format-details" Member Attributes

Member Attribute
document-source-application-name (name(MAX))
document-source-application-version (text(127))
document-source-os-name (name(40))
document-source-os-version (text(40))

5.1.1.1 document-source-application-name (name(MAX))

This member attribute identifies the application that generated the Document data. The value MUST be all lowercase with any version number portion removed in order to facilitate matching, e.g., "photoshop", "microsoft word", "unknown", etc. The version number MUST NOT be included in this attribute since the "document-source-application-version" member attribute contains that information.

5.1.1.2 document-source-application-version (text(127))

This member attribute identifies the version number of the application that created the Document data. If specified, the "document-source-application-name" member attribute MUST also be specified. The value MUST be all lowercase in order to facilitate matching, e.g., "8.1 (4331)", "5.0.5 10/26/2001", "2000 (9.0.4119 sr-1)", etc.

5.1.1.3 document-source-os-name (name(40))

This member attribute identifies the name of the operating system that created the Document data. The value MUST be all lowercase with any version number portion removed in order to facilitate matching, e.g., "android", "chromeos", "ios", "linux", "macos", "solaris", "unix", "windows", etc. The version number MUST NOT be included in this attribute since the "document-source-os-version" member attribute contains that information.

769 Note: The previous version of this specification [PWG5100.7-2003] specified that the IANA
770 Operating System name registry was the source of values, however since this registry is no
771 longer being updated implementors can simply use the marketing name of the Client
772 operating system.

5.1.1.4 document-source-os-version (text(40))

774 This member attribute identifies the version number of the operating system that created the
775 Document data. If specified, the "document-source-os-name" member attribute MUST also
776 be specified. The value MUST be all lowercase in order to facilitate matching, e.g., "10.14.4",
777 "18.04", "10 (1903)", etc.

5.1.2 job-hold-until-time (dateTime)

779 This RECOMMENDED attribute specifies the date and time after which the Job MUST
780 become a candidate for processing. Printers that support this attribute MUST support the
781 "job-hold-until" [STD92] operation attribute.

782 Clients MUST NOT supply both the "job-hold-until-time" and "job-hold-until" [STD92]
783 operation attributes in a Hold-Job request. If a Client supplies both attributes, the Printer
784 MUST reject the request and return the 'client-error-conflicting-attributes' status code.

5.1.3 job-ids (1setOf integer(1:MAX))

786 This REQUIRED attribute specifies a list of "job-id" [STD92] values for the Cancel-Jobs
787 (section 4.1), Cancel-My-Jobs (section 4.2), and Get-Jobs (section 6.1) operations.

5.1.4 job-mandatory-attributes (1setOf keyword)

789 This REQUIRED attribute identifies which Job Template attributes the Printer MUST support
790 in the Job Creation request in order to accept the Job. The values are the names of Job
791 Template attributes, for example, 'job-hold-until', 'copies', and 'media'. In order to identify a
792 member attribute of a collection attribute, the keyword names of both the collection attribute
793 and the member attribute are given separated by a period (.) character. For example, to
794 make the "media" attribute of the "cover-front" collection attribute mandatory, supply the
795 keyword value 'cover-front.media'.

796 Note: As with "ipp-attribute-fidelity", the "job-mandatory-attributes" attribute does not
797 determine whether the Printer overrides the PDL with the identified Job Template attributes,
798 as that functionality is defined by the "pdl-override-supported" Printer Description attribute
799 [STD92].

800   **5.2 Document and Job Status Attributes**

801   **5.2.1 document-format-details (collection)**

802   This DEPRECATED attribute specifies details about the source of the Document data as
803   provided by the Client in the operation attribute of the same name (section 5.1.1).

804   **5.2.2 document-format-details-detected (collection)**

805   This DEPRECATED attribute specifies details about the source of the Document data as
806   detected by the Printer. Member attributes are the same as for the "document-format-details"
807   operation attribute (section 5.1.1).

808   **5.2.3 errors-count (integer(0:MAX))**

809   This RECOMMENDED attribute reports the number of errors encountered processing the
810   Job as a whole. An error is reported when some portion of the printed output is not present,
811   such as a glyph encountered which isn't in a Printer's font or an image in a page was in a
812   format that the Printer didn't support, though the Printer did support the overall Document
813   format.

814   **5.2.4 print-content-optimize-actual (1setOf type2 keyword)**

815   This RECOMMENDED attribute reports the "print-content-optimize" value(s) that the Printer
816   actually used to produce the Job.

817   **5.2.5 warnings-count (integer(0:MAX))**

818   This RECOMMENDED attribute reports the number of warnings encountered processing
819   the Job as a whole. A warning is reported when no information is lost but the appearance
820   of the printed output might not be as expected.

821   **5.3 Document and Job Template Attributes**

822   **5.3.1 media-col (collection)**

823   This REQUIRED attribute augments the "media" Job Template attribute [STD92] and allows
824   a Client to specify detailed media characteristics for the Job. Each member attribute of the
825   collection identifies a media characteristic. Clients MUST NOT supply both the "media" and
826   "media-col" attributes in any request to the Printer. Printers that support the "media-col"
827   attribute MUST also support the "media" attribute.

828   Note: Historically some Printers have used common aliases ('folio'), names that combine
829   media size and color ('iso-a4-white'), or names that identify specific input trays ('tray-1').
830   However, the PWG Media Standardized Names v2.0 (MSN2) [PWG5101.1] have replaced
831   this ad-hoc convention and were specifically written to support media specification using
832   either a self-describing "media" value or separate "media-col" member attribute values.

833   When a Printer receives a "media-col" attribute in a Job Creation or Validate-Job request, it
834   searches for matching "media-col" values. Any member attribute not supplied by the Client
835   can match any supported value of the corresponding member attribute in the Printer. The
836   Printer ignores any member attributes supplied by the Client that are not supported by the
837   Printer.

838   If the number of matched "media-col" values is 0, the Printer MUST either treat the Client-
839   supplied "media-col" value as an unsupported value [STD92] or accept the "media-col" value
840   and put the Job in the 'pending-held' state if the Job is otherwise accepted.

841   If the number of matched "media-col" values is 1, the Printer MUST either use this single
842   value of "media-col" as the value specified by the Client or eliminate it if the matching media
843   is unsuitable for the Job.

844   If the number of matched "media-col" values is 2 or more, the Printer MUST reduce the
845   number of matching "media-col" values in an implementation-defined manner to 1 or 0. To
846   reduce the number of "media-col" values, an implementation SHOULD pick an algorithm
847   that gives reproducible results, such as:

848   • Apply defaults for member attributes not specified by the Client and perform the
849   matching algorithm again on the matched values. This algorithm may result in 0
850   matches.

851   • Find the "closest" or "best" match of the matched "media-col" values, resulting in a
852   single match.

853   • Find the "closest" or "best" match of the matched "media-col" values that are also
854   ready (i.e. loaded in trays). This algorithm has a chance of being less reproducible
855   but may still be sufficiently reproducible to be useful. This algorithm may yield 0
856   matches unless there is a fallback such as to the preceding algorithm.

857   A Printer MUST implement either the above algorithm or one that produces equivalent
858   results.

859   Table 2 lists the member attributes of the "media-col" collection attribute.

860   **Table 2 - "media-col" Member Attributes**

Member Attribute	Conformance
media-back-coating (type2 keyword | name(MAX))	MAY
media-bottom-margin (integer(0:MAX))	MUST
media-color (type2 keyword | name(MAX))	SHOULD
media-front-coating (type2 keyword | name(MAX))	MAY
media-grain (type2 keyword | name(MAX))	MAY
media-hole-count (integer(0:MAX))	MAY
media-info (text(255))	SHOULD
media-key (type2 keyword | name(MAX))	SHOULD

Member Attribute	Conformance
media-left-margin (integer(0:MAX))	MUST
media-order-count (integer(1:MAX))	MAY
media-pre-printed (type2 keyword | name(MAX))	SHOULD
media-recycled (type2 keyword | name(MAX))	SHOULD
media-right-margin (integer(0:MAX))	MUST
media-size (collection)	MUST
media-size-name (type2 keyword | name(MAX))	SHOULD
media-source (type2 keyword | name(MAX))	MUST
media-source-properties (collection) (note 1)	MUST
media-thickness (integer(1:MAX))	MAY
media-tooth (type2 keyword | name(MAX))	MAY
media-top-margin (integer(0:MAX))	MUST
media-type (type2 keyword | name(MAX))	MUST
media-weight-metric (integer(0:MAX))	MAY

861　　　　Note 1: The "media-source-properties" member attribute is only used for values of
862　　　　the "media-col-database" and "media-col-ready" Printer Description attributes.

863　**5.3.1.1 Media Selection and Full-Bleed Printing**

864　The "media-bottom-margin", "media-left-margin", "media-right-margin", and "media-top-
865　margin" member attributes specify the Printer's physical margins, allowing a Printer to
866　determine how the content needs to be printed. A Client specifies that is has borderless or
867　"full-bleed" content by setting all of the margins to 0.

868　Printers that support full-bleed printing MUST accept margins of 0 and MAY scale and center
869　the print document to fill as needed to achieve full-bleed output. Printers SHOULD use the
870　document Image Box when scaling for full-bleed output.

871　**5.3.1.2 media-back-coating (type2 keyword | name(MAX))**

872　This OPTIONAL member attribute specifies which pre-process coating has been applied to
873　the back of the desired media. Standard keyword values include:

874　　　　'none': The media does not have any coating.

875　　　　'glossy': The media has a "glossy" coating.

876　　　　'high-gloss': The media has a "high-gloss" coating.

877　　　　'semi-gloss': The media has a "semi-gloss" coating.

878　　　　'satin': The media has a "satin" coating.

879　　　　'matte': The media has a "matte" coating.

880 **5.3.1.3 media-bottom-margin (integer(0:MAX))**

881 The REQUIRED "media-bottom-margin" member attribute defines the Printer's physical
882 bottom margin in hundredths of millimeters from the bottom edge, without respect to the
883 value of the "orientation-requested" Job Template attribute.

884 **5.3.1.4 media-color (type2 keyword | name(MAX))**

885 This RECOMMENDED member attribute specifies the color of the media. Standard keyword
886 values are defined in the PWG Media Standardized Names v2.0 (MSN2) [PWG5101.1].

887 **5.3.1.5 media-front-coating (type2 keyword | name(MAX))**

888 This OPTIONAL member attribute specifies which pre-process coating has been applied to
889 the front of the desired media. Standard keyword values are the same as the "media-back-
890 coating" member attribute (section 5.3.1.2).

891 **5.3.1.6 media-grain (type2 keyword | name(MAX))**

892 This OPTIONAL member attribute specifies the desired grain of the media being specified
893 [ISO10175]. Grain affects the curl and the folding of the media. Some marking engines are
894 sensitive to the resulting curl. Standard keyword values for "media-grain" include:

895 'x-direction': The direction of the paper fibers is in the cross-feed direction of the
896 media.

897 'y-direction': The direction of the paper fibers is in the feed direction of the media.

898 **5.3.1.7 media-hole-count (integer(0:MAX))**

899 This OPTIONAL member attribute specifies the number of pre-drilled holes in the desired
900 media. A value of 0 (zero) indicates that no holes are present in the media.

901 **5.3.1.8 media-info (text(255))**

902 This RECOMMENDED member attribute provides a human-readable description of the
903 media.

904 **5.3.1.9 media-key (type2 keyword | name(MAX))**

905 This RECOMMENDED member attribute contains a unique identifier of the media
906 represented as a keyword or name. Valid "media-key" values are also valid "media" values.

907 Because Printers often support many different kinds and sizes of media, Printers that
908 support this attribute SHOULD automatically assign unique values for all supported
909 combinations of media characteristics, even for values that are locally-defined by an
910 Administrator or Operator. A Client can supply such a Printer-generated value with either
911 the "media-key" member attribute or the "media" Job Template attribute [STD92].

912   **5.3.1.10 media-left-margin (integer(0:MAX))**

913   The REQUIRED "media-left-margin" member attribute defines the Printer's physical left
914   margin in hundredths of millimeters from the left edge, without respect to the value of the
915   "orientation-requested" Job Template attribute.

916   **5.3.1.11 media-order-count (integer(1:MAX))**

917   This OPTIONAL member attribute indicates the number of Media Sheets, within an ordered
918   sequence of Media Sheets, after which the sequence begins to repeat. For example, third
919   cut tab stock in which all three forms are present has an order count of 3. This is also
920   sometimes called the modulus of the ordered media. Full-cut tab stock can have an order
921   count greater than 1 if it has an ordered sequence, such as a cycle of colors or cycle of pre-
922   printing. If the "media-order-count" is 1, then all media is the same.

923   **5.3.1.12 media-pre-printed (type2 keyword | name(MAX))**

924   This RECOMMENDED member attribute specifies that the pre-printed characteristics of the
925   desired media. Examples of pre-printed media include forms and company letterhead. The
926   standard keyword values for "media-pre-printed" are:

927   'blank': The desired medium is not pre-printed.

928   'pre-printed': The desired medium is pre-printed; the other attributes identify which
929   medium instance and so what is actually pre-printed.

930   'letter-head': The site-defined letterhead is desired.

931   **5.3.1.13 media-recycled (type2 keyword | name(MAX))**

932   This RECOMMENDED member attribute specifies the recycled characteristics of the media.
933   The standard keyword values are:

934   'none': The media is not recycled.

935   'standard': The media is the site-defined standard recycled stock.

936   If this member attribute is supported, the Printer MUST support at least the 'none' and
937   'standard' values.

938   **5.3.1.14 media-right-margin (integer(0:MAX))**

939   The REQUIRED "media-right-margin" member attribute defines the Printer's physical right
940   margin in hundredths of millimeters from the right edge, without respect to the value of the
941   "orientation-requested" Job Template attribute.

5.3.1.15 media-size (collection)

This REQUIRED member attribute is a collection that explicitly specifies the numerical media width and height dimensions. Clients SHOULD localize the dimensions to the size names that users are familiar with, such as 'Letter' and 'A4', and/or provide the exact dimensions units appropriate for the user's locale, e.g. "8.5x11in" and "210x297mm".

A requested media size dimension matches a supported media dimension if it is within an implementation-defined tolerance. For example, PostScript [redbook] specifies a tolerance of 5 points (5/72 of an inch = 1.7 mm) of a supported dimension, i.e., within 176 units of the value of the dimension.

Table 3 lists the "media-size" collection member attributes.

Table 3 - "media-size" Member Attributes

Member Attribute	Conformance
x-dimension (integer(0:MAX))	MUST
y-dimension (integer(0:MAX))	MUST

The REQUIRED "x-dimension" member attribute specifies the width of the media in hundredths of a millimeter (1/2540th of an inch) along the bottom edge of the media.

The REQUIRED "y-dimension" member attribute specifies the height of the media in hundredths of a millimeter (1/2540th of an inch) along the left edge of the media.

5.3.1.16 media-size-name (type2 keyword | name(MAX))

The RECOMMENDED "media-size-name" member attribute defines the media size using a PWG media size name [PWG5101.1] instead of the dimensions in the "media-size" member attribute. Clients and Printers MUST NOT specify both the "media-size" and "media-size-name" member attributes in a collection.

5.3.1.17 media-source (type2 keyword | name(MAX))

The REQUIRED "media-source" member attribute specifies the input tray, slot, roll, or other source for the media. The standard keyword values are shown in Table 4.

Note: The name "media-source" was chosen over "media-input-tray" since the values represent more than trays.

Table 4 - "media-source" Keyword Values

Keyword	Description
alternate	The alternate or secondary input tray
alternate-roll	The alternate or secondary roll
auto	The Printer's automatic choice
bottom	The bottom input tray

Keyword	Description
by-pass-tray	The by-pass ("multi-purpose") tray
center	The center feed slot/tray
disc	The CD/DVD/Bluray disc feed slot/tray
envelope	The envelope feed slot/tray
hagaki	The Hagaki feed slot/tray
large-capacity	The large capacity input tray
left	The left feed slot/tray
main	The main or primary input tray
main-roll	The main or primary roll
manual	The manual feed slot
middle	The middle input tray
photo	The photo feed slot/tray
rear	The rear feed slot/tray
right	The right feed slot/tray
roll-1	The first roll
roll-2	The second roll
roll-3	The third roll
roll-4	The fourth roll
roll-5	The fifth roll
roll-6	The sixth roll
roll-7	The seventh roll
roll-8	The eighth roll
roll-9	The ninth roll
roll-10	The tenth roll
side	The side feed slot/tray
top	The topmost input tray
tray-1	The first tray
tray-2	The second tray
tray-3	The third tray
tray-4	The fourth tray
tray-5	The fifth tray
tray-6	The sixth tray
tray-**7**	The seventh tray
tray-8	The eighth tray
tray-9	The ninth tray
tray-10	The tenth tray
tray-11	The eleventh tray
tray-12	The twelfth tray
tray-13	The thirteenth tray
tray-14	The fourteenth tray
tray-15	The fifteenth tray
tray-16	The sixteenth tray
tray-17	The seventeenth tray
tray-18	The eighteenth tray
tray-19	The nineteenth tray

Keyword	Description
tray-20	The twentieth tray

5.3.1.18 media-source-properties (collection)

The REQUIRED "media-source-properties" member attribute is provided in the "media-col-database" and "media-col-ready" collections to describe the media path and natural orientation for the specified collection. For example, when printing an envelope or form it is important to know which orientation to use for the Document Data.

Clients SHOULD use "media-col-ready" instead of "media-col-database" since the latter includes all possible media combinations, including potentially multiple instances of the same media with different "media-source-properties" values.

This member attribute MUST NOT be included in the "media-col" Document and Job Template attributes since it is informational rather than specifying intent.

5.3.1.18.1 media-source-feed-direction (type2 keyword)

This REQUIRED member attribute defines whether the long edge ('long-edge-first') or short edge ('short-edge-first') of the media is pulled from the source.

5.3.1.18.2 media-source-feed-orientation (type2 enum)

This REQUIRED member attribute defines the orientation of the media as pulled from the source. The value is an "orientation-requested" [STD92] enumeration.

5.3.1.19 media-thickness (integer(1:MAX))

This OPTIONAL member attribute specifies the thickness of the media [JDF] in hundreds of millimeters (1/2540th of an inch).

5.3.1.20 media-tooth (type2 keyword | name(MAX))

This OPTIONAL member attribute specifies the tooth (or roughness) of the media [ISO10175]. The tooth is particularly important for marking engines that use pens (e.g. plotters) to mark the media - the type of pen used matches the tooth of the media for best resolution.

Standard keyword values for "media-tooth" include:

'antique': Rougher than 'vellum' [JDF].

'calendared': Extra smooth or polished, uncoated paper [JDF].

'coarse': Rough finish.

'fine': Smoother finish than 'smooth'.

997   'linen': Finish like coarse woven cloth [JDF].

998   'medium': Regular finish.

999   'smooth': Smooth finish [JDF].

1000   'stipple': Fine pebble finish [JDF].

1001   'uncalendared': Rough, unpolished and uncoated papers [JDF].

1002   'vellum': Slightly rough surface [JDF].

1003   **5.3.1.21 media-top-margin (integer(0:MAX))**

1004   The REQUIRED "media-top-margin" member attribute defines the Printer's physical top
1005   margin in hundredths of millimeters from the top edge, without respect to the value of the
1006   "orientation-requested" Job Template attribute.

1007   **5.3.1.22 media-type (type2 keyword | name(MAX))**

1008   This REQUIRED member attribute identifies the type of media, i.e., the media instance's
1009   predominate characteristic. Depending on implementation, the Printer MAY need to behave
1010   differently or perform different validation, depending on the type of the media. For example,
1011   prohibiting stapling transparencies or selecting a different paper path for an envelope.
1012   Standard keyword values for media type are defined in the PWG Media Standardized
1013   Names v2.0 (MSN2) [PWG5101.1].

1014   **5.3.1.23 media-weight-metric (integer(0:MAX))**

1015   This OPTIONAL member attribute indicates the weight of the desired media rounded to the
1016   nearest whole number of grams per square meter.

1017   **5.3.2 output-device (name(127))**

1018   This attribute requests a named Output Device for a Printer that fans-out to multiple devices.
1019   If omitted, the Printer selects the best Output Device for the Job in an implementation
1020   dependent manner.

1021   **5.3.3 print-content-optimize (type2 keyword)**

1022   This RECOMMENDED attribute specifies the type of content optimization to perform on the
1023   Document data. Keyword values specify the type of content to optimize, including:

1024   'graphics': Graphs and line drawings.

1025   'photo': Photographs.

1026   'text': Text.

1027   'text-and-graphics': Text and graphics.

1028 5.4 Job Template Attributes

1029 5.4.1 job-account-id (name(MAX))

1030   This attribute specifies the account associated with the Job, such as a customer name, a
1031   sequence of digits referencing an internal billing number, or even a credit card number. How
1032   the Printer uses this attribute is implementation dependent.

1033   A zero-length value indicates that there is no account name.

1034 5.4.2 job-accounting-user-id (name(MAX))

1035   This attribute specifies the user ID associated with the account specified by the "job-account-
1036   id" attribute (see section 5.4.15.4.1) used for this Job. These two attributes can be used for
1037   account tracking.

1038   A zero-length value indicates that there is no user accounting ID.

1039 5.4.3 job-cancel-after (integer(0:MAX))

1040   This RECOMMENDED attribute specifies the maximum number of seconds allowed for
1041   processing a Job. When specified, the Printer cancels the Job automatically if it cannot be
1042   completed within the specified timeframe. The completion timer does not begin until the Job
1043   enters the 'processing' state'.

1044 5.4.4 job-delay-output-until (type2 keyword | name(MAX))

1045   This RECOMMENDED attribute specifies a time period in the future when the Printer will
1046   produce the output for the Job. If the specified time period has not yet arrived, the Printer
1047   MUST set the Job's "job-state-reasons" value to 'job-delay-output-until-specified'. The
1048   Printer MUST NOT produce any output until the time period arrives but MAY perform pre-
1049   processing. When the time period arrives, the Job MUST become a candidate for output,
1050   including any processing required to produce the output. The only way to alter the delay
1051   period for a Job is by using the Set-Job-Attributes [RFC3380] operation.

1052   Standard keyword values for named time periods are:

1053   'day-time': Delay output until daylight, typically 6am to 6pm.

1054   'evening': Delay output until the evening, typically from 6pm to 12am.

1055   'indefinite': Delay output indefinitely; the time period can be changed using the Set-
1056   Job-Attributes [RFC3380] operation.

1057   'night': Delay output until the night, typically from 12am to 6am.

1058   'no-delay-output': Do not delay the output.

1059   'second-shift': Delay output until the second work shift, typically from 4pm to 12am.

1060   'third-shift': Delay output until the third work shift, typically from 12am to 8am.

1061   'weekend': Delay output until the weekend.

1062 Clients MUST NOT supply both the "job-delay-output-until" and "job-delay-output-until-time"
1063 (section 5.4.5) Job Template attributes in a Job Creation request. If a Client supplies both
1064 attributes, the Printer MUST reject the request and return the 'client-error-conflicting-
1065 attributes' status code.

1066 Note: Unlike the "job-hold-until" [STD92] Job Template attribute, the "job-delay-output-until"
1067 attribute does not cause the Job to enter the 'pending-held' state.

1068 **5.4.5 job-delay-output-until-time (dateTime)**

1069 This RECOMMENDED attribute specifies a date and time when the Printer will produce the
1070 output for the Job. If the specified time period has not yet arrived, the Printer MUST set the
1071 Job's "job-state-reasons" value to 'job-delay-output-until-specified'. The Printer MUST NOT
1072 produce any output until the time period arrives but MAY perform pre-processing. When the
1073 time period arrives, the Job MUST become a candidate for output, including any processing
1074 required to produce the output. The only way to alter the delay period for a Job is by using
1075 the Set-Job-Attributes [RFC3380] operation.

1076 Clients MUST NOT supply both the "job-delay-output-until-time" and "job-delay-output-until"
1077 (section 5.4.4) Job Template attributes in a Job Creation request. If a Client supplies both
1078 attributes, the Printer MUST reject the request and return the 'client-error-conflicting-
1079 attributes' status code.

1080 Note: Unlike the "job-hold-until-time" (section 5.4.6) Job Template attribute, the "job-delay-
1081 output-until-time" attribute does not cause the Job to enter the 'pending-held' state.

1082 **5.4.6 job-hold-until-time (dateTime)**

1083 This RECOMMENDED attribute specifies the date and time after which the Job MUST
1084 become a candidate for processing. Printers that support this attribute MUST support the
1085 "job-hold-until" [STD92] Job Template attribute.

1086 Clients MUST NOT supply both the "job-hold-until-time" and "job-hold-until" [STD92] Job
1087 Template attributes in a Job Creation request. If a Client supplies both attributes, the Printer
1088 MUST reject the request and return the 'client-error-conflicting-attributes' status code.

1089 **5.4.7 job-retain-until (type2 keyword | name(MAX))**

1090 This RECOMMENDED attribute specifies how long the Job remains in the Job Retention
1091 phase of a Job's life cycle [STD92]. Standard values include:

1092   'end-of-day': Retain the Job until the end of the current day.

1093   'end-of-month': Retain the Job until the end of the current month.

1094   'end-of-week': Retain the Job until the end of the current week.

1095   'indefinite': Retain the Job indefinitely.

1096   'none': Do not retain the Job.

1097 Clients MUST NOT supply the "job-retain-until", "job-retain-until-interval" (section 5.4.8),
1098 and/or "job-retain-until-time" (section 5.4.9) Job Template attributes together in a Job
1099 Creation request. If a Client supplies more than one of these attributes, the Printer MUST
1100 reject the request and return the 'client-error-conflicting-attributes' status code.

1101 5.4.8 job-retain-until-interval (integer(0:MAX))

1102 This RECOMMENDED attribute specifies the number of seconds the Job remains in the Job
1103 Retention phase of a Job's life cycle [STD92].

1104 Clients MUST NOT supply the "job-retain-until" (section 5.4.7), "job-retain-until-interval",
1105 and/or "job-retain-until-time" (section 5.4.9) Job Template attributes together in a Job
1106 Creation request. If a Client supplies more than one of these attributes, the Printer MUST
1107 reject the request and return the 'client-error-conflicting-attributes' status code.

1108 5.4.9 job-retain-until-time (dateTime)

1109 This RECOMMENDED attribute specifies the date and time when the Job can leave the Job
1110 Retention phase of a Job's life cycle [STD92].

1111 Clients MUST NOT supply the "job-retain-until" (section 5.4.7), "job-retain-until-interval"
1112 (section 5.4.8), and/or "job-retain-until-time" Job Template attributes together in a Job
1113 Creation request. If a Client supplies more than one of these attributes, the Printer MUST
1114 reject the request and return the 'client-error-conflicting-attributes' status code.

1115 5.4.10 job-sheets-col (collection)

1116 This RECOMMENDED attribute augments the "job-sheets" Job Template attribute [STD92]
1117 and allows a Client to specify media for Job Sheets that is different than the current media
1118 being used for the Job. Table 5 lists the member attributes.

1119   **Table 5 - "job-sheets-col" Member Attributes**

Member Attribute
job-sheets (type2 keyword | name(MAX))
media (type2 keyword | name(MAX))
media-col (collection)

5.4.10.1 job-sheets (type2 keyword | name(MAX))

This REQUIRED member attribute specifies which Job Sheets to print on the specified media. The values for this member attribute are identical to the keyword and name values for the "job-sheets" Job Template attribute [STD92] itself, including the 'none' value, and convey the same semantics.

5.4.10.2 media (type2 keyword | name(MAX))

This REQUIRED member attribute specifies which media to use for the Job Sheets. If specified, the "media-col" member attribute (section 5.4.10.3) MUST NOT be specified.

5.4.10.3 media-col (collection)

This REQUIRED member attribute specifies which media to use for the Job Sheets. If specified, the "media" member attribute (section 5.4.10.2) MUST NOT be specified.

5.5 Printer Description Attributes

5.5.1 document-charset-default (charset)

This CONDITIONALLY REQUIRED attribute specifies the default charset that the Printer will assume for charset-ambiguous Document formats when the Client omits the "document-charset" operation attribute [PWG5100.5]. Printers that support the "document-charset" operation attribute MUST support this attribute.

5.5.2 document-charset-supported (1setOf charset)

This CONDITIONALLY REQUIRED attribute lists the charsets that the Printer supports for charset-ambiguous Document formats. Printers that support the "document-charset" operation attribute [PWG5100.5] MUST support this attribute.

5.5.3 document-format-details-supported (1setOf keyword)

This DEPRECATED attribute lists the supported member attributes of the "document-format-details" operation (section 5.1.1) and Document/Job Status (section 5.2.1) attributes.

5.5.4 document-natural-language-default (naturalLanguage)

This CONDITIONALLY REQUIRED attribute specifies the default natural language that the Printer will assume for Document data when the Client omits the "document-natural-language" operation attribute [STD92]. Printers that support the "document-natural-language" attribute MUST support this attribute.

5.5.5 document-natural-language-supported (1setOf naturalLanguage)

This CONDITIONALLY REQUIRED attribute lists the natural languages supported for Printer-supported Document formats. Printers that support the "document-natural-language" attribute MUST support this attribute.

5.5.6 job-account-id-default (name(MAX) | no-value)

This attribute specifies the default value of the "job-account-id" Job Template attribute (section 5.4.1). Printers MUST support this attribute if the "job-account-id" attribute is supported.

5.5.7 job-account-id-supported (boolean)

This attribute specifies whether the "job-account-id" Job Template attribute (section 5.4.1) is supported. Printers MUST support this attribute if the "job-account-id" attribute is supported.

5.5.8 job-accounting-user-id-default (name(MAX) | no-value)

This attribute specifies the default value of the "job-accounting-user-id" Job Template attribute (section 5.4.2). Printers MUST support this attribute if the "job-accounting-user-id" attribute is supported.

5.5.9 job-accounting-user-id-supported (boolean)

This attribute specifies whether the "job-accounting-user-id" Job Template attribute (section 5.4.2) is supported. Printers MUST support this attribute if the "job-accounting-user-id" attribute is supported.

5.5.10 job-cancel-after-default (integer(0:MAX) | no-value)

This CONDITIONALLY REQUIRED attribute specifies the default value for the "job-cancel-after" (section 5.4.1) Job Template attribute. Printers that support the "job-cancel-after" attribute MUST support this attribute.

5.5.11 job-cancel-after-supported (rangeOfInteger(0:MAX))

This CONDITIONALLY REQUIRED attribute specifies the range of values supported for the "job-cancel-after" (section 5.4.1) Job Template attribute. Printers that support the "job-cancel-after" attribute MUST support this attribute.

5.5.12 job-creation-attributes-supported (1setOf keyword)

This REQUIRED attribute lists the names of the operation and Job Template attributes that can be sent in a Job Creation or Validate-Job request.

5.5.13 job-delay-output-until-default (type2 keyword | name(MAX))

This CONDITIONALLY REQUIRED attribute specifies the default value of the "job-delay-output-until" (section 5.4.4) Job Template attribute. Printers that support the "job-delay-output-until" attribute MUST support this attribute.

5.5.14 job-delay-output-until-supported (1setOf (type2 keyword | name(MAX)))

This CONDITIONALLY REQUIRED attribute lists the supported values of the "job-delay-output-until" (section 5.4.4) Job Template attribute. Printers that support the "job-delay-output-until" attribute MUST support this attribute.

5.5.15 job-delay-output-until-time-supported (rangeOfInteger(0:MAX))

This CONDITIONALLY REQUIRED attribute specifies the range of time values supported by the "job-delay-output-until-time" (section 5.4.5) Job Template attribute. Printers that support the "job-delay-output-until-time" attribute MUST support this attribute.

5.5.16 job-history-attributes-configured (1setOf keyword)

This REQUIRED attribute lists the Job attributes that will be retained in the history phase of each Job. IPP/1.1 [STD92] specifies that at least the "job-id", "job-printer-uri", "job-state", and "job-state-reasons" attributes MUST be retained in the history phase. Printers that support the "job-history-attributes-supported" (section N.M.P) attribute MUST support this attribute.

5.5.17 job-history-attributes-supported (1setOf keyword)

This REQUIRED attribute lists the Job attributes that can be retained in the history phase of each Job. Printers that support the "job-history-attributes-configured" (section N.M.P) attribute MUST support this attribute.

5.5.18 job-history-interval-configured (integer(0:MAX))

This REQUIRED attribute specifies the minimum number of seconds that a Job will remain in the history phase of its lifecycle [STD92]. Printers SHOULD have a default configured value of at least 60 seconds to allow Clients to discover the disposition of any Jobs that have reached a terminating state. Printers that support the "job-history-interval-supported" (section N.M.P) attribute MUST support this attribute.

5.5.19 job-history-interval-supported (rangeOfInteger(0:MAX))

This REQUIRED attribute specifies the range of values that are supported for the "job-history-interval-configured" Printer Description attribute. Printers that support the "job-history-interval-configured" (section N.M.P) attribute MUST support this attribute.

5.5.20 job-ids-supported (boolean)

This REQUIRED attribute specifies whether the "job-ids" operation attribute (section 5.1.3) is supported.

5.5.21 job-mandatory-attributes-supported (boolean)

This REQUIRED attribute specifies that the "job-mandatory-attributes" operation attribute (section 5.1.4) is supported. Printers MUST report a value of 'true' for this attribute.

5.5.22 job-retain-until-default (type2 keyword | name(MAX))

This CONDITIONALLY REQUIRED attribute specifies the default value of the "job-retain-until" (section 5.4.7) Job Template attribute. Printers that support the "job-retain-until" attribute MUST support this attribute.

5.5.23 job-retain-until-interval-default (integer(0:MAX) | no-value)

This CONDITIONALLY REQUIRED attribute specifies the default value of the "job-retain-until-interval" (section 5.4.8) Job Template attribute. Printers that support the "job-retain-until-interval" attribute MUST support this attribute.

5.5.24 job-retain-until-interval-supported (rangeOfInteger(0:MAX))

This CONDITIONALLY REQUIRED attribute specifies the supported values of the "job-retain-until-interval" (section 5.4.8) Job Template attribute. Printers that support the "job-retain-until-interval" attribute MUST support this attribute.

5.5.25 job-retain-until-supported (1setOf (type2 keyword | name(MAX)))

This CONDITIONALLY REQUIRED attribute lists the supported values of the "job-retain-until" (section 5.4.7) Job Template attribute. Printers that support the "job-retain-until" attribute MUST support this attribute.

5.5.26 job-retain-until-time-supported (rangeOfInteger(0:MAX))

This CONDITIONALLY REQUIRED attribute specifies the supported values of the "job-retain-until-time" (section 5.4.9) Job Template attribute. Printers that support the "job-retain-until-time" attribute MUST support this attribute.

5.5.27 job-sheets-col-default (collection)

This attribute specifies the default value of the "job-sheets-col" Job Template attribute (section **Error! Reference source not found.**). Printers that support the "job-sheets-col" attribute MUST support this attribute.

5.5.28 job-sheets-col-supported (1setOf keyword)

This attribute lists the supported member attributes of the "job-sheets-col" Job Template attribute (section **Error! Reference source not found.**). Printers that support the "job-sheets-col" attribute MUST support this attribute.

5.5.29 job-spooling-supported (type2 keyword)

This REQUIRED attribute specifies whether Jobs are spooled before the Document data is processed. The value of this attribute returned in a Get-Printer-Attributes response MAY depend on the "document-format" attribute supplied in the Get-Printer-Attributes request [STD92]. If the Printer does not support this attribute, then the spooling behavior is implementation dependent.

Standard keyword values include:

'automatic': The Printer chooses whether to process the Document data as it is received or after spooling (storage).

'spool': The printer processes the Document data after it has been spooled (stored).

'stream': The printer processes the Document data as it is received.

5.5.30 media-back-coating-supported (1setOf (type2 keyword | name(MAX)))

This attribute lists the supported values of the "media-back-coating" member attribute (section 5.3.1.2). Printers that support the "media-back-coating" member attribute MUST support this attribute.

5.5.31 media-bottom-margin-supported (1setOf integer(0:MAX))

This REQUIRED attribute lists the supported values for the "media-bottom-margin" member attribute (section 5.3.1.3).

5.5.32 media-col-database (1setOf collection)

This REQUIRED attribute lists the set of pre-defined "media-col" collections available in the Printer's media database. This attribute is similar to "media-col-ready" (section 5.5.34) but returns the entire set of pre-defined "media-col" collections known by the Printer instead of just the media loaded in the Printer.

Because the number and size of values of this attribute can be very large, the Printer MUST NOT return this attribute in the response to the Get-Printer-Attributes operation unless the Client explicitly requests it by including the 'media-col-database' value in the "requested-attributes" [STD92] operation attribute.

In order to limit the number and size of values of this attribute, Printers MAY exclude the "media-source" and/or "media-type" member attributes from collection values when all

1275 values of the corresponding member attribute are supported when combined with the other
1276 member attributes and values.

1277 Because a Printer may support multiple values for the "media-bottom-margin", "media-left-
1278 margin", "media-right-margin", and "media-top-margin" member attributes, a Printer MAY
1279 only enumerate the best (smallest) values of these attributes to reduce the number of
1280 collection values returned in the "media-col-database" attribute. However, if full-bleed and
1281 non-full-bleed margins have a significant performance, scaling, or quality differences, a
1282 Printer MUST enumerate both the full-bleed (all zeroes) and smallest non-zero hardware
1283 margins in the "media-col-database" attribute.

1284 For example, a Printer that supports ISO A4, ISO DL Envelope, US Letter, US Legal, and
1285 US #10 Envelope media, a single removable tray and a multi-purpose tray, and cardstock,
1286 envelopes, plain paper, labels, letterhead, and transparency media types might report the
1287 following attributes and values:

```
1288        media-size-supported={...}
1289        media-source-supported='by-pass-tray','main','manual'
1290        media-type-supported='cardstock','envelope','labels','stationery',
1291                             'stationery-letterhead','transparency'
1292        media-col-database={
1293          /* ISO A4 cardstock only from manual feed */
1294          media-size={
1295            x-dimension=21000
1296            y-dimension=29700
1297          }
1298          media-source='manual'
1299          media-type='cardstock'
1300        },{
1301          /* ISO A4 transparency only from manual feed */
1302          media-size={
1303            x-dimension=21000
1304            y-dimension=29700
1305          }
1306          media-source='manual'
1307          media-type='transparency'
1308        },{
1309          /* ISO A4 plain paper from any source */
1310          media-size={
1311            x-dimension=21000
1312            y-dimension=29700
1313          }
1314          media-type='stationery'
1315        },{
1316          /* ISO A4 letterhead from any source */
1317          media-size={
1318            x-dimension=21000
1319            y-dimension=29700
1320          }
1321          media-type='stationery-letterhead'
1322        },... /* Lots of other values */
```

5.5.33 media-col-default (collection)

This REQUIRED attribute specifies the default value of the "media-col" Job Template attribute (section 5.3.1). Printers that conform to this specification MUST support the "media-default" Printer Description attribute [STD92]. The "media-default" and "media-col-default" Printer attributes MUST both be configured to specify the same media instance. If the Administrator sets one of them to a value (either locally or with the Set-Printer-Attributes [RFC3380] operation), the Printer MUST set the other attribute's value to the same media instance or to the 'unknown' out-of-band value, if there isn't a corresponding value to be set for the other attribute. If a Client attempts to set both attributes, but their values specify different media instances, the Printer MUST reject the Set-Printer-Attributes operation and return the 'client-error-conflicting-attributes' status code.

5.5.34 media-col-ready (1setOf collection)

This REQUIRED attribute lists the "media-col" (section 5.3.1) values representing media that are available for use without human intervention, i.e., the media that are ready to be printed on without interaction. Printers that conform to this specification MUST support the "media-ready" Printer Description attribute [STD92]. The ith value of the "media-col-ready" attribute corresponds to the ith value of the "media-ready" attribute so that the Client can correlate the media names or keywords with the collection values and determine the characteristics of each ready media instance.

5.5.35 media-col-supported (1setOf keyword)

This REQUIRED attribute lists the supported member attributes of the "media-col" Job/Document Template attribute (section 5.3.1).

5.5.36 media-color-supported (1setOf (type2 keyword | name(MAX)))

This attribute lists the supported values of the "media-color" member attribute (section 5.3.1.4). Printers that support the "media-color" member attribute MUST support this attribute.

5.5.37 media-front-coating-supported (1setOf (type2 keyword | name(MAX)))

This attribute lists the supported values of the "media-front-coating" member attribute (section 5.3.1.5). Printers that support the "media-front-coating" member attribute MUST support this attribute.

5.5.38 media-grain-supported (1setOf (type2 keyword | name(MAX)))

This attribute lists the supported values of the "media-grain" member attribute (section 5.3.1.6). Printers that support the "media-grain" member attribute MUST support this attribute.

5.5.39 media-hole-count-supported (1setOf rangeOfInteger(0:MAX))

This attribute lists the supported ranges of values of the "media-hold-count" member attribute (section 5.3.1.6). Printers that support the "media-hole-count" member attribute MUST support this attribute.

5.5.40 media-key-supported (1setOf (type2 keyword | name(MAX)))

This attribute lists the supported values of the "media-key" member attribute (section 5.3.1.9). Printers that support the "media-key" member attribute MUST support this attribute.

5.5.41 media-left-margin-supported (1setOf integer(0:MAX))

This REQUIRED attribute lists the supported values for the "media-left-margin" member attribute (section 5.3.1.10).

5.5.42 media-order-count-supported (1setOf rangeOfInteger(1:MAX))

This attribute lists the ranges of supported values of the "media-order-count" member attribute (section 5.3.1.8). Printers that support the "media-order-count" member attribute MUST support this attribute.

5.5.43 media-pre-printed-supported (1setOf (type2 keyword | name(MAX)))

This attribute lists the supported values of the "media-pre-printed" member attribute (section 5.3.1.5). Printers that support the "media-pre-printed" member attribute MUST support this attribute.

5.5.44 media-recycled-supported (1setOf (type2 keyword | name(MAX)))

This attribute lists the supported values of the "media-recycled" member attribute (section 5.3.1.13). Printers that support the "media-recycled" member attribute MUST support this attribute and MUST include the 'none' keyword value.

5.5.45 media-right-margin-supported (1setOf integer(0:MAX))

This REQUIRED attribute lists the supported values for the "media-right-margin" member attribute (section 5.3.1.14).

5.5.46 media-size-supported (1setOf collection)

This REQUIRED attribute lists the supported values of the "media-size" member attribute (section 5.3.1.12). Unlike the "media-size" member attribute, the "x-dimension" and "y-dimension" member attributes of "media-size-supported" have a syntax of "integer(1:MAX) | rangeOfInteger(1:MAX)" to allow for arbitrary ranges of sizes for custom and roll-fed media.

5.5.47 media-source-supported (1setOf (type2 keyword | name(MAX)))

This REQUIRED attribute lists the supported values of the "media-source" member attribute (section 5.3.1.17).

5.5.48 media-thickness-supported (1setOf rangeOfInteger(1:MAX))

This attribute lists the ranges of supported values for the "media-thickness" member attribute (section 5.3.1.19). Printers that support the "media-thickness" member attribute MUST support this attribute.

5.5.49 media-tooth-supported (1setOf (type2 keyword | name(MAX)))

This attribute lists the supported values of the "media-tooth" member attribute (section 5.3.1.20). Printers that support the "media-tooth" member attribute MUST support this attribute.

5.5.50 media-top-margin-supported (1setOf integer(0:MAX))

This REQUIRED attribute lists the supported values for the "media-top-margin" member attribute (section 5.3.1.21).

5.5.51 media-type-supported (1setOf (type2 keyword | name(MAX)))

This REQUIRED attribute lists the supported values of the "media-type" member attribute (section 5.3.1.21).

5.5.52 media-weight-metric-supported (1setOf rangeOfInteger(1:MAX))

This attribute lists the supported ranges of values of the "media-weight-metric" member attribute (section 5.3.1.23). Printers that support the "media-weight-metric" member attribute MUST support this attribute.

5.5.53 output-device-supported (1setOf name(127))

This CONDITIONALLY REQUIRED attribute lists the supported "output-device" values. Printers MUST support this attribute if the "output-device" Job Template attribute (section 5.3.1) is supported.

5.5.54 print-content-optimize-default (type2 keyword)

This CONDITIONALLY REQUIRED attribute specifies the default "print-content-optimize" (section 5.3.3) value. Printers that support the "print-content-optimize" attribute MUST support this attribute.

1416 **5.5.55 print-content-optimize-supported (1setOf type2 keyword)**

1417 This CONDITIONALLY REQUIRED attribute lists the supported "print-content-optimize"
1418 (section 5.3.3) values. Printers that support the "print-content-optimize" attribute MUST
1419 support this attribute.

1420 **5.5.56 which-jobs-supported (1setOf type2 keyword)**

1421 This REQUIRED attribute lists the supported values for the "which-jobs" operation attribute
1422 [STD92] that is used with the Get-Jobs operation [STD92].

1423 ## 5.6 Printer Status Attributes

1424 **5.6.1 printer-detailed-status-messages (1setOf text(MAX))**

1425 This attribute specifies additional detailed and technical information about the Printer,
1426 including information such as fault and warning messages, in the same way that the "job-
1427 detailed-status-messages" [STD92] Job Status attribute provides additional information
1428 about a Job. Because the messages are human-readable text, Clients MUST NOT attempt
1429 to parse the value(s) of this attribute.

1430 # 6. Additional Semantics for Existing Operations

1431 ## 6.1 Create-Job, Print-Job, Print-URI, Validate-Job: job-mandatory-
1432 ## attributes

1433 This specification extends the Create-Job, Print-Job, Print-URI, and Validate-Job operations
1434 to support the "job-mandatory-attributes" operation attribute (section 5.1.4) in the request
1435 sent by the Client, which specifies a list of Job Template attributes that MUST be supported
1436 by the Printer for the request to be accepted.

1437 The Client MAY supply and the Printer MUST accept the "job-mandatory-attributes"
1438 operation attribute in any Job Creation or Validate-Job request.

1439 The Printer MUST reject the Job Creation request if the Client supplies an unsupported Job
1440 Template attribute or value in the request that is included in this list of "job-mandatory-
1441 attributes" values.

1442 If the Client supplies both the "job-mandatory-attributes" and "ipp-attribute-fidelity" operation
1443 attributes, the Printer MUST ignore the "job-mandatory-attributes" attribute.

6.2 Create-Job, Print-Job, Print-URI: server-error-too-many-jobs Status Code

This specification extends the Job Creation operations to return the 'server-error-too-many-jobs' status code value when the Printer is currently unable to create a new Job object.

6.3 Get-Jobs Operation: "job-ids (1setOf integer(1:MAX))"

The "job-ids" (section 5.1.3) operation attribute, if supplied, specifies a list of target Jobs to be returned in the response to a Get-Jobs [STD92] request. Printers MUST support it in Get-Jobs requests to limit the list of Jobs that are returned.

If the Client supplies the "job-ids" operation attribute in a Get-Jobs request, the Client MUST NOT also supply any of the following operation attributes in the same request: "limit", "my-jobs", or "which-jobs". If the Client does supply prohibited operation attributes, the Printer MUST reject the request and return the 'client-error-conflicting-attributes' status code.

6.4 Hold-Job Operation: "job-hold-until-time (dateTime)"

The "job-hold-until-time" (section 5.1.1) operation attribute can be provided to specify a date and time when the Job will become a candidate for processing. Printers that support the "job-hold-until-time" attribute and Hold-Job operation MUST support its use with the Hold-Job operation. If accepted, the "job-hold-until-time" operation attribute is copied to the Job, replacing any existing "job-hold-until" [STD92] or "job-hold-until-time" attribute.

Clients MUST NOT send both the "job-hold-until" [STD92] and "job-hold-until-time" operation attributes in a Hold-Job request. If both attributes are sent, Printers MUST reject the request and return the 'client-error-conflicting-attributes' status code.

6.5 Print-Job, Print-URI, Send-Document, Send-URI: server-error-too-many-documents Status Code

This specification extends the Document Creation operations to return the 'server-error-too-many-documents' status code value when the Printer is currently unable to create a new Document object.

6.6 Set-Job-Attributes Operation: "job-hold-until-time (dateTime)"

The "job-hold-until-time" (section 5.4.6) Job Template attribute can be provided to specify a date and time when the Job will become a candidate for processing. Printers that support the "job-hold-until-time" attribute and Set-Job-Attributes operation MUST support its use with the Set-Job-Attributes operation. If accepted, the "job-hold-until-time" operation attribute is copied to the Job, replacing any existing "job-hold-until" [STD92] or "job-hold-until-time" attribute.

Clients MUST NOT send both the "job-hold-until" [STD92] and "job-hold-until-time" Job Template attributes in a Set-Job-Attributes request. If both attributes are sent, Printers MUST reject the request and return the 'client-error-conflicting-attributes' status code.

7. Additional Values for Existing Attributes

7.1 job-sheets (type2 keyword | name(MAX))

The following additional values are defined for the "job-sheets" Job Template attribute [STD92]:

'job-start-sheet': A Job Sheet is printed to indicate the start of the Job.

'job-end-sheet': A Job Sheet is printed to indicate the end of the Job.

'job-both-sheets': Job Sheets is printed to indicate the start and end of all the output associated with the Job.

'first-print-stream-page': The first Input Page in the Document Data is printed as the Job Sheet and the Printer's standard Job Sheet is suppressed.

7.2 job-state-reasons (1setOf type2 keyword)

This specification adds the following new keyword values for the "job-state-reasons" Job Status attribute [STD92]:

'digital-signature-did-not-verify': One or more documents in the Job contains a digital signature that could not be verified by the Printer.

'errors-detected': The Printer has detected one or more errors during processing of the Job.

'job-delay-until-specified': The Job's output is delayed because the "job-delay-output-until" or "job-delay-output-until-time" Job Template attribute was specified.

'warnings-detected': The Printer has detected one or more warnings during processing of the Job.

7.3 media (type2 keyword | name(MAX))

This specification adds the following new keyword value for the "media" Job Template attribute [STD92]:

'choice_iso_a4_210x297mm_na_letter_8.5x11in': Print using US Letter or ISO A4 media (whichever is available).

1506 Note: The semantics of the 'choice' prefix are documented in the PWG Media Standardized
1507 Names v2.0 (MSN2) specification [PWG5101.1].

7.4 pdl-override-supported (type2 keyword)

1509 This specification defines a new 'guaranteed' value for the "pdl-override-supported" [STD92]
1510 Printer Description attribute. This value indicates that the Printer guarantees that:

1511   1. Document and/or Job Template attribute values take precedence over instructions of
1512   any form embedded anywhere in the Document data;

1513   2. Document and/or Job Template attributes that have only a single supported value
1514   take precedence over instructions of any form embedded anywhere in the Document
1515   data, even if the attribute is not included in the Job or Document Creation request;
1516   and

1517   3. No PDL instruction is performed that does not correspond to a current value in the
1518   corresponding "xxx-supported" Printer Description attribute.

1519 If a Printer cannot honor the advertised "pdl-override-supported" value for a Job, it can abort
1520 the Job, stop the Printer, hold the Job, or substitute a supported value. This choice can be
1521 fixed by the implementation or configurable by the Administrator and can depend on the
1522 Document and/or Job Template attribute.

7.5 which-jobs (type2 keyword)

1524 This specification adds the following new keyword values for the "which-jobs" operation
1525 attribute [STD92]:

1526   'aborted': Any Job in the 'aborted' state.

1527   'all': All Jobs regardless of state.

1528   'canceled': Any Job in the 'canceled' state.

1529   'pending': Any Job in the 'pending' state.

1530   'pending-held': Any Job in the 'pending-held' state.

1531   'processing': Any Job in the 'processing' state.

1532   'processing-stopped': Any Job in the 'processing-stopped' state.

8. New Status Codes

1534 This section defines additional status code values.

8.1 server-error-too-many-jobs (0x050B)

The Client has attempted to create a Job using any of the Job Creation operations which would exceed the capacity of the Printer. The Client can retry the unmodified request.

8.2 server-error-too-many-documents (0x050C)

The Client has attempted to create a Document using any of the Document Creation operations which would exceed the capacity of the Printer for this Job. The Client can retry the unmodified request.

9. Obsolete Attributes

9.1 Obsolete Operation Attributes

Table 6 lists the operation attributes from the previous version of this specification [PWG5100.7-2003] which are now OBSOLETE.

Table 6 - OBSOLETE Operation Attributes

Attribute	Notes
document-digital-signature (type2 keyword)	Not usable
document-format-version (text(127))	Interoperability issues

9.2 Obsolete Member Attributes

Table 7 lists the member attributes of the "document-format-details" operation attribute (section) which are now OBSOLETE.

Table 7 - OBSOLETE "document-format-details" Member Attributes

Member Attribute	Notes
document-format (mimeMediaType)	Redundant, security issues
document-format-device-id (text(127))	Too short, not used
document-format-version (text(127))	Redundant, obsolete parent attribute
document-natural-language (1setOf naturalLanguage)	Redundant, nfot used

9.3 Obsolete Job Status Attributes

Table 8 lists the Job Status attributes from the previous version of this specification [PWG5100.7-2003] which are now OBSOLETE.

Table 8 - OBSOLETE Job Status Attributes

Attribute	Notes
compression-supported (type2 keyword)	Not usable
document-charset-supported (charset)	Superseded by PWG 5100.5
document-digital-signature-supplied (type2 keyword)	Obsolete parent attribute
document-format-supplied (mimeMediaType)	Superseded by PWG 5100.5
document-format-version-supplied (text(127))	Obsolete parent attribute
document-message-supplied (text(MAX))	Superseded by PWG 5100.5
document-name-supplied	Superseded by PWG 5100.5
document-natural-language-supplied (naturalLanguage)	Superseded by PWG 5100.5
ipp-attribute-fidelity (boolean)	Only used at time of creation
job-copies-actual (integer(1:MAX))	Obsolete parent attribute

Attribute	Notes
job-cover-back-actual (collection)	Obsolete parent attribute
job-cover-front-actual (collection)	Obsolete parent attribute
job-finishings-actual (1setOf type2 enum)	Obsolete parent attribute
job-finishings-col-actual (1setOf collection)	Obsolete parent attribute
job-mandatory-attributes (1setOf keyword)	Only used at time of creation
output-device-actual (1setOf name(127))	Redundant

9.4 Obsolete Job Template Attributes

Table 9 lists the Job Templates attributes from the previous version of this specification [PWG5100.7-2003] which are now OBSOLETE.

Table 9 - OBSOLETE Job Template AttributesTable 8

Attribute	Notes
job-copies (integer(1:MAX))	Interoperability issues
job-cover-back (collection)	Interoperability issues
job-cover-front (collection)	Interoperability issues
job-finishings (1setOf type2 enum)	Interoperability issues
job-finishings-col (1setOf collection)	Interoperability issues

9.5 Obsolete Printer Description Attributes

The following Printer Description attributes from the previous version of this specification [PWG5100.7-2003] which are now OBSOLETE.

Table 10 - OBSOLETE Printer Description Attributes

Attribute	Notes
document-digital-signature-default (type2 keyword)	Obsolete parent attribute
document-digital-signature-supported (1setOf type2 keyword)	Obsolete parent attribute
document-format-details-default (collection)	Does not make sense
document-format-version-default (text(127))	Obsolete parent attribute
document-format-version-supported (1setOf text(127))	Obsolete parent attribute
job-copies-default (integer(1:MAX))	Obsolete parent attribute
job-copies-supported (rangeOfInteger(1:MAX))	Obsolete parent attribute
job-cover-back-default (collection)	Obsolete parent attribute
job-cover-back-supported (1setOf keyword)	Obsolete parent attribute
job-cover-front-default (collection)	Obsolete parent attribute
job-cover-front-supported (1setOf keyword)	Obsolete parent attribute
job-finishings-col-default (1setOf collection)	Obsolete parent attribute
job-finishings-col-ready (1setOf collection)	Obsolete parent attribute
job-finishings-col-supported (1setOf keyword)	Obsolete parent attribute

Attribute	Notes
job-finishings-default (1setOf type2 enum)	Obsolete parent attribute
job-finishings-ready (1setOf type2 enum)	Obsolete parent attribute
job-finishings-supported (1setOf type2 enum)	Obsolete parent attribute
media-info-supported (boolean)	Unnecessary attribute

10. Obsolete Values

10.1 Obsolete "job-state-reasons" Values

The 'digital-signature-type-not-supported' and 'job-digital-signature-wait' keyword values from the previous version of this specification [PWG5100.7-2003] are now OBSOLETE because the corresponding Job Template attribute is OBSOLETE.

11. Conformance Requirements

11.1 Printer Conformance Requirements

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

1. The new operations defined in section 4;
2. The operation attributes defined in 5.1;
3. The Job Status attributes defined in section 5.2 that correspond to any supported Job Template attributes defined in section 5.3;
4. The Document Status attributes defined in section 5.2 that correspond to any supported Document Template attributes defined in section 5.3;
5. The Printer Description attributes defined in section 5.5 that correspond to any supported Document/Job Template attributes defined in section 5.3;
6. The additional semantics defined in section 6;
7. The additional values defined in section 7;
8. The internationalization considerations defined in section 12; and
9. The security considerations defined in section 13.

11.2 Client Conformance Requirements

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

1. The internationalization considerations defined in section 12; and
2. The security considerations defined in section 13.

1588 **12. Internationalization Considerations**

1589 For interoperability and basic support for multiple languages, conforming implementations
1590 MUST support:

1591   1. The Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8)
1592   [STD63] encoding of Unicode [UNICODE] [ISO10646]; and
1593   2. The Unicode Format for Network Interchange [RFC5198] which requires
1594   transmission of well-formed UTF-8 strings and recommends transmission of
1595   normalized UTF-8 strings in Normalization Form C (NFC) [UAX15].

1596 Unicode NFC is defined as the result of performing Canonical Decomposition (into base
1597 characters and combining marks) followed by Canonical Composition (into canonical
1598 composed characters wherever Unicode has assigned them).

1599 WARNING – Performing normalization on UTF-8 strings received from Clients and
1600 subsequently storing the results (e.g., in Job objects) could cause false negatives in Client
1601 searches and failed access (e.g., to Printers with percent-encoded UTF-8 URIs now
1602 'hidden').

1603 Implementations of this specification SHOULD conform to the following standards on
1604 processing of human-readable Unicode text strings, see:

1605   Unicode Bidirectional Algorithm [UAX9] – left-to-right, right-to-left, and vertical

1606   Unicode Line Breaking Algorithm [UAX14] – character classes and wrapping

1607   Unicode Normalization Forms [UAX15] – especially NFC for [RFC5198]

1608   Unicode Text Segmentation [UAX29] – grapheme clusters, words, sentences

1609   Unicode Identifier and Pattern Syntax [UAX31] – identifier use and normalization

1610   Unicode Collation Algorithm [UTS10] – sorting

1611   Unicode Locale Data Markup Language [UTS35] – locale databases

1612 Implementations of this specification are advised to also review the following informational
1613 documents on processing of human-readable Unicode text strings:

1614   Unicode Character Encoding Model [UTR17] – multi-layer character model

1615   Unicode Character Property Model [UTR23] – character properties

1616   Unicode Conformance Model [UTR33] – Unicode conformance basis

1617 13. Security Considerations

1618 The IPP extensions defined in this document require the same security considerations as
1619 defined in the Internet Printing Protocol/1.1 [STD92].

1620 Implementations of this specification SHOULD conform to the following standard on
1621 processing of human-readable Unicode text strings, see:

1622   Unicode Security Mechanisms [UTS39] – detecting and avoiding security attacks

1623 Implementations of this specification are advised to also review the following informational
1624 document on processing of human-readable Unicode text strings:

1625   Unicode Security FAQ [UNISECFAQ] – common Unicode security issues

1626 14. IANA Considerations

1627 14.1 Attribute Registrations

1628 The attributes defined in this specification will be published by IANA according to the
1629 procedures in the Internet Printing Protocol/1.1 [STD92] in the following file:

1630   http://www.iana.org/assignments/ipp-registrations

1631 The registry entries will contain the following information:

```
1632     Document Status attributes:                              Reference
1633     ---------------------------                              ---------
1634     document-format-details(deprecated)(collection)         [PWG5100.7]
1635     document-format-details-detected(deprecated)(collection) [PWG5100.7]
1636     document-format-supplied(obsolete) (mimeMediaType)      [PWG5100.7]
1637     document-format-version-supplied(obsolete) (text(127))  [PWG5100.7]
1638     document-message-supplied(obsolete) (text(MAX))         [PWG5100.7]
1639     document-name-supplied(obsolete) (name(MAX))            [PWG5100.7]
1640     errors-count (integer(0:MAX))                           [PWG5100.7]
1641     output-device-actual(obsolete) (1setOf name(127))       [PWG5100.7]
1642     print-content-optimize-actual (1setOf type2 keyword)    [PWG5100.7]
1643     warnings-count (integer(0:MAX))                         [PWG5100.7]
1644
1645     Document Template attributes:                           Reference
1646     ----------------------------                            ---------
1647     media-col (collection)                                  [PWG5100.7]
1648       <Any "media-col" member attribute>                   [PWG5100.7]
1649     output-device (name(127))                               [PWG5100.7]
1650     print-content-optimize (type2 keyword)                  [PWG5100.7]
1651
1652     Job Status attributes:                                  Reference
1653     ---------------------                                   ---------
1654     compression-supplied(obsolete) (type2 keyword)          [PWG5100.7]
1655     document-charset-supplied(obsolete) (charset)           [PWG5100.7]
```

```
1656        document-digital-signature-supplied(obsolete) (type2 keyword)
1657                                                              [PWG5100.7]
1658        document-format-details(deprecated)(collection)      [PWG5100.7]
1659        document-format-details-detected(deprecated)(collection)   [PWG5100.7]
1660        document-format-details-supplied(obsolete) (1setOf collection)
1661                                                              [PWG5100.7]
1662        document-format-supplied(obsolete) (mimeMediaType)   [PWG5100.7]
1663        document-format-version-supplied(obsolete) (text(127))   [PWG5100.7]
1664        document-message-supplied(obsolete) (text(MAX))      [PWG5100.7]
1665        document-name-supplied(obsolete) (name(MAX))         [PWG5100.7]
1666        document-natural-language-supplied(obsolete) (naturalLanguage)
1667                                                              [PWG5100.7]
1668        errors-count (integer(0:MAX))                        [PWG5100.7]
1669        ipp-attribute-fidelity(obsolete) (boolean)           [PWG5100.7]
1670        job-copies-actual(obsolete) (integer(1:MAX))         [PWG5100.7]
1671        job-cover-back-actual(obsolete) (collection)         [PWG5100.7]
1672        job-cover-front-actual(obsolete) (collection)        [PWG5100.7]
1673        job-finishings-actual(obsolete) (1setOf type2 enum)  [PWG5100.7]
1674        job-finishings-col-actual(obsolete) (1setOf collection)   [PWG5100.7]
1675        job-mandatory-attributes(obsolete) (1setOf keyword)  [PWG5100.7]
1676        output-device-actual(obsolete) (1setOf name(127))    [PWG5100.7]
1677        print-content-optimize-actual (1setOf type2 keyword) [PWG5100.7]
1678        warnings-count (integer(0:MAX))                      [PWG5100.7]
1679
1680        Job Template attributes:                             Reference
1681        ------------------------                             ---------
1682        job-account-id (name(MAX))                           [PWG5100.7]
1683        job-accounting-user-id (name(MAX))                   [PWG5100.7]
1684        job-cancel-after (integer(0:MAX))                    [PWG5100.7]
1685        job-copies(obsolete) (integer(1:MAX))                [PWG5100.7]
1686        job-cover-back(obsolete) (collection)                [PWG5100.7]
1687        job-cover-front(obsolete) (collection)               [PWG5100.7]
1688        job-delay-output-until (type2 keyword | name(MAX))   [PWG5100.7]
1689        job-delay-output-until-time (dateTime)               [PWG5100.7]
1690        job-hold-until-time (dateTime)                       [PWG5100.7]
1691        job-finishings(obsolete) (1setOf type2 enum)         [PWG5100.7]
1692        job-finishigns-col(obsolete) (1setOf collection)     [PWG5100.7]
1693        job-retain-until (type2 keyword | name(MAX))         [PWG5100.7]
1694        job-retain-until-interval (integer(0:MAX))           [PWG5100.7]
1695        job-retain-until-time (dateTime)                     [PWG5100.7]
1696        job-sheets-col (collection)                          [PWG5100.7]
1697          job-sheets (type2 keyword | name(MAX))             [PWG5100.7]
1698          media (type2 keyword | name(MAX))                  [PWG5100.7]
1699          media-col (collection)                             [PWG5100.7]
1700        media-col (collection)                               [PWG5100.7]
1701          media-back-coating (type2 keyword | name(MAX))     [PWG5100.7]
1702          media-bottom-margin (integer(0:MAX))               [PWG5100.7]
1703          media-color (type2 keyword | name(MAX))            [PWG5100.7]
1704          media-front-coating (type2 keyword | name(MAX))    [PWG5100.7]
1705          media-grain (type2 keyword | name(MAX))            [PWG5100.7]
1706          media-hole-count (integer(0:MAX))                  [PWG5100.7]
1707          media-info (text(255))                             [PWG5100.7]
1708          media-key (type2 keyword | name(MAX))              [PWG5100.7]
1709          media-left-margin (integer(0:MAX))                 [PWG5100.7]
1710          media-order-count (integer(1:MAX))                 [PWG5100.7]
1711          media-pre-printed (type2 keyword | name(MAX))      [PWG5100.7]
```

```
1712        media-recycled (type2 keyword | name(MAX))              [PWG5100.7]
1713        media-right-margin (integer(0:MAX))                     [PWG5100.7]
1714        media-size (collection)                                 [PWG5100.7]
1715          x-dimension (integer(0:MAX))                          [PWG5100.7]
1716          y-dimension (integer(0:MAX))                          [PWG5100.7]
1717        media-size-name (type2 keyword | name(MAX))             [PWG5100.7]
1718        media-source (type2 keyword | name(MAX))                [PWG5100.7]
1719        media-thickness (integer(1:MAX))                        [PWG5100.7]
1720        media-tooth (type2 keyword | name(MAX))                 [PWG5100.7]
1721        media-top-margin (integer(0:MAX))                       [PWG5100.7]
1722        media-type (type2 keyword | name(MAX))                  [PWG5100.7]
1723        media-weight-metric (integer(0:MAX))                    [PWG5100.7]
1724      output-device (name(127))                                 [PWG5100.7]
1725      print-content-optimize (type2 keyword)                    [PWG5100.7]
1726
1727      Operation attributes:                                     Reference
1728      --------------------                                      ---------
1729      document-digital-signature(obsolete) (type2 keyword)      [PWG5100.7]
1730      document-format-details(deprecated) (collection)          [PWG5100.7]
1731        document-format(obsolete) (mimeMediaType)               [PWG5100.7]
1732        document-format-device-id(obsolete) (text(127))         [PWG5100.7]
1733        document-format-version(obsolete) (text(127))           [PWG5100.7]
1734        document-natural-language(obsolete) (1setOf naturalLanguage)
1735                                                                [PWG5100.7]
1736        document-source-application-name (name(MAX))            [PWG5100.7]
1737        document-source-application-version (text(127))         [PWG5100.7]
1738        document-source-os-name (name(40))                      [PWG5100.7]
1739        document-source-os-version (text(40))                   [PWG5100.7]
1740      document-format-version(obsolete) (text(127))             [PWG5100.7]
1741      job-hold-until-time (dateTime)                            [PWG5100.7]
1742      job-ids (1setOf integer(1:MAX))                           [PWG5100.7]
1743      job-mandatory-attributes (1setOf keyword)                 [PWG5100.7]
1744
1745      Printer Description attributes:                           Reference
1746      ------------------------------                            ---------
1747      document-charset-default (charset)                        [PWG5100.7]
1748      document-charset-supported (1setOf charset)               [PWG5100.7]
1749      document-digital-signature-default(obsolete) (type2 keyword)
1750                                                                [PWG5100.7]
1751      document-digital-signature-supported(obsolete) (1setOf type2 keyword)
1752                                                                [PWG5100.7]
1753      document-format-details-default(obsolete) (collection)    [PWG5100.7]
1754      document-format-details-supported (1setOf keyword)        [PWG5100.7]
1755      document-format-version-default(obsolete) (text(127))     [PWG5100.7]
1756      document-format-version-supported(obsolete) (1setOf text(127))
1757                                                                [PWG5100.7]
1758      document-natural-language-default (naturalLanguage)       [PWG5100.7]
1759      document-natural-language-supported (1setOf naturalLanguage)
1760                                                                [PWG5100.7]
1761      job-cancel-after-default (integer(0:MAX) | no-value)      [PWG5100.7]
1762      job-cancel-after-supported (rangeOfInteger(0:MAX))        [PWG5100.7]
1763      job-copies-default(obsolete) (integer(1:MAX))             [PWG5100.7]
1764      job-copies-supported(obsolete) (rangeOfInteger(1:MAX))    [PWG5100.7]
1765        job-cover-back-default(obsolete) (collection)           [PWG5100.7]
1766        job-cover-back-supported(obsolete) (1setOf keyword)     [PWG5100.7]
1767        job-cover-front-default(obsolete) (collection)          [PWG5100.7]
```

```
1768        job-cover-front-supported(obsolete) (1setOf keyword)        [PWG5100.7]
1769        job-creation-attributes-supported (1setOf keyword)          [PWG5100.7]
1770        job-delay-output-until-default (type2 keyword | name(MAX))  [PWG5100.7]
1771        job-delay-output-until-interval-supported (rangeOfInteger(0:MAX))
1772                                                                    [PWG5100.7]
1773        job-delay-output-until-supported (1setOf (type2 keyword | name(MAX)))
1774                                                                    [PWG5100.7]
1775        job-delay-output-until-time-supported (rangeOfInteger(0:MAX))
1776                                                                    [PWG5100.7]
1777        job-finishings-col-default(obsolete) (1setOf collection)    [PWG5100.7]
1778        job-finishings-col-ready(obsolete) (1setOf collection)      [PWG5100.7]
1779        job-finishings-col-supported(obsolete) (1setOf keyword)     [PWG5100.7]
1780        job-finishings-default(obsolete) (1setOf type2 enum)        [PWG5100.7]
1781        job-finishings-ready(obsolete) (1setOf type2 enum)          [PWG5100.7]
1782        job-finishings-supported(obsolete) (1setOf type2 enum)      [PWG5100.7]
1783        job-history-attributes-configured (1setOf keyword)          [PWG5100.7]
1784        job-history-attributes-supported (1setOf keyword)           [PWG5100.7]
1785        job-history-interval-configured (integer(0:MAX))            [PWG5100.7]
1786        job-history-interval-supported (rangeOfInteger(0:MAX))      [PWG5100.7]
1787        job-ids-supported (boolean)                                 [PWG5100.7]
1788        job-mandatory-attributes-supported (boolean)                [PWG5100.7]
1789        job-retain-until-default (type2 keyword | name(MAX))        [PWG5100.7]
1790        job-retain-until-interval-supported (rangeOfInteger(0:MAX)) [PWG5100.7]
1791        job-retain-until-supported (1setOf (type2 keyword | name(MAX)))
1792                                                                    [PWG5100.7]
1793        job-retain-until-time-supported (rangeOfInteger(0:MAX))     [PWG5100.7]
1794        job-spooling-supported (type2 keyword)                      [PWG5100.7]
1795        media-back-coating-supported (1setOf (type2 keyword | name(MAX)))
1796                                                                    [PWG5100.7]
1797        media-bottom-margin-supported (1setOf integer(0:MAX))       [PWG5100.7]
1798        media-col-database (1setOf collection)                      [PWG5100.7]
1799          <Any "media-col" member attribute>                        [PWG5100.7]
1800          media-source-properties (collection)                      [PWG5100.7]
1801            media-source-feed-direction (type2 keyword)             [PWG5100.7]
1802            media-source-feed-orientation (type2 enum)              [PWG5100.7]
1803        media-col-default (collection)                              [PWG5100.7]
1804          <Any "media-col" member attribute>                        [PWG5100.7]
1805        media-col-ready (1setOf collection)                         [PWG5100.7]
1806          <Any "media-col" member attribute>                        [PWG5100.7]
1807          media-source-properties (collection)                      [PWG5100.7]
1808            media-source-feed-direction (type2 keyword)             [PWG5100.7]
1809            media-source-feed-orientation (type2 enum)              [PWG5100.7]
1810        media-col-supported (1setOf keyword)                        [PWG5100.3]
1811        media-color-supported (1setOf (type2 keyword | name(MAX)))  [PWG5100.7]
1812        media-front-coating-supported (1setOf (type2 keyword | name(MAX)))
1813                                                                    [PWG5100.7]
1814        media-grain-supported (1setOf (type2 keyword | name(MAX)))  [PWG5100.7]
1815        media-hole-count-supported (1setOf rangeOfInteger(0:MAX))   [PWG5100.7]
1816        media-key-supported (1setOf (type2 keyword | name(MAX)))    [PWG5100.7]
1817        media-info-supported(obsolete) (boolean)                    [PWG5100.7]
1818        media-left-margin-supported (1setOf integer(0:MAX))         [PWG5100.7]
1819        media-order-count-supported (1setOf rangeOfInteger(1:MAX))  [PWG5100.7]
1820        media-pre-printed-supported (1setOf (type2 keyword | name(MAX)))
1821                                                                    [PWG5100.7]
1822        media-recycled-supported (1setOf (type2 keyword | name(MAX)))
1823                                                                    [PWG5100.7]
```

```
1824        media-right-margin-supported (1setOf integer(0:MAX))      [PWG5100.7]
1825        media-size-supported (1setOf collection)                  [PWG5100.7]
1826          x-dimension (integer(1:MAX) | rangeOfInteger(1:MAX))    [PWG5100.7]
1827          y-dimension (integer(1:MAX) | rangeOfInteger(1:MAX))    [PWG5100.7]
1828        media-source-supported (1setOf (type2 keyword | name(MAX))
1829                                                                  [PWG5100.7]
1830        media-thickness-supported (1setOf rangeOfInteger(1:MAX))  [PWG5100.7]
1831        media-tooth-supported (1setOf (type2 keyword | name(MAX)))[PWG5100.7]
1832        media-top-margin-supported (1setOf integer(0:MAX))        [PWG5100.7]
1833        media-type-supported (1setOf (type2 keyword | name(MAX))) [PWG5100.7]
1834        media-weight-metric-supported (1setOf rangeOfInteger(1:MAX))
1835                                                                  [PWG5100.7]
1836        output-device-supported (1setOf name(127))                [PWG5100.7]
1837        print-content-optimize-default (type2 keyword)            [PWG5100.7]
1838        print-content-optimize-supported (1setOf type2 keyword)   [PWG5100.7]
1839        which-jobs-supported (1setOf type2 keyword)               [PWG5100.7]
1840
1841        Printer Status attributes:                                Reference
1842        --------------------------                                ---------
1843        printer-detailed-status-messages (1setOf text(MAX))       [PWG5100.7]
```

1844   14.2 Type2 keyword Value Registrations

1845   The keyword values defined in this specification will be published by IANA according to the
1846   procedures in the Internet Printing Protocol/1.1 [STD92] in the following file:

1847   http://www.iana.org/assignments/ipp-registrations

1848   The registry entries will contain the following information:

```
1849        Attributes (attribute syntax)
1850          Keyword Attribute Value                                 Reference
1851          -----------------------                                 ---------
1852        job-delay-output-until (type2 keyword | name(MAX))        [PWG5100.7]
1853          day-time                                                [PWG5100.7]
1854          evening                                                 [PWG5100.7]
1855          indefinite                                              [PWG5100.7]
1856          night                                                   [PWG5100.7]
1857          no-delay-output                                         [PWG5100.7]
1858          second-shift                                            [PWG5100.7]
1859          third-shift                                             [PWG5100.7]
1860          weekend                                                 [PWG5100.7]
1861        job-delay-output-until-default (type2 keyword | name(MAX))[PWG5100.7]
1862          <Any "job-delay-output-until" value>                    [PWG5100.7]
1863        job-delay-output-until-supported (1setOf (type2 keyword | name(MAX)))
1864                                                                  [PWG5100.7]
1865          <Any "job-delay-output-until" value>                    [PWG5100.7]
1866
1867        job-retain-until (type2 keyword | name(MAX))              [PWG5100.7]
1868          end-of-day                                              [PWG5100.7]
1869          end-of-month                                            [PWG5100.7]
1870          end-of-week                                             [PWG5100.7]
1871          indefinite                                              [PWG5100.7]
1872          none                                                    [PWG5100.7]
```

```
1873          job-retain-until-default (type2 keyword | name(MAX))        [PWG5100.7]
1874            <Any "job-retain-until" value>                            [PWG5100.7]
1875          job-retain-until-supported (1setOf (type2 keyword | name(MAX)))
1876                                                                      [PWG5100.7]
1877            <Any "job-retain-until" value>                            [PWG5100.7]
1878
1879          job-sheets (type2 keyword)                                  [STD92]
1880            first-print-stream-page                                   [PWG5100.7]
1881            job-both-sheets                                           [PWG5100.7]
1882            job-end-sheet                                             [PWG5100.7]
1883            job-start-sheet                                           [PWG5100.7]
1884
1885          job-state-reasons (1setOf type2 keyword)                    [STD92]
1886            digital-signature-did-not-verify                         [PWG5100.7]
1887            digital-signature-type-not-supported(obsolete)           [PWG5100.7]
1888            errors-detected                                           [PWG5100.7]
1889            job-delay-output-until-specified                          [PWG5100.7]
1890            job-digital-signature-wait(obsolete)                      [PWG5100.7]
1891            warnings-detected                                         [PWG5100.7]
1892
1893          media (type2 keyword | name(MAX))                           [STD92]
1894            choice_iso_a4_210x297mm_na_letter_8.5x11in                [PWG5100.7]
1895
1896          media-back-coating (type2 keyword | name(MAX))              [PWG5100.7]
1897          media-back-coating-supported (1setOf (type2 keyword | name(MAX)))
1898                                                                      [PWG5100.7]
1899            <Any "media-back-coating" value>                          [PWG5100.7]
1900
1901          media-color (type2 keyword | name(MAX))                     [PWG5100.7]
1902          media-color-supported (1setOf (type2 keyword | name(MAX)))  [PWG5100.7]
1903            <Any "media-color" value>                                 [PWG5100.7]
1904
1905          media-front-coating (type2 keyword | name(MAX))             [PWG5100.7]
1906            <Any "media-back-coating" value>                          [PWG5100.7]
1907          media-front-coating-supported (1setOf (type2 keyword | name(MAX)))
1908                                                                      [PWG5100.7]
1909            <Any "media-front-coating" value>                         [PWG5100.7]
1910
1911          media-pre-printed (type2 keyword | name(MAX))               [PWG5100.7]
1912            blank                                                     [PWG5100.7]
1913            letter-head                                               [PWG5100.7]
1914            pre-printed                                               [PWG5100.7]
1915          media-pre-printed-supported (1setOf (type2 keyword | name(MAX)))
1916                                                                      [PWG5100.7]
1917            <Any "media-pre-printed" value>                           [PWG5100.7]
1918
1919          media-recycled (type2 keyword | name(MAX))                  [PWG5100.7]
1920            none                                                      [PWG5100.7]
1921            standard                                                  [PWG5100.7]
1922          media-recycled-supported (1setOf (type2 keyword | name(MAX)))
1923                                                                      [PWG5100.7]
1924            <Any "media-recycled" value>                              [PWG5100.7]
1925
1926          media-source-feed-direction (type2 keyword)                 [PWG5100.7]
1927            long-edge-first                                           [PWG5100.7]
1928            short-edge-first                                          [PWG5100.7]
```

```
1929
1930      media-source (type2 keyword | name(MAX))                    [PWG5100.7]
1931        alternate                                                 [PWG5100.7]
1932        alternate-roll                                            [PWG5100.7]
1933        auto                                                      [PWG5100.7]
1934        bottom                                                    [PWG5100.7]
1935        by-pass-tray                                              [PWG5100.7]
1936        center                                                    [PWG5100.7]
1937        disc                                                      [PWG5100.7]
1938        envelope                                                  [PWG5100.7]
1939        hagaki                                                    [PWG5100.7]
1940        large-capacity                                            [PWG5100.7]
1941        left                                                      [PWG5100.7]
1942        main                                                      [PWG5100.7]
1943        main-roll                                                 [PWG5100.7]
1944        manual                                                    [PWG5100.7]
1945        middle                                                    [PWG5100.7]
1946        photo                                                     [PWG5100.7]
1947        rear                                                      [PWG5100.7]
1948        right                                                     [PWG5100.7]
1949        roll-1                                                    [PWG5100.7]
1950        roll-10                                                   [PWG5100.7]
1951        roll-2                                                    [PWG5100.7]
1952        roll-3                                                    [PWG5100.7]
1953        roll-4                                                    [PWG5100.7]
1954        roll-5                                                    [PWG5100.7]
1955        roll-6                                                    [PWG5100.7]
1956        roll-7                                                    [PWG5100.7]
1957        roll-8                                                    [PWG5100.7]
1958        roll-9                                                    [PWG5100.7]
1959        side                                                      [PWG5100.7]
1960        top                                                       [PWG5100.7]
1961        tray-1                                                    [PWG5100.7]
1962        tray-10                                                   [PWG5100.7]
1963        tray-11                                                   [PWG5100.7]
1964        tray-12                                                   [PWG5100.7]
1965        tray-13                                                   [PWG5100.7]
1966        tray-14                                                   [PWG5100.7]
1967        tray-15                                                   [PWG5100.7]
1968        tray-16                                                   [PWG5100.7]
1969        tray-17                                                   [PWG5100.7]
1970        tray-18                                                   [PWG5100.7]
1971        tray-19                                                   [PWG5100.7]
1972        tray-2                                                    [PWG5100.7]
1973        tray-20                                                   [PWG5100.7]
1974        tray-3                                                    [PWG5100.7]
1975        tray-4                                                    [PWG5100.7]
1976        tray-5                                                    [PWG5100.7]
1977        tray-6                                                    [PWG5100.7]
1978        tray-7                                                    [PWG5100.7]
1979        tray-8                                                    [PWG5100.7]
1980        tray-9                                                    [PWG5100.7]
1981      media-source-supported (1setOf (type2 keyword | name(MAX)))
1982                                                                  [PWG5100.7]
1983        <Any "media-source" value>                                [PWG5100.7]
1984
```

```
1985        media-tooth (type2 keyword | name(MAX))                  [PWG5100.7]
1986        media-tooth-supported (1setOf (type2 keyword | name(MAX)))  [PWG5100.7]
1987          <Any "media-tooth" value>                              [PWG5100.7]
1988
1989        media-type (type2 keyword | name(MAX))                   [PWG5100.7]
1990        media-type-supported (1setOf (type2 keyword | name(MAX)))  [PWG5100.7]
1991          <Any "media-type" value>                               [PWG5100.7]
1992
1993        pdl-override-supported (type2 keyword)                   [STD92]
1994          guaranteed                                             [PWG5100.7]
1995
1996        print-content-optimize (type2 keyword)                  [PWG5100.7]
1997          graphics                                               [PWG5100.7]
1998          photo                                                  [PWG5100.7]
1999          text                                                   [PWG5100.7]
2000          text-and-graphics                                      [PWG5100.7]
2001        print-content-optimize-actual (1setOf type2 keyword)    [PWG5100.7]
2002          <Any "print-content-optimize" value>                   [PWG5100.7]
2003        print-content-optimize-default (type2 keyword)          [PWG5100.7]
2004          <Any "print-content-optimize" value>                   [PWG5100.7]
2005        print-content-optimize-supported (1setOf type2 keyword) [PWG5100.7]
2006          <Any "print-content-optimize" value>                   [PWG5100.7]
2007
2008        which-jobs (type2 keyword)                              [STD92]
2009          aborted                                                [PWG5100.7]
2010          all                                                    [PWG5100.7]
2011          canceled                                               [PWG5100.7]
2012          pending                                                [PWG5100.7]
2013          pending-held                                           [PWG5100.7]
2014          processing                                             [PWG5100.7]
2015          processing-stopped                                     [PWG5100.7]
```

2016 ## 14.3 Type2 enum Registrations

2017 The attributes defined in this specification will be published by IANA according to the
2018 procedures in the Internet Printing Protocol/1.1 [STD92] in the following file:

2019   http://www.iana.org/assignments/ipp-registrations

2020 The registry entries will contain the following information:

```
2021        Attributes (attribute syntax)
2022          Enum Value Enum Symbolic Name                         Reference
2023          ---------- ------------------                         ---------
2024        media-source-feed-orientation (type2 enum)             [PWG5100.7]
2025          <Any "orientation-requested" value>                  [PWG5100.7]
2026
2027        operations-supported (1setOf type2 enum)               [STD92]
2028          0x0038 Cancel-Jobs                                   [PWG5100.7]
2029          0x0039 Cancel-My-Jobs                                [PWG5100.7]
2030          0x003A Close-Job                                     [PWG5100.7]
2031          0x003B Resubmit-Job                                  [PWG5100.7]
```

2032 **14.4 Operation Registrations**

2033 The operations defined in this specification will be published by IANA according to the
2034 procedures in the Internet Printing Protocol/1.1 [STD92] in the following file:

2035   http://www.iana.org/assignments/ipp-registrations

2036 The registry entries will contain the following information:

```
2037    Operation Name                                    Reference
2038    --------------                                    ---------
2039    Cancel-Jobs                                       [PWG5100.7]
2040    Cancel-My-Jobs                                    [PWG5100.7]
2041    Close-Job                                         [PWG5100.7]
2042    Create-Job(Extension)                             [PWG5100.7]
2043    Hold-Job(Extension)                               [PWG5100.7]
2044    Print-Job(Extension)                              [PWG5100.7]
2045    Print-URI(Extension)                              [PWG5100.7]
2046    Resubmit-Job                                      [PWG5100.7]
2047    Send-Document(Extension)                          [PWG5100.7]
2048    Send-URI(Extension)                               [PWG5100.7]
2049    Set-Job-Attributes(Extension)                     [PWG5100.7]
2050    Validate-Job(Extension)                           [PWG5100.7]
```

2051 **14.5 Status Code Registrations**

2052 The status codes defined in this specification will be published by IANA according to the
2053 procedures in the Internet Printing Protocol/1.1 [STD92] in the following file:

2054   http://www.iana.org/assignments/ipp-registrations

2055 The registry entries will contain the following information:

```
2056    Value    Status Code Name                         Reference
2057    ------   ----------------------------------------  ---------
2058    0x0500:0x05FF - Server Error:
2059      0x050B server-error-too-many-jobs               [PWG5100.7]
2060      0x050C server-error-too-many-documents          [PWG5100.7]
```

2061

2062 # 15. Overview of Changes

2063 ## 15.1 IPP Job Extensions v2.0

2064 The following changes were made to the previous version of this specification [PWG5100.7-
2065 2003]:

2066 • A rationale section was added, including use cases, exceptions, and requirements;

2067 • References now point to the current versions of dependent documents and
2068 specifications at the time of publication;

2069 • Read-only attributes are now defined and registered as status attributes;

2070 • A REQUIRED "job-mandatory-attributes-supported" Printer Description attribute has
2071 been added to indicate support for the "job-mandatory-attributes" Job Template
2072 attribute;

2073 • The "job-hold-until-time" and "job-ids" operation attributes were moved from the
2074 OBSOLETE IPP Job and Printer Extensions - Set 3 [PWG5100.11-2010]
2075 specification;

2076 • The "job-delay-output-until", "job-delay-output-until-time", and "job-hold-until-time"
2077 Job Template attributes were moved from the OBSOLETE IPP Job and Printer
2078 Extensions - Set 3 [PWG5100.11-2010] specification;

2079 • The "job-creation-attributes-supported", "job-spooling-supported", "media-col-
2080 database", "printer-detailed-status-messages", and "which-jobs-supported" Printer
2081 attributes were moved from the OBSOLETE IPP Job and Printer Extensions - Set 3
2082 [PWG5100.11-2010] specification;

2083 • The "job-account-id" and "job-accounting-user-id" Job Template and related Printer
2084 Description attributes were moved from the IPP Production Printing Attributes - Set 1
2085 [PWG5100.3-2001] specification;

2086 • The "job-sheets-col" Job Template and related Printer Description attributes were
2087 moved from the IPP Production Printing Attributes - Set 1 [PWG5100.3-2001]
2088 specification;

2089 • The additional values for the "job-sheets" Job Template attribute were moved from
2090 the IPP Production Printing Attributes - Set 1 [PWG5100.3-2001] specification;

2091 • The REQUIRED "media-col" Document/Job Template attribute and related Printer
2092 Description attributes were moved from the IPP Production Printing Attributes - Set 1
2093 [PWG5100.3-2001], OBSOLETE IPP Job and Printer Extensions - Set 2

2094   [PWG5100.11-2010], and IPP Job and Printer Extensions - Set 3 [PWG5100.13-
2095   2012] specifications;

2096   • RECOMMENDED "job-retain-until", "job-retain-until-interval", and "job-retain-until-
2097   time" Job Template attributes were added to control the Job Retention phase of a
2098   Job's lifecycle;

2099   • REQUIRED "job-history-attributes-configured", "job-history-attributes-supported",
2100   "job-history-interval-configured", and "job-history-interval-supported" Printer
2101   Description attributes were added to control the Job History phase of a Job's lifecycle;

2102   • The "document-charset" operation attribute and corresponding operation semantics
2103   are now defined in PWG 5100.5: IPP Document Object v1.1;

2104   • The "document-digital-signature" operation attribute and corresponding Document
2105   Status, Job Status, and Printer Description attributes have been made OBSOLETE
2106   because of interoperability issues;

2107   • The "document-format-details" operation attribute and corresponding Document
2108   Status, Job Status, and Printer Description attributes have been made
2109   DEPRECATED because of interoperability issues and privacy concerns;

2110   • The "document-format", "document-format-version", and "document-natural-
2111   language" member attributes of "document-format-details" have been made
2112   OBSOLETE because the attributes are redundant;

2113   • The "document-format-device-id" member attribute of "document-format-details"
2114   have been made OBSOLETE because the attribute syntax is too short to be useful;

2115   • The "document-format-version" operation attribute and corresponding Document
2116   Status, Job Status, and Printer Description attributes have been made OBSOLETE
2117   because of interoperability issues;

2118   • The "job-copies" Job Template attribute and corresponding Job Status and Printer
2119   Description attributes have been made OBSOLETE because of interoperability
2120   issues;

2121   • The "job-cover-back" Job Template attribute and corresponding Job Status and
2122   Printer Description attributes have been made OBSOLETE because of
2123   interoperability issues;

2124   • The "job-cover-front" Job Template attribute and corresponding Job Status and
2125   Printer Description attributes have been made OBSOLETE because of
2126   interoperability issues;

2127
2128
2129

- The "job-finishings" Job Template attribute and corresponding Job Status and Printer Description attributes have been made OBSOLETE because of interoperability issues;

2130
2131
2132

- The "job-finishings-col" Job Template attribute and corresponding Job Status and Printer Description attributes have been made OBSOLETE because of interoperability issues; and

2133
2134
2135

- The 'digital-signature-type-not-supported' and 'job-digital-signature-wait' values for the "job-state-reasons" attribute have been made OBSOLETE because of interoperability issues.

2136 **16. References**

2137 **16.1 Normative References**

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http://www.pwg.org/

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

2225 The editors would like to especially thank the following individuals who also contributed
2226 significantly to the development of this document:

2227   Tom Hastings (author of v1.0)
2228   Peter Zehler (author of v1.0)
2229

2230   # 18. Change History

2231   ## 18.1 May 10, 2019

2232   • Copied media-col and related attributes and extensions from PWG 5100.3 and
2233   5100.13 (JPS3)

2234   • Copied job-account-id, job-accounting-user-id, and related attributes from PWG
2235   5100.3

2236   • Section 15.1: Updated discussion of media-col, add reference to 5100.13

2237   • Section 16.1: Moved 5100.3 reference to section 16.2

2238   • Section 16.2: Added 5100.13 reference

2239   ## 18.2 April 18, 2019

2240   • Status: stable

2241   • Make document-format-details DEPRECATED, only obsolete redundant member
2242   attributes per April 2019 F2F

2243   • Use OBSOLETE and DEPRECATED (uppercase) in text

2244   ## 18.3 March 15, 2019

2245   • Version: 2.0

2246   • Section 2.1: OBSOLETED -> OBSOLETE

2247   • Section 2.4: Cleaned out unused terms, added definitions of Completed Job, Not
2248   Completed Job, and Retained Job

2249   • Sections 5 and 6: Updated conformance requirements

2250   ## 18.4 March 8, 2019

2251   • Status: Prototype

2252   • Abstract: Reworded for updated scope

2253   • Section 1: Reworded for updated scope, added discussion of obsolete JPS2 bits
2254   moving here

2255 • Section 2.1: Added definitions of OBSOLETED and DEPRECATED

2256 • Section 3: Added rationale, use cases, and design requirements for attributes and
2257 operations from JPS2.

2258 • New section 4 for operations from JPS2

2259 • Section 5: Made most attributes RECOMMENDED, added job-creation-attributes-
2260 supported, job-delay-output-until-xxx, job-history-xxx, job-hold-until-time, job-ids, job-
2261 spooling-supported, media-col-database, printer-detail-status-messages from JPS2

2262 • Section 5: Added new job-history-xxx and job-retain-until-xxx attributes

2263 • New section 6 for additional semantics (imported from JPS2)

2264 • Section 7: Added pdl-override-supported, which-jobs values, media-col member
2265 attributes.

2266 18.5 October 23, 2018

2267 • Status: Interim

2268 • Updated references to the first version of 5100.7 to include year and exclude the full
2269 name.

2270 • Abstract and intro: Clarified that this specification is defining attributes and values.

2271 • Editorial changes

2272 • Added reference to the MSN2 spec.

2273 18.6 September 26, 2018

2274 • Brought back the job-mandatory-attributes operation attribute, which is still needed.

2275 • Added a rationale, use case, and design requirement for selective fidelity/job-
2276 mandatory-attributes.

2277 • Added Additional Semantics and Operation Registrations sections for using job-
2278 mandatory-attributes with job creation/validation operations.

2279 • Added Additional Semantics and Operation Registrations sections for returning the
2280 too-many-jobs/documents status codes.

2281 **18.7 September 25, 2018**

2282 Initial revision.