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The Printer Working Group

# IPP Job and Printer Extensions – Set 2 v2.0 (JPS2)

Status: Initial

Abstract: This IPP Job and Printer Extensions – Set 2 v2.0 Specification (JPS2) defines extension to IPP/1.1 [STD92]. This JPS2 defines IPP additions to support the Job Proof Print Feature, the Job Save and Reprint Feature, Job passwords and processing control, and a collection of other attributes to support various use cases.

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

This document is available electronically at:

https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippjobprinterext2v20-20180904.docx
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# 1. Introduction

This specification defines an extension to IPP/1.1 [STD92]. This specification defines Operation attributes, Job Template attributes, and Printer Description attributes as summarized in Table 1. This specification also defines or references REQUIRED operations as summarized in Table 2. Finally, this specification defines OPTIONAL semantics for Attribute Precedence, a Queue Override Feature, and a feature to guarantee protocol precedence over the PDL directives.

**Table 1 - Summary of Attributes Defined**

| Attribute Name (syntax) | Description | Conformance |
|---|---|---|
| **Operation Attributes** | | |
| job-password (octetString(255)) | Password for secure processing | OPTIONAL |
| job-password-encryption (type2 keyword \| name(MAX)) | Password encryption method for secure printing | OPTIONAL |
| job-ids (1setOf integer(1:MAX)) | List of Job ids for Cancel-Jobs, Cancel-My-Jobs, Get-Jobs, and Purge-Jobs operations. | REQUIRED |
| **Job Template Attributes** | | |
| feed-orientation (type2 keyword) | Media edge to be fed into the print engine from the paper tray | OPTIONAL |
| font-name-requested (name(MAX)) | Font name when missing from the document data (e.g. text documents) | OPTIONAL |
| font-size-requested (integer (1:MAX)) | Font size in points when missing from the document data (e.g. text documents) | OPTIONAL |
| job-delay-output-until (type2 keyword \| name(MAX)) | Delay output until a specified time period, but allow processing | OPTIONAL |
| job-delay-output-until-time (dateTime) | Delay output until a specified date and time, but allow processing | OPTIONAL |
| job-hold-until-time (dateTime) | Hold the Job until the supplied date and time | OPTIONAL |
| job-phone-number (uri) | Contact telephone number for the job | OPTIONAL |
| job-recipient-name (name(MAX)) | Name of the person that is to receive the output of the job | OPTIONAL |
| job-save-disposition (collection) | Save the Document Data of a job, such that the Job can be re-printed | OPTIONAL |

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| Attribute Name (syntax) | Description | Conformance |
|---|---|---|
| pdl-init-file (1setOf collection) | Controls initialization of the Printer's PDL interpreter(s) | OPTIONAL |
| proof-print (collection) | Control a proof print of the Job before printing a full run of the job | REQUIRED |
| **Job Description Attributes** | | |
| job-save-printer-make-and-model (text(127)) | Make and model of the output device which saved this job | OPTIONAL |
| **Printer Description Attributes** | | |
| job-creation-attributes-supported **(**1setOf type2 keyword) | set of Job Creation attributes supported | OPTIONAL |
| job-ids-supported (boolean) | Whether "job-ids-supported" is supported in Purge-Jobs and Get-Jobs operations | REQUIRED |
| job-password-supported (integer (0:255)) | Maximum unencrypted password length supported | OPTIONAL |
| job-password-encryption-supported (1setOf (type2 keyword \| name(MAX))) | Encryption methods supports for Secure Print | OPTIONAL |
| job-spooling-supported (type2 keyword) | Indicates whether or not jobs are spooled before printing | OPTIONAL |
| max-save-info-supported (integer(1:MAX)) | Maximum number of "save-info" member attribute collections that a Printer can accept | OPTIONAL |
| media-col-database (1setOf collection) | Set of media collections available in the printer's media database | OPTIONAL |
| printer-detailed-status-messages **(**1setOf text(MAX)) | Additional detailed and technical information about the printer | OPTIONAL |
| which-jobs-supported **(**1setOf type2 keyword) | Supported values for the "which-jobs" operation attribute of the Get-Jobs operation | REQUIRED |

Many of the semantics of these Job Template and Operation attributes MAY also be supplied in corresponding document format (PDL) directive. In such cases, the user MAY request that the application include these directives as part of the document data when the document is generated, rather than in the IPP protocol at print time. However, some applications are unable to generate such PDL directives when generating the PDL document data. Also, some of these semantics are not supported in some PDLs. Finally, in a production environment, the document may be generated separately from being printed, in which case

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290 the end user or the production printer operator supplies the instructions at print time, long
291 after the document had been created.

292 **Table 2 - Summary of Operations defined or referenced**

| Operation | Description | Conformance |
|---|---|---|
| Cancel-Jobs | Allows an operator/administrator to cancel a list of Not Completed jobs or all Not Completed jobs on the Printer | REQUIRED |
| Cancel-My-Jobs | Allows a user to cancel a list of their Not Completed jobs or *all* of their Not Completed jobs | REQUIRED |
| Close-Job | Allows a Client to close a multi-document Job without supplying any additional documents. | REQUIRED |
| Reprocess-Job | Allows a user to re-process an exact copy of a Retained Job. This operation is defined in [RFC3998] | REQUIRED |
| Resubmit-Job | Allows a user to re-process a modified copy of a Retained Job. | REQUIRED |

# 293 2. Terminology

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

## 295 2.1 Conformance Terminology

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

## 301 2.2 Printing Terminology

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

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

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

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*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 an endpoint device, e.g., a marking engine, a fax modem, etc.

## 2.3 Protocol Role Terminology

This document also defines the following protocol roles in order 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.

## 2.4 Other Terminology

*Document Creation Operations:* The operations that create documents: Print-Job, Print-URI, Send-Document and Sent-URI.

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

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

*Job Proof Print Feature:* The Job Proof Print Feature (section 4.4) is REQUIRED functionality to allow a user to print one or more copies of a Job for proofing, called a Proof Print Job, using the "proof-print" (collection) Job Template attribute (section 7.11). Subsequently, the user can reprint the Proof Print Job using REQUIRED Resubmit-Job operation (section 5.4) or the REQUIRED Reprocess-Job operation [RFC3998] to get the desired number of copies after the user has proof read the output of the Proof Print Job

*Job Save and Reprint Feature:* The Job Save and Reprint Feature (section 4.3) is additional OPTIONAL functionality to allow a user to save a Job as part of Job processing and print it at another time using the OPTIONAL "job-save-disposition" (collection) Job Template

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attribute (section 7.9). When saving a job, a user MAY specify saving parameters such as the location (remote or local) to save the Job Instructions and/or the Document Data, and/or specify the format in which the print data and Job instructions are saved. Subsequently, the user reprints the Saved Job using either the REQUIRED Resubmit-Job operation (section 5.4) or the REQUIRED Reprocess-Job operation [RFC3998].

*Job-Submission Operations:* The Job-Submission Operations are the IPP operations that create jobs and send document content, namely Print-Job, Print-URI, Create-Job, Send-Document and Send-URI. See [STD92] for further information.

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

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

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

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

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

*Retained Job:* A Retained Job is a Job that the Printer retains in the so-called Job Retention Phase (see [STD92] section 5.3.7.2 Partitioning of Job States) in the job's terminal state ('completed', 'aborted', or 'canceled') after processing it, for an implementation-defined period (including zero seconds) or removed by an explicit Delete-Job or Purge-Jobs operation. An exact copy of a Retained Job can be processed using a Reprocess-Job operation. A modified copy of a Retained Job can be processed using a Resubmit-Job operation.

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

*Saved Job:* A Saved Job is a Retained Job that the Printer retains indefinitely (until removed by a Delete-Job or Purge-Jobs operation) so that a copy of it can be reprinted any time using the Reprocess-Job or Resubmit-Job operations, rather than aging the Job out after an implementation-defined period.

## 2.5 Acronyms and Organizations

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

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

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

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

# 3. Requirements

In order to satisfy the PWG Process/3.0 [PWG_PROC], the following requirements for JPS2 are included in this section:

(a) A rationale for developing this IPP Job and Printer Operations - Set2 (JPS2) specification;

(b) A set of use cases for IPP JPS2;

(c) A set of design requirements for IPP JPS2.

## 3.1 Rationale for IPP Job and Printer Extensions – Set 2 v2.0

IETF and PWG IPP printing standards define:

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

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

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

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

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

(f) A set of abstract operations for controlling Print Jobs in section 3.3.5 'Hold-Job Operation' (Job Owner and Operator) and section 3.3.6 'Release-Job Operation' (Job Owner and Operator) of IETF IPP/1.1 [STD92] and section 4.3.1 'Suspend-Current-

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Job Operation' (Job Owner and Operator) and section 4.3.2 'Resume-Job Operation' (Job Owner and Operator) of IETF IPP Job and Printer Administrative Operations [RFC3998]; and

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

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

Therefore, this IPP Job and Printer Extensions – Set 2 v2.0 Specification should:

(1) Support proofing of Print Jobs in IPP Job Creation operations;

(2) Support saving of Print Jobs in IPP Job Creation operations;

(3) Support reprinting saved or proofed Print Jobs with different processing instructions;

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

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

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

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

## 3.2 Use Cases

### 3.2.1 Proof Print

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

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

Once a month, Charlie extracts from their database all of the detailed software requirements for each project into a spreadsheet. He also extracts all the high-level software requirements into a word processing document. Charlie then submits a single Print Job with two

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Documents [PWG5100.5] (the spreadsheet and the word processing document) for a proof print of 3 copies (single-sided and portrait).

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

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

### 3.2.2 Job Save

Max and Nancy work in Human Resources at a large company. Twice every year they have to put out a comprehensive guide to the current benefits for all company employees. They do all their proofing electronically in softcopy on their workstations. So, when they're ready, Max submits a master Print Job that requests Job saving and an initial run of 50 copies.

Nancy and Max distribute these copies via interoffice mail with a cover note that includes the "printer-uri" and "job-id" for the saved master Print Job, suggesting that some employees may wish to print extra copies for their families.

### 3.2.3 Reprint Job

Sam is an operator in the 'glasshouse' print room of a large company. End users can submit Print Jobs to some of his managed printers, but all their jobs are placed on hold for later manual scheduling and release by the Operator, per site policy.

Sam decides when to run various held jobs, loads required media, powers up finishing devices, etc. For example, a Print Job may request special handling for one copy stapled on plain paper, one copy on overhead slide media, and several copies on colored paper with nice covers and binding, in a "job-message-to-operator" attribute [PWG5100.3]. These special handling instructions mean that the Print Job has to be run once (plain paper) and reprinted twice (slides and colored paper), since IPP doesn't support per-copy processing instructions in the same Print Job execution.

## 3.3 Exceptions

Provide exceptions for the use cases using the casual use case format.

None in original IPP Job and Printer Extensions – Set 2 v2.0...

## 3.4 Out of Scope

Provide a list of out of scope use cases and other possibly related areas.

None in original IPP Job and Printer Extensions – Set 2 v2.0...

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## 3.5 Design Requirements

This IPP Job and Printer Extensions – Set 2 v2.0 design should:

(1) Follow the naming conventions defined in IETF IPP/1.1 [STD92], including keyword value (lowercase) and hyphenation requirements;

(2) Optimize compatibility with existing IETF and PWG IPP operations when making design decisions in defining new operations and attributes;

(3) Define new proof print attributes;

(4) Define new Job saving attributes;

(5) Define a new Cancel-Jobs operation (for Operator);

(6) Define a new Cancel-My-Jobs operation (for Job Owner);

(7) Define a new Close-Job operation (for Job Owner);

(8) Define a new "job-ids" operation attribute for existing Get-Jobs and Purge-Jobs operations and new Cancel-Jobs and Cancel-My-Jobs operations that contains a list of target Print Jobs; and

(9) Define a new Resubmit-Job operation (for Job Owner or Operator) for reprinting a saved Print Job with new processing instructions.

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# 4. Semantics Common to More Than One Attribute

## 4.1 Guaranteed Protocol Precedence Over the PDL and Queue Overrides

The IPP "pdl-override-supported" attribute [STD92] has a new 'guaranteed' value which a Printer implementation uses to indicate that it can guarantee that Job Template attribute supplied in the protocol will override corresponding instructions in the PDL document data. The existing values for this attribute are 'not-attempted' and 'attempted' which are weaker than 'guaranteed'.

IPP does not preclude multiple Printer objects representing a single output device, i.e., so-called "device fan-in". [RFC2911] describes device fan-in in detail and also introduces the concept of "Printer fan-in" in which multiple Printer objects represent a single Printer object, each with the ability to accept IPP requests. “Printer fan-in” is described more fully in [RFC3998]. A system with multiple queues can be represented as separate Printer objects for each queue, using either device fan-in or Printer fan-in depending on implementation. The administrator can configure each such Printer object with different policies, including supported and default attributes. Each Printer can also have a different access control list, as well.

Sometimes, the system administrator needs to set up a Printer object that will override one or more attributes with a single fixed value for each attribute. These are called "queue overrides". The administrator can configure a Printer that supports the 'guaranteed' value of "pdl-override-supported" to achieve a queue override for the "xxx" attribute by configuring the "xxx-supported" Printer attribute with only a single value. That value will not only override the PDL, but it will also force the Job to have that same value when queried or processed. See the description of the "pdl-override-supported" attribute in Section 11.1 of this volume.

## 4.2 Attribute Precedence

This section defines the precedence rules for Queue Override attributes, Page Override attributes, Document Override attributes, attributes supplied in the protocol, PDL instructions, and Printer object defaults. Since each attribute can be specified for all of these levels, it is important to define which level takes precedence when the same attribute occurs at different levels with differing values.

The attribute precedence model has the following features:

1. In principle, each defined attribute can occur at each of the precedence levels.

2. Attributes can be introduced and modified at different points in the Job workflow, e.g., in the application, print driver, submission Client, protocol, and Printer.

    - Attributes are supplied by different agents in the system: application, user, print driver, administrator, operator, Printer object, and the output device hardware.

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- Attributes are supplied at different points in time: PDL generation, Job submission, Job acceptance, Job pending, Job processing.

3. Attributes can be introduced and modified at different points in the Job workflow, e.g., in the application, print driver, submission Client, protocol, and Printer.

The following levels of precedence are defined in order of decreasing priority:

1. **queue override** - The value that the Printer enforces for any Job submitted to it (see section 4.1). Set by the administrator when configuring the Printer by setting an "xxx-supported" Printer attribute to contain a single value, i.e., the override value. Example: the administrator sets the Printer's "sides" = 'two-sided-long' so that all Jobs submitted to that (logical) Printer are printed two-sided flipped along the long edge.

   Note: The queue override level is only available for Printers that support the 'guaranteed' value for its "pdl-override-supported" attribute (see section 3.1 of this specification). All other levels are available for all Printers independent of the "pdl-override-supported" value.

2. **page override programming** - A special "overrides" collection Job Template attribute that contains the attributes that are to have the page override status (see [PWG5100.6]). Set by the Client when submitting a Job either in the protocol or set by the user or operator after the Job has been accepted either using the Set-Job-Attributes operation [RFC3380], or by the operator using means local to the Printer. Example: "overrides" = {"page-number" = '1'; "media" = 'letterhead'}

3. **protocol Job object attribute** - The Job Template attribute submitted in the protocol (IPP, LPR, etc.). Set by the Client when submitting a Job in the protocol or set by the user or operator after the Job has been accepted either using the Set-Job-Attributes operation [RFC3380], or by the operator using means local to the Printer. Examples: "media" = 'na-letter' and "copies" = '2'.

4. **PDL document data** - an instruction in the PDL document data. Set by the application or print driver that created the PDL. Example: PostScript setPageDevice specifying na-letter media.

5. **PDL Init File data** - a file that the Printer uses to initialize the PDL Interpreter before it starts interpreting each document in a Job. See description of “pdl-init-file” Job Template attribute in Section 7.10 of this specification. It is immaterial how this file is specified, whether it be by a queue override, Job object attribute or Printer default – the precedence of the contents of this file is at this level.

6. **printer default** - a Printer "xxx-default" attribute that is applied by the Printer provided that none of the higher levels have supplied a value. The Printer implementation MUST supply values for all of the Printer's "xxx-default" attributes that reflect the out-of-the-box action by the output device. For example, if the output device will use media from the large-capacity input tray if not directed otherwise, the implementation MUST supply the Printer's "media-default" attribute with the 'large-capacity' keyword

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value without requiring the administrator to configure that value. The implementation MUST allow the administrator to configure the Printer's "xxx-default" attributes to other values, if other values are supported by the implementation. Example: The administrator changes the Printer's "media-default" from 'large-capacity' to 'na-letter'.

Note: Because of the requirement that the implementation supply pre-configured values for the Printer's "xxx-default" attributes, there is no need for a lower "hardware default" precedence level.

## 4.3 Job Save and Reprint OPTIONAL Feature

The Job Save and Reprint Feature is additional OPTIONAL functionality to allow a user to save a print Job as part of Job processing and print a copy of it at another time. A Client requests a Printer to save a print Job by supplying the “job-save-disposition” (collection) Job Template attribute (see section 7.9) when submitting the Job. In this case, the Printer retains the Job indefinitely in the so-called Job Retention Phase [STD92] in the Job’s terminal state (‘completed’, ‘aborted’, or ‘canceled’) after processing it, rather than aging the Job out after an implementation-defined period. In other words, a Saved Job is just a Retained Job that the Printer is retaining indefinitely. When saving a Job, a user MAY specify saving the Document Data, and specify the format in which the print data is saved. These semantics necessitate the definition of additional values for the "job-state-reasons" Job Description attribute, the "job-save-printer-make-and-model" Job Description attribute (see section 9.1), and the use of the Reprocess-Job and Resubmit-Job operations to print these saved Jobs.

This section, in conjunction with the description of the "job-save-disposition" Job Template attribute (see section 7.9) fully describe the Job Save and Reprint Feature. If a Printer supports the Job Save and Reprint Feature, then it MUST also support the Proof Print Feature (see section 4.4). See section 12.4 Conformance Requirements for the OPTIONAL "job-save-disposition" Job Template attribute for additional conformance requirements for clients and Printers.

### 4.3.1 Reprinting Saved Jobs

This section defines the method by which to reprint a copy of the Saved Job using the Reprocess-Job and Resubmit-Job operations. The Reprocess-Job operation is defined in [RFC3998] and Resubmit-Job is defined in this document and operates on any Retained Job, whether or not it is a Saved Job.

#### 4.3.1.1 Reprinting using the Reprocess-Job operation

The Reprocess-Job operation [RFC3998] re-processes a copy of any Retained Job after processing was completed, canceled, or aborted. In order to prevent the Printer from aging out a Retained Job, the Client can supply a “job-save-disposition” Job Template attribute (see section 7.9) in a Job submission. In this case the Printer retains the Job (until removed by a Delete-Job or Purge-Jobs operation) as a Saved Job, so that a Client can reprint the Job using Reprocess-Job any time subsequently. When reprinting a Saved Job, the Printer MUST NOT copy the “job-save-disposition” attribute to the copy; otherwise, the Job would

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be saved again. Similarly, when reprinting a Proof Print Job, the Printer MUST NOT copy the “proof-print” attribute to the Job copy; otherwise, the Job would be proofed again.

#### 4.3.1.2 Reprinting using the Resubmit-Job operation

The Resubmit-Job operation (see section 5.4 below for a complete description) re-processes a copy of any Retained Job in the same way as Reprocess-Job (see section 4.3.1.1), with the addition of being able to supply additional operation and Job Template attributes that will affect the processing of that copy of the Job by either override the values of existing attributes or providing additional attributes. The Resubmit-Job operation has the same structure as the Print-URI operation [STD92] except that the “job-id” (integer(1:MAX)) operation attribute MUST take the place of the “document-uri” (uri) operation attribute.

## 4.4 Job Proof Print REQUIRED Feature

The Proof Print Feature is additional REQUIRED functionality to allow a user to print a Proof Print Job and to save it as part of Job processing in such a way that users can submit a request to print a copy of the Proof Print Job at a later time. A Client requests a Printer to print and save a Proof Print Job by supplying the “proof-print” (collection) Job Template attribute (see section 7.11) when submitting the Job. In this case, the Printer retains the Proof Print Job indefinitely in the so-called Job Retention Phase [STD92] in the Job’s terminal state (‘completed’, ‘aborted’, or ‘canceled’) after processing it, rather than aging the Job out after an implementation-defined period. In other words, a Proof Print Job is just a Retained Job that the Printer is retaining indefinitely. A Client can then request the Printer to reprint a copy of the Proof Print Job using the Reprocess-Job operation (using the original “copies” and “media” attributes - see section 4.3.1.1) and a modified copy of the Job using the Resubmit-Job operation (see section 4.3.1.2). See section 12.5 Conformance Requirements for the REQUIRED "proof-print" Job Template attribute for additional conformance requirements for clients and Printers.

# 5. New Attributes

## 5.1 Operation Attributes

This section defines additional Operation attributes for existing IPP operations.

#### 5.1.1 job-password (octetString(255)) for Job Creation operations

This attribute allows a user to perform Secure Print. The user enters a password in the Job submitting application which is encrypted by the Client using one of the methods specified by the "job-password-encryption-supported" attribute. The encrypted password is sent to the Printer as the value of the "job-password" attribute. If a "job-password" value is provided, other than a zero-length string, the Printer MUST hold the Job in the 'pending-held' state, and the 'job-password-wait' value is added to the "job-state-reason" attribute.

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The user enters the same password at the device to release the Job for printing. The Printer uses the same encryption method specified in the "job-password-encryption" attribute on this password. The Printer MUST resume the print Job when the locally-supplied encrypted password matches the value of the "job-password" attribute. The method in which the password is entered and validated at the Printer is implementation dependent.

The "job-password" attribute may OPTIONALLY be included in the request of the following Job Creation operations: Print-Job, Print-URI, and Create-Job. The "job-password" attribute value MUST NOT be returned in a Get-Job-Attributes response.

Other jobs may be printed before the release of the Secure Print Job from the 'pending-held' state. If the Secure Print Job is released by the user while another Job is printing, the Secure Job MUST NOT resume printing until the current Job is done printing. The Secure Job SHOULD be the next Job printed after the current job, unless there is another Job in the Printer which has a higher priority than the Secure Job as determined by the "job-priority" attribute.

### 5.1.2 job-password-encryption (type2 keyword | name(MAX)) for Job Creation operations

This attribute specifies the type of encryption used for the value of the "job-password" attribute in the request of the following Job Creation operations: Print-Job, Print-URI, and Create-Job. The Client MUST supply this operation attribute whenever the "job-password" attribute is supplied.

The valid keyword values are the same as the valid values for the "job-password-encryption-supported" attribute (See description below in section 5.4.14).

### 5.1.3 job-ids (1setOf integer(1:MAX)) for the Get-Jobs operation

This attribute is defined for use with the Get-Jobs operation [STD92]. A Client MUST be able to supply and a Printer MUST support the "job-ids" operation attribute in a Get-Jobs operation in order to claim support of this Job and Printer Extensions - Set 2 Specification, respectively. See also section 10.2 job-ids-supported (boolean) Printer Description attribute.

The “job-ids” Operation attribute, if supplied, specifies a list of target jobs to be returned, rather than all jobs, in the response to the Get-Jobs operation [STD92]. If the Client supplies the "job-ids" Operation attribute, 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 the "job-ids" Operation attribute with any of the following Operation attributes: "limit", “my-jobs”. or "which-jobs", the Printer MUST reject the request and return the ‘client-error-conflicting-attributes’ status code [STD92].

### 5.1.4 job-ids (1setOf integer(1:MAX)) for the Purge-Jobs operation

This attribute specifies a list of target jobs to be purged, rather than all jobs. If this attribute is not supplied, the Printer MUST purge all jobs. This attribute is defined for use with the

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679 Purge-Jobs operation [STD92]. If a Client or Printer support the Purge-Jobs operation, such
680 a Client MUST be able to supply and a Printer MUST support the "job-ids" operation in the
681 Purge-Jobs operation in order to claim support of this IPP Job and Printer Extensions – Set
682 2 v2.0 Specification, respectively.

683 ## 5.2 Job Status Attributes

684 ### 5.2.1 job-save-printer-make-and-model (text(127))

685 This attribute identifies the make and model of the output device which saved this job. The
686 values are the same as the corresponding "printer-make-and-model" Printer Description
687 attribute [STD92]. If this attribute is present in the saved Job, then only Printers that have
688 the same make and model will be able to print the saved Job with identical appearance.
689 Other make and models MAY be able to print the job, but not necessarily with identical
690 appearance, provided that the Printer supports the “save-document-format” value of the
691 saved job. If this attribute is not present in the saved Job Instructions and the Job object
692 after saving, then the saved Job was saved in a format that can be printed on any output
693 device and will generate the same appearance provided that the Printer supports the “save-
694 document-format” value of the saved job.

695 If the Printer implementation supports the "job-save-disposition" Job Template attribute in
696 section 7.9, then it is REQUIRED that the Printer support the "printer-make-and-model"
697 Printer Description attribute.

698 ## 5.3 Job Template Attributes

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

702 ### 5.3.1 feed-orientation (type2 keyword)

703 This attribute specifies the media edge which is fed into the print engine from the paper tray.
704 Long-edge-first is the preferred method of feeding media to attain the fastest printing speed.
705 Certain media will have adverse effects when fed from a certain direction; for instance, some
706 labels will peel off in the paper path when fed long-edge-first, but not when fed short-edge-
707 first. The feed orientation also may allow the Job to be finished in more acceptable ways; for
708 instance, a stationary finishing stapler may provide a preferred stapling location when the
709 media is fed short-edge-first.

710 When this attribute is specified, the Printer selects media that has already been loaded in
711 the requested orientation. If the media is not currently loaded in the requested orientation,
712 the Job may enter the 'processing-stopped' state with a "job-state-reason" of 'resources-are-
713 not-ready'.

714 Standard keyword values are:

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| Keyword | Description |
|---|---|
| 'long-edge-first' | The specified media is fed using the long edge first. |
| 'short-edge-first' | The specified media is fed using the short edge first. |

This attribute allows a PDL interpreter to determine which way to send the image data to the frame buffer for imposition on the media. Although Postscript supports this attribute as a PDL construct, support in other PDLs such as PCL and TIFF are dependent on the implementation. Therefore, this attribute is defined to be specified as a Job Template attribute such that printers may use this feature with PDLs other than Postscript. Some Printer implementations may be able to internally determine the best feed orientation to use so that if this attribute was sent over the wire to the printer, the attribute would be ignored.

This attribute has no special interaction with the "orientation-requested" attribute. It is possible to print a portrait document on either SEF (short edge feed) or LEF (long edge feed) paper, and likewise for landscape documents. However, this may affect staple placement and other finishing, depending on the device's capabilities.

This attribute applies as to how the media is loaded into the tray rather than the media itself and is therefore a job-level attribute rather than a media collection member attribute. This attribute may be used with "overrides" just as any other Job Template attribute (see [PWG5100.6]).

### 5.3.2 font-name-requested (name(MAX))

This attribute enables a Client to specify what default font name the Printer MUST use to print a Job if the document data is in a format that does not have inherent font information (e.g., ‘text/plain’). For document formats which have inherent font information (such as PostScript), this attribute will be ignored and will NOT override that information.

For some document formats (such as 'application/postscript'), the desired default font name of the print-stream pages is specified within the document data. This information is generated by a device driver prior to the submission of the print Job. Other document formats (such as 'text/plain') do not include the notion of desired font name within the document data. In the latter case it is possible for the Printer object to bind the desired font name to the document data after it has been submitted. It is expected that a Printer object would only support "font-name-requested" for some document formats (e.g., 'text/plain' or 'text/html') but not others (e.g., 'application/postscript'). This PDL-dependent behavior is no different than any other Job Template attribute since a Printer object may support or not support any Job Template attribute based on the document format supplied by the client. However, a special mention is made here since it is very likely that a Printer object will support "font-name-requested" for only a subset of the supported document formats.

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This attribute can be specified as a Document Override that affects the Input-Document. The use of this attribute on a Page override basis is not supported since changing the font characteristics can affect the pagination.

> NOTE: The use of the “xxx-requested” pattern for attribute names indicates that the value of the attribute is to be used ONLY in the case when a value for the attribute is not contained within the source document. This value will override the printer’s default value but will not override the source document’s value. See the description of the “orientation-requested” Job Template attribute [STD92].

### 5.3.3 font-size-requested (integer (1:MAX))

This attribute enables a Client to specify what default font size the Printer MUST use to print a Job if the document data is in a format that does not have inherent font information (e.g., ‘text/plain’). For document formats which have inherent font information (such as PostScript), this attribute will be ignored and will NOT override that information.

For some document formats (such as 'application/postscript'), the desired default font size of the print-stream pages is specified within the document data. This information is generated by a device driver prior to the submission of the print Job. Other document formats (such as 'text/plain') do not include the notion of desired font size within the document data. In the latter case it is possible for the Printer object to bind the desired font size to the document data after it has been submitted. It is expected that a Printer object would only support "font-size-requested" for some document formats (e.g., 'text/plain' or 'text/html') but not others (e.g., 'application/postscript'). This PDL-dependent behavior is no different than any other Job Template attribute since a Printer object may support or not support any Job Template attribute based on the document format supplied by the client. However, a special mention is made here since it is very likely that a Printer object will support "font-size-requested" for only a subset of the supported document formats.

The “font-size-requested” units are points, equivalent to 1/72nd of an inch.

This attribute can be specified as a Document Override that affects the Input-Document. The use of this attribute on a Page override basis is not supported since changing the font characteristics can affect the pagination.

> Note: The use of the “xxx-requested” pattern for attribute names indicates that the value of the attribute is to be used ONLY in the case when a value for the attribute is not contained within the source document. This value will override the printer’s default value but will not override the source document’s value. See the description of the “orientation-requested” Job Template attribute [STD92].

### 5.3.4 job-delay-output-until (type2 keyword | name(MAX))

This attribute permits the Client to specify a time period in the future until which the Printer is to delay the output. If the specified time period has not yet arrived, the Printer MUST set the Job's "job-state-reasons" value to 'job-delay-output-until-specified'. However, the Printer MAY perform processing before the time period arrives, but the Printer MUST NOT produce

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any output until the time period arrives. When the time period arrives, the Job MUST become a candidate for output (including any processing required to produce the output).

Standard keyword values for named time periods are:

| Keyword | Description |
|---|---|
| 'no-delay-output' | There are no reasons to delay output |
| 'indefinite' | The Job output is delayed indefinitely until a Client performs a Set-Job-Attributes operation [RFC3380] with either of the delay output Operation attributes: "job-delay-output-until" or "job-delay-output-until-time" |
| 'day-time' | During the day |
| 'evening' | During the evening |
| 'night' | During the night |
| 'weekend' | During the weekend |
| 'second-shift' | During the second shift (after close of business) |
| 'third-shift' | During the third shift (after midnight) |

Even though a Job supplied with the "job-delay-output-until" Job Template attribute may be in the 'processing-stopped' state, the Client MUST NOT supply and the Printer MUST NOT support the Resume-Job ([RFC3998]) to move the Job out of the 'processing-stopped' state. The only way for a Client to alter the delay period for a Job and for the Printer to support altering the delay period for a Job is by supporting the Set-Job-Attributes operation [RFC3380]. See section 8.2 below.

The Client MUST NOT supply both the "job-delay-output-until" and "job-delay-output-until-time" (see section 7.5 below) Job Template attributes in a Job Creation request. If the Client supplies such a malformed request by supplying both, the Printer MUST reject the request and return the 'client-error-conflicting-attributes' status code [STD92].

> Note: it is not an error for a Client to supply and a Printer to support a "job-hold-xxx" and a "job-delay-output-xxx" in the same Job Creation operation, since they control separate aspects of Job processing.

A Flow Diagram for Job Creation with the "job-delay-output-until" attribute is shown in Figure 1 below. The semantics of the "job-delay-output-until" attribute are similar to the "job-hold-until" Job Template attribute [STD92] (see Table 5 below), except that for the "job-delay-output-until" attribute the Job is not put into the 'pending-held' state while waiting for the time period to arrive. Instead, the Printer MAY process the Job normally, i.e., by putting the Job into the 'pending' and 'processing' states. However, the Printer MUST NOT produce any

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output until the specified time period arrives. If the Printer completes the processing and the specified time period has not yet arrived, the Printer MUST suspend the processing of the Job by putting the Job in the 'processing-stopped' state and MUST NOT delay processing or output of any other Jobs while waiting for the specified time period to arrive. When the time period does arrive, the Printer MUST remove the 'job-delay-output-until-specified' value from the Job's "job-state-reasons" attribute and MAY add the 'job-queued' [STD92] value to the Job's "job-state-reasons" attribute. Then the Job can be scheduled and processed, i.e., the Job enters the 'processing' state and produces the output.

If the Printer implementation is not able to put such a delayed output Job into the 'processing-stopped' state and process other Jobs, the Printer implementation MUST behave identically to that of the "job-hold-until" attribute and put the Job into the 'pending-held' state immediately (instead of 'pending' and 'processing'), set the "job-state-reasons" to 'job-delay-output-until-specified' (instead of 'job-hold-until-specified'), and wait for the specified time period to arrive to begin processing the Job (see the description of the "job-hold-until" attribute [STD92]).

**Table 3 - Comparison of "job-delay-output-until" with "job-hold-until"**

| Description | "job-delay-output-until" | "job-hold-until" |
|---|---|---|
| Initial Job states before the specified time period is reached | 'pending', 'processing', 'processing-stopped' | 'pending-held |
| Job states when the specified time period is reached | 'pending', 'processing' | 'pending', 'processing' |
| "job-state-reasons" value | "job-delay-output-until-specified" | "job-hold-until-specified" |

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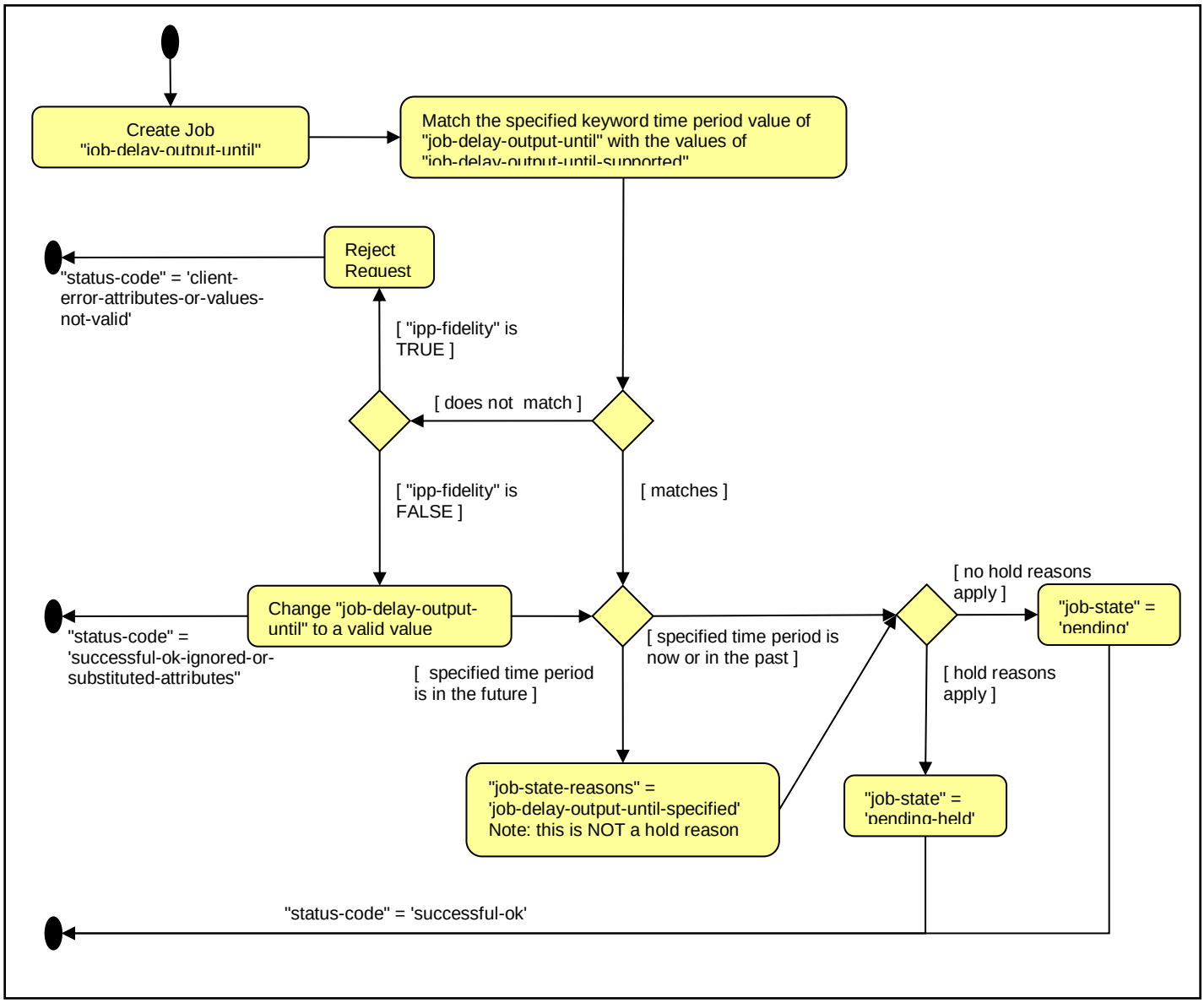


824

**Figure 1 - Job Creation Operation Flow Diagram with "job-delay-output-until" specified**

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827 **5.3.5 job-delay-output-until-time (dateTime)**

828 This attribute permits the Client to specify a date and time in the future after which the Printer
829 is to delay the output. If the specified date and time has not yet arrived, the Printer MUST
830 set the Job's "job-state-reasons" value to 'job-delay-output-until-specified'. However, the
831 Printer MAY perform processing before the specified date and time occurs, but the Printer
832 MUST NOT produce any output until the date and time occurs.

833 A Flow Diagram for Job Creation with the "job-delay-output-until-time" attribute is shown in
834 Figure 2 below. A Time Sequence Diagram for a Job with "job-hold-until-time", a Job with
835 "job-delay-output-until-time", and 4 ordinary print Jobs is shown in Figure 4 below. The
836 semantics of the "job-delay-output-until-time" attribute are similar to the "job-hold-until-time"

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Job Template attribute (see Section 7.6 and Table 6, except that for the "job-delay-output-until-time" attribute the Job is not put into the 'pending-held' state while waiting for the date and time to occur. Instead, the Printer MAY process the Job normally (i.e., by putting the Job into the 'pending' and 'processing' states). However, the Printer MUST NOT produce any output until the specified date and time occurs. If the Printer completes the processing and the specified date and time has not yet occurred, the Printer MUST suspend the processing of the Job by putting the Job in the 'processing-stopped' state and MUST NOT delay processing or output for any other Jobs while waiting for the specified date and time to occur. When the date and time does occur, the Printer MUST remove the 'job-delay-output-until-specified' value from the Job's "job-state-reasons" attribute and MAY add the 'job-queued' [STD92] value to the Job's "job-state-reasons" attribute. Then the Job can be scheduled and processed, i.e., the Job enters the 'processing' state and produces the output.

If the Printer implementation is not able to put such a delayed output Job into the 'processing-stopped' state and process other Jobs, the Printer implementation MUST behave identically to that of the "job-hold-until-time" attribute and put the Job into the 'pending-held' state immediately (instead of 'pending' and 'processing'), set the "job-state-reasons" to 'job-delay-output-until-specified' (instead of 'job-hold-until-specified'), and wait for the specified date and time to occur to begin processing the Job (see the description of the "job-hold-until-time" attribute in 7.6).

Even though a Job supplied with the "job-delay-output-until-time" Job Template attribute may be in the 'processing-stopped' state, the Client MUST NOT supply and the Printer MUST NOT support the Resume-Job ([RFC3998]) to move the Job out of the 'processing-stopped' state. The only way for a Client to alter the delay time for a Job and for the Printer to support altering the delay time for a Job is by supporting the Set-Job-Attributes operation ([RFC3380]). See section 8.2 below.

The Client MUST NOT supply both the "job-delay-output-until" (see section 7.4 above) and "job-delay-output-until-time" Job Template attributes in a Job Creation request. If the Client supplies such a malformed request by supplying both, the Printer MUST reject the request and return the 'client-error-conflicting-attributes' status code [STD92]. Note: it is not an error for a Client to supply and a Printer to support a "job-hold-xxx" and a "job-delay-output-xxx" in the same Job Creation operation, since they control separate aspects of Job processing.

**Table 4 - Comparison of "job-delay-output-until-time" with "job-hold-until-time"**

| Description | "job-delay-output-until" | "job-hold-until" |
|---|---|---|
| Initial Job states before the specified time period is reached | 'pending', 'processing', 'processing-stopped' | 'pending-held |
| Job states when the specified time period is reached | 'pending', 'processing' | 'pending', 'processing' |
| "job-state-reasons" value | "job-delay-output-until-specified" | "job-hold-until-specified" |

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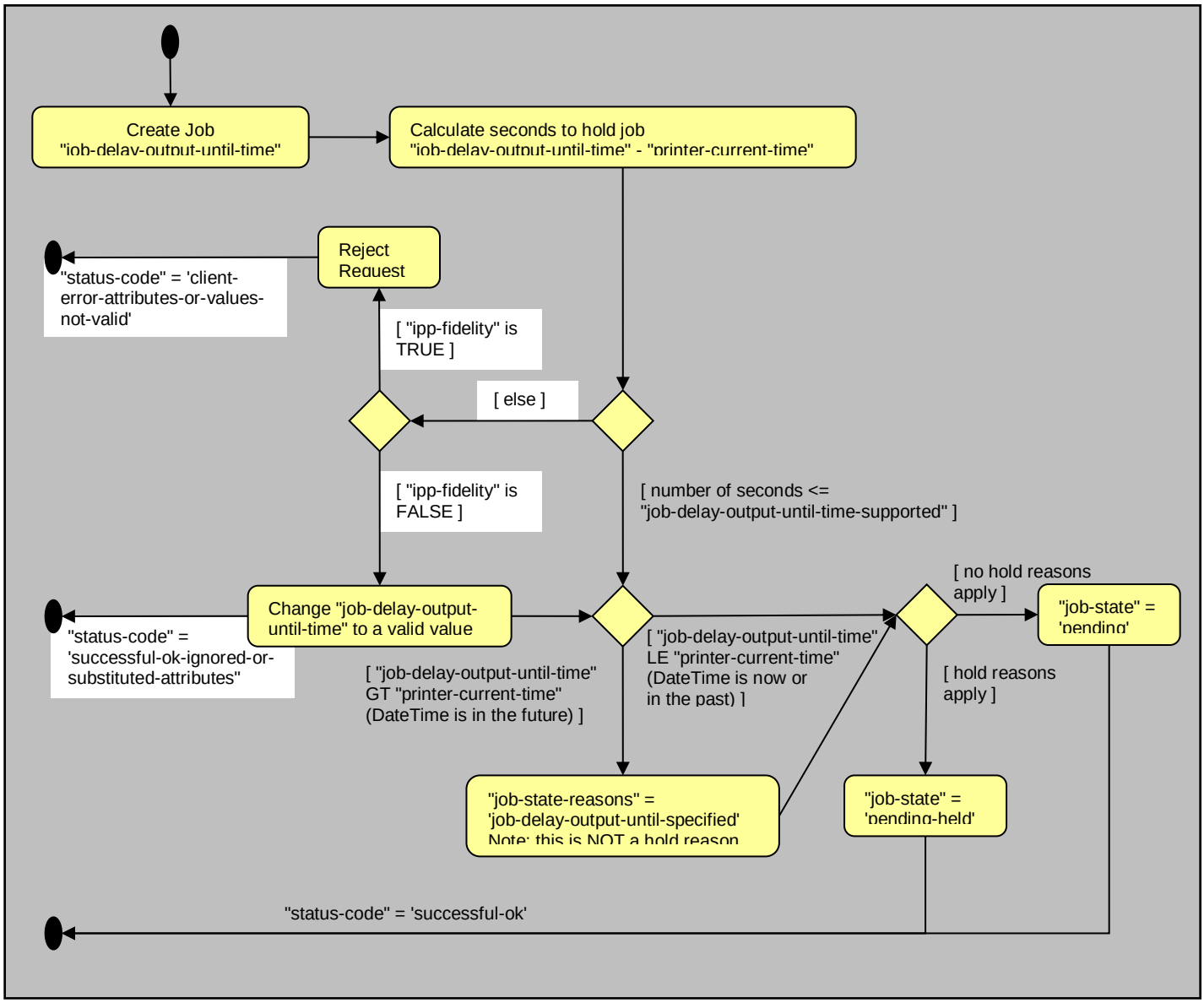


**Figure 2 - Job Creation Operation Flow Diagram with "job-delay-output-until-time" specified**

#### 5.3.5.1 Why there is no job-delay-output-until-time-default attribute

There is no “job-delay-output-until-time-default” attribute because it would either be a fixed date and time in the future or would have to be updated periodically. Neither seem useful enough to be worth the complexity.

### 5.3.6 job-hold-until-time (dateTime)

This attribute permits the Client to specify the date and time after which the Job MUST become a candidate for processing.

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Note: The Client application has the choice to present the "job-hold-until-time" to the end user as either a delta time (the amount of time until the Job is no longer held), or a fixed time when the Job will no longer be held. The fixed time is represented using the appropriate time zone(s) (usually the client's time zone, or the Printer's time zone, or both if the Client is capable). See the description of "printer-current-time" in [STD92].

If the Printer supports the "job-hold-until-time" attribute, the "job-hold-until" attribute MUST also be supported. However, if the "job-hold-until" attribute is supported, the "job-hold-until-time" attribute NEED NOT be supported. If the Printer supports the "job-hold-until-time" attribute, the "printer-current-time" (dateTime) Printer Description attribute MUST also be supported.

The Client MUST NOT supply both the "job-hold-until" and "job-hold-until-time" Job Template attributes in a Job Creation request. If the Client supplies such a malformed request by supplying both, the Printer MUST reject the request and return the 'client-error-conflicting-attributes' status code [STD92]. Note: it is not an error for a Client to supply and a Printer to support a "job-hold-xxx" and a "job-delay-output-xxx" in the same Job Creation operation, since they control separate aspects of Job processing.

A Flow Diagram for Job Creation operations with the "job-hold-until-time" attribute is shown in Figure 3 below. A Time Sequence Diagram for a Job with "job-hold-until-time", a Job with "job-delay-output-until-time", and 4 ordinary print Jobs is shown in Figure 4 below. A Hold Job request is sent by the Client with a "job-hold-until-time" value specified as a dateTime. The Printer calculates the number of seconds between the "job-hold-until-time" value and the "printer-current-time" value. If this number of seconds is NOT in the range specified by the Printer's "job-hold-until-time-supported" attribute value, then the Printer either:

1. rejects the request with the 'client-error-attributes-or-values-not-supported' status code [STD92] if the "ipp-attribute-fidelity" is 'true'; or

2. accepts the request with the 'successful-ok-ignored-or-substituted-attributes', if the client-supplied "ipp-attribute-fidelity" is 'false'. Also, the Printer MUST return the "job-hold-until-time" attribute and the client-supplied value in the Unsupported Attributes group of the operation response. If the "job-hold-until-time" value is earlier than the "printer-current-time" value plus the minimum value of "job-hold-until-time-supported", the Printer MUST set the value of the Job's "job-hold-until-time" to the current dateTime plus the minimum time. Also, if the "job-hold-until-time" value is later than the "printer-current-time" value plus the maximum value of "job-hold-until-time-supported", the Printer MUST set the value of the Job's "job-hold-until-time" to the current dateTime plus the maximum time.

If the Job is accepted, the Printer then determines the state in which to place this Job. If the dateTime value is equal to or sooner than the Printer's "printer-current-time" dateTime value, then no hold is placed on the Job and the Job moves into the pending state (assuming there are no other reasons to hold the Job).

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If the value of this attribute specifies a time period that is in the future, the Printer 1) MUST add the 'job-hold-until-specified' value to the Job's "job-state-reasons" attribute, 2) MUST move the Job to the 'pending-held' state, and 3) MUST NOT schedule the Job for printing until the specified time arrives. When the specified time arrives, the Printer MUST remove the 'job-hold-until-specified' value from the Job's "job-state-reason" attribute and, and then if there are no other Job state reasons that keep the Job in the 'pending-held' state, the Printer MUST consider the Job as a candidate for processing by moving the Job to the 'pending' state.

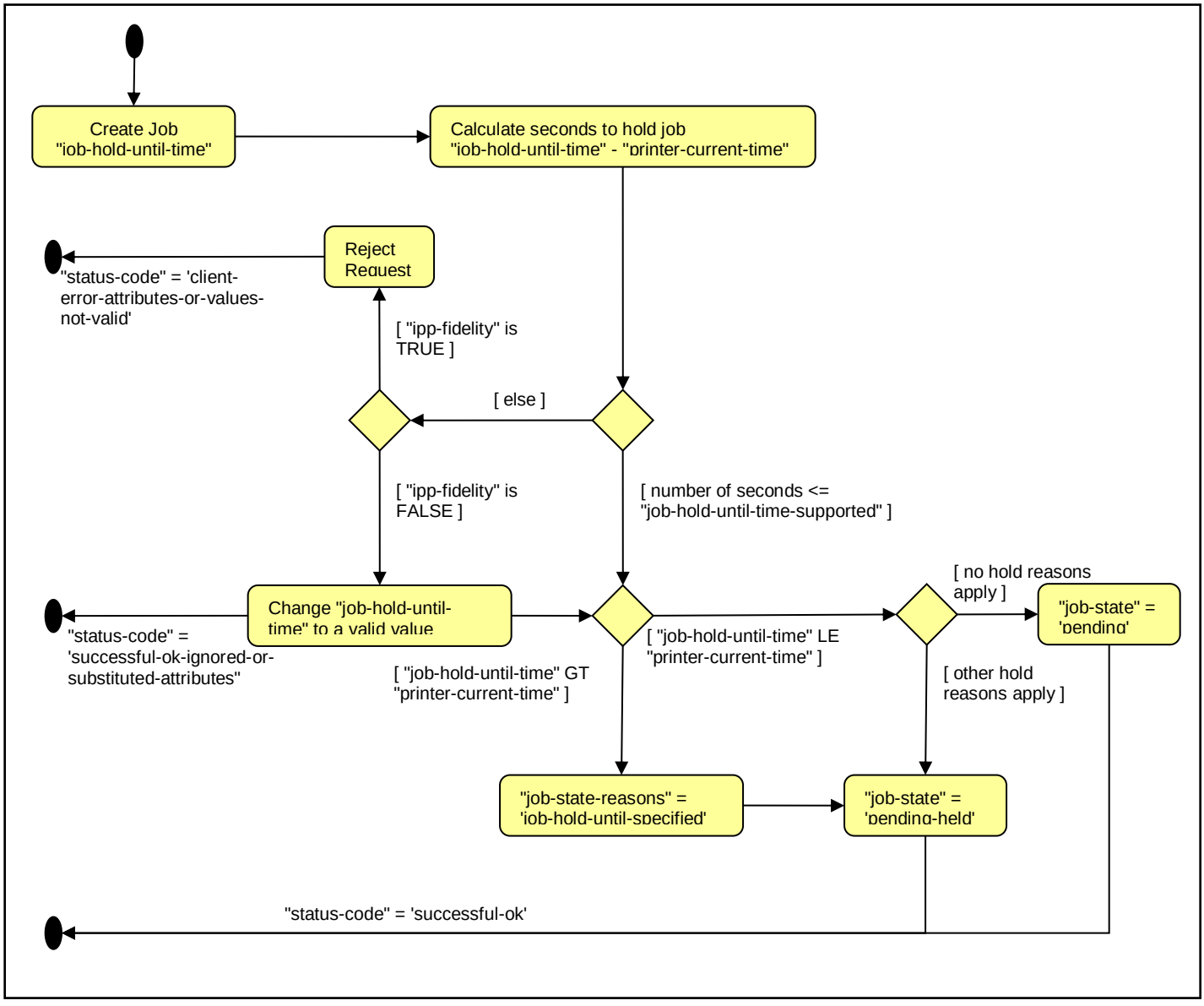


**Figure 3 - Job Creation Operation Flow Diagram with "job-hold-until-time" specified**

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Figure 4 below shows a Time Sequence Diagram for an implementation of 6 Jobs, where Job 1 is a Job Delay Output Job that processes the Job partly before the delay date-time arrives, Job 2 is a Hold Job, and Jobs 3 through 6 are ordinary print Jobs that complete successfully. Jobs 3-5 are submitted before either of the Job Hold Time (B) and the Job Delay Time (A) occurs. Job 6 is submitted after the Job Hold Time (B) but before the Job Delay Time (A) occurs. OPTIONAL "job-state-reasons" values are shown in parenthesis.

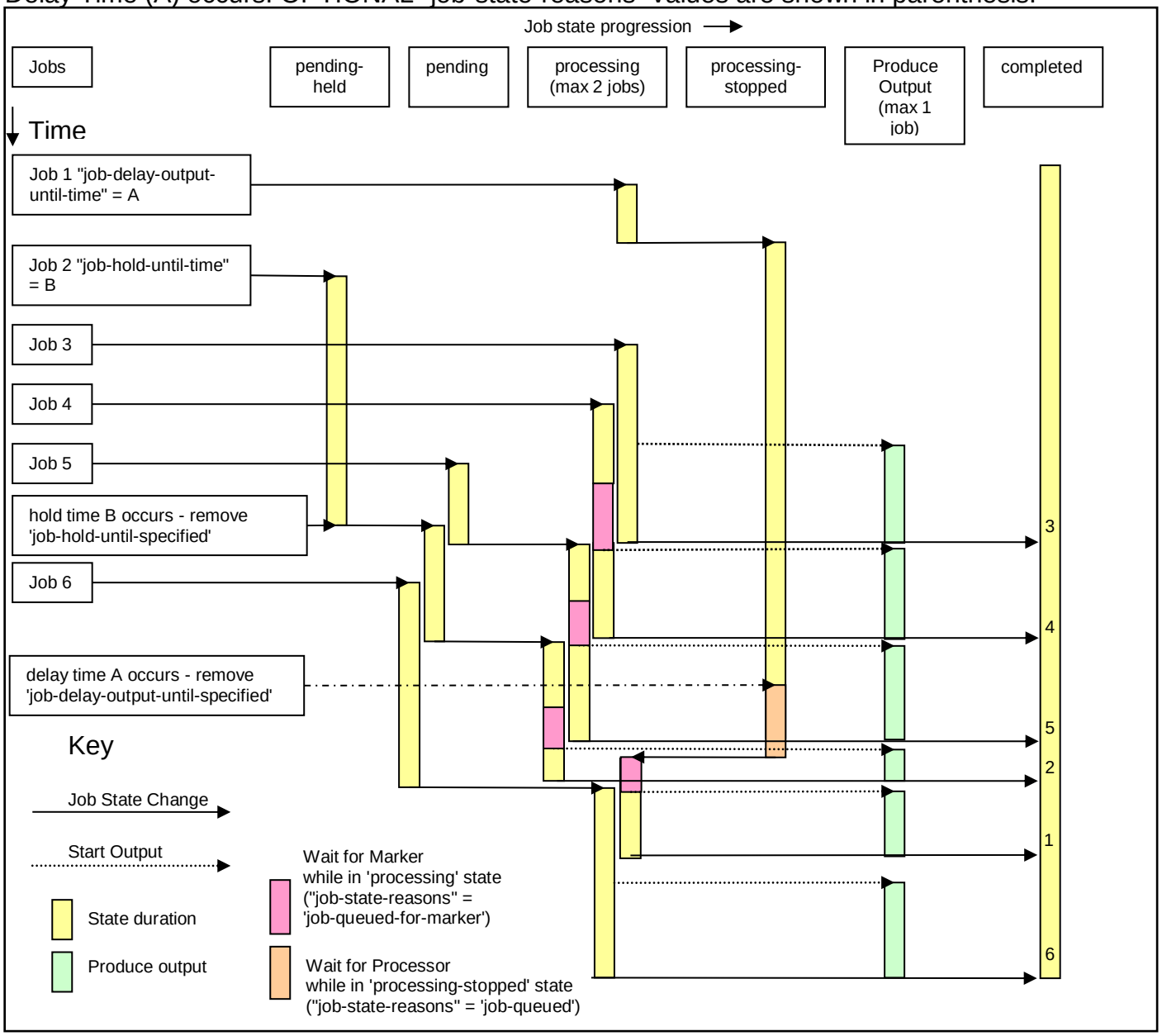


**Figure 4 - Time Sequence Diagram for 1 Hold, 2 Delay Output, and 4 normal Jobs**

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#### 5.3.6.1 Why there is no job-hold-until-time-default

There is no "job-hold-until-time-default" attribute because it would either be a fixed time in the future or would have to be updated periodically. Neither seem useful enough to be worth the complexity.

### 5.3.7 job-phone-number (uri)

This attribute contains the contact telephone number for the Job. If supported, the Printer MUST accept the ‘tel:’ URI scheme [RFC2806] and MAY accept other schemes, such as the ‘fax:’ scheme [RFC2806]. Any processing by the Printer of the “job-phone-number” attribute is implementation-dependent.

### 5.3.8 job-recipient-name (name(MAX))

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

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

### 5.3.9 job-save-disposition (collection)

This attribute is used to archive/save the Document Data of a job, such that the Job can be re-printed on demand at some undefined time in the future. See also section 4.3 of this specification for a detailed description of the Job Save and Reprint Feature. If the Printer supports the “job-save-disposition” attribute for Saving Jobs, then it MUST also support the “proof-print” attribute for proofing jobs. However, if the Printer supports the “proof-print” attribute, it NEED NOT support the “job-save-disposition” attribute.

If a Printer object is able to save a Job in a particular document format, the Printer MUST be able to process that document format for reprint using the Reprocess-Job and Resubmit-Job operations. See section 12.4 Conformance Requirements for the OPTIONAL "job-save-disposition" Job Template attribute for additional conformance requirements for clients and Printers.

#### 5.3.9.1 Interaction with "job-hold-until" and "job-hold-until-time"

The "job-hold-until" attribute causes the Job to be moved to the ‘pending-held’ state, which prevents processing of the job. The "job-save-disposition" attribute on the other hand does not become relevant until the Job is moved to the ‘processing’ state. These two attributes can be used together in the same Job Creation operation with no adverse interactions.

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976 The member attributes of the "job-save-disposition" attribute are:

977 **Table 5 - "job-save-disposition" member attributes**

| Member Attribute Name | Request | Printer Support |
|---|---|---|
| save-disposition | MUST | MUST |
| save-info | MAY | MUST |

978 **5.3.9.2 Interaction with "job-state-reasons"**

979 Many of the existing "job-state-reasons" attribute values can apply to a ‘save-only’ Job as
980 well as a Job submitted for printing. If the value of the “job-disposition” attribute is 'save-
981 only', the "job-state-reasons" attribute MAY be set with existing values such as 'job-
982 incoming', 'resources-are-not-ready' (such as a font), 'job-interpreting', and 'job-queued'.
983 Likewise, errors that occur on a saved Job MAY have existing "job-state-reasons" attribute
984 values such as 'job-data-insufficient', 'document-access-error', 'submission-interrupted', 'job-
985 canceled-by-user', 'aborted-by-system', etc.

986 There are also new four new "job-state-reasons" keyword values REQUIRED that support a
987 saved Job -- 'job-saving', 'job-saved-successfully', 'job-saved-with-warnings', and 'job-
988 saved-with-errors' -- and these have been added to the list defined above. The existing ‘job-
989 completed-successfully’, job-completed-with-warnings’, and ‘job-completed-with-errors’
990 values are also clarified in the list above for implementations that support the "job-save-
991 disposition" Job Template attribute, in such a way that these values remain compatible with
992 Printers and clients that do not support Job saving.

993 Table 14 enumerates the possible combinations of print and save success, warning, and
994 error conditions. Note that two values occur only when there are print warnings/errors and a
995 save error.

996 **Table 6 - Values of "job-state-reasons" attribute for various Job conditions**

| | Not saving | Save was successful | Save was unsuccessful |
|---|---|---|---|
| Not printing | <not possible> | 'job-completed-successfully' | 'job-saved-with-errors' |
| Print successful | 'job-completed-successfully' | 'job-completed-successfully' | 'job-saved-with-errors' |
| Print warnings | 'job-completed-with-warnings' | 'job-completed-with-warnings' | 'job-completed-with-warnings', 'job-saved-with-errors' |
| Print errors | 'job-completed-with-errors' | 'job-completed-with-errors' | 'job-completed-with-errors', 'job-saved-with-errors' |

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| | | | |
|---|---|---|---|
| Print warnings and errors | 'job-completed-with-errors' | 'job-completed-with-errors' | 'job-completed-with-errors', 'job-saved-with-errors' |

997 **5.3.9.3 save-disposition (type2 keyword)**

998 This member attribute specifies whether or not the Job MUST be printed and/or saved. When
999 a Job moves into the ‘processing’ state, the value of the member attribute "save-disposition"
1000 is checked to determine what is to happen during the ‘processing’ state.

1001 The "save-disposition" member attribute specifies processing steps that either MUST occur
1002 or that are prohibited. However, other processing steps MAY occur during the ‘processing’
1003 state, provided they are not prohibited by the value of the "save-disposition" member
1004 attribute.

1005 When a Saved Job is reprinted using any of the operations that reprint a Retained Job (e.g.,
1006 Reprocess-Job or Resubmit-Job), the Printer MUST NOT copy the “job-save-disposition”
1007 attribute from the Saved Job to the copy of the Saved Job so that the Job is not re-saved
1008 again. Note: the copy of the Saved Job will be saved again, if the Resubmit-Job operation
1009 supplies its own “save-job-disposition” attribute.

1010 Standard keyword values are:

| Keyword | Description |
|---|---|
| 'none' | The Printer MUST print the job. The Printer MUST NOT save any portion of the Job except for processing purposes. The Printer MUST NOT apply the "job-save-disposition-default" attribute.<br><br>If the print was successful, the Printer MUST add the ‘job-completed-successfully’ value to the job’s “job-state-reasons” attribute.<br><br>If the printing had (1) warnings or (2) errors (possibly with warnings), the Printer MUST add the ‘job-completed-with-warnings’ or ‘job-completed-with-errors’ value, respectively, to the job’s “job-state-reasons” attribute. |
| 'save-only' | The following constraints apply to the ‘processing’ of the job:<br>• The Job MUST NOT be printed.<br>• The Document Data MUST be saved to the location specified by the "save-location" member attribute.<br><br>The Printer’s Job scheduling algorithm MAY depend on whether or not the Job is ‘save-only’. However, the Printer MUST save the Job |

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while the Job is in the ‘processing’ state (the job’s “job-state” attribute is set to ‘processing’). Thus, the Printer MUST move the Job (typically from the ‘pending’ state) to ‘processing’ state and add the ‘job-saving’ value (see description of new "job-state-reasons" later in section 11.3) to the job’s “job-state-reasons” attribute.

When the Printer completes saving the job, the Printer MUST move the Job to the ‘completed’ state by setting the job’s “job-state” attribute to the ‘completed’ value and removing the ‘job-saving’ value (see description of new "job-state-reasons" later in section 11.3) from the job’s “job-state-reasons” attribute.

If the save was not successful, the Printer MUST add the 'job-saved-with-warnings' or ‘job-saved-with-errors’ value to the job’s “job-state-reasons” attribute (see description of new "job-state-reasons" later in section 11.3). If the Printer encounters an error during saving, such that a reprint of that Job using the Reprocess-Job (see section 4.3.1.1) or Resubmit-Job (see section 4.3.1.2) operations will not produce complete results, the Printer MUST reject the Reprocess-Job or Resubmit-Job with the error client-error-not-possible.

'print-save' The following constraints apply to the ‘processing’ of the job:

- The Job MUST be printed.
- The Document Data MUST be saved to the location specified by the "save-location" member attribute.

The order of the processing steps required for the ‘print-save’ disposition is implementation dependent. However, the Printer MUST save the Job during the same period that it prints the job, namely, while the Job is in the ‘processing’ state (the job’s “job-state” attribute is set to ‘processing’). Thus, the Printer MUST move the Job (typically from the ‘pending’ state) to ‘processing’ state and add the ‘job-printing’ and ‘job-saving’ value (see description of new "job-state-reasons" later in section 11.3) to the job’s “job-state-reasons” attribute at the appropriate times.

When the Printer completes saving the job, then the Printer MUST move the Job to the ‘completed’ state by setting the job’s “job-state” attribute to the ‘completed’ value and removing the ‘job-printing’ and ‘job-saving’ (see description of new "job-state-reasons" later in section 11.3) values from the job’s “job-state-reasons” attribute.

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If both the save and the print were successful, the Printer MUST add the ‘job-completed-successfully’ value to the job’s “job-state-reasons” attribute.

If the printing had (1) warnings or (2) errors (possibly with warnings), the Printer MUST add the ‘job-completed-with-warnings’ or ‘job-completed-with-errors’ value, respectively.

As with the ‘save-only’ value, if the save was not successful, the Printer MUST add the 'job-saved-with-warnings' or ‘job-saved-with-errors’ value to the job’s “job-state-reasons” attribute (see description of new "job-state-reasons" later in section 11.3).

#### 5.3.9.4 save-info (1setOf collection)

This member attribute is a collection that contains the attributes that tell the Printer how to save the job. This includes the format in which the Document Data MUST be saved, and the location to which these are saved. Multiple save locations or document formats MAY be saved by specifying multiple collections within this attribute.

If the Client supplies the “job-save-disposition” Job Template attribute but omits the “save-info” member attribute, the Printer supplies a single collection value for the “save-info” member attribute from the values of its “save-location-default” attribute, the job’s “job-name”, and its “save-document-format-default” attribute (see descriptions immediately below).

A Client MUST supply in a request a number of collections not to exceed the maximum number supported specified in the "max-save-info-supported" Printer Description attribute (see "max-save-info-supported" description in section 10.6). As with any Job Template attribute, if the Client does supply more values than the Printer supports and the values of the “ipp-attribute-fidelity” is ‘false’ (or omitted), the Printer MUST accept the job, return the ‘successful-ok-ignored-or-substituted-attributes’ status code, return the ignored values in the Ignored Attributes group, use the first n values, and ignore the remaining values. If the Client does supply more values than the Printer supports and the values of the “ipp-attribute-fidelity” is ‘true’, the Printer MUST reject the request and return the ‘client-error-request-entity-too-large’ status code.

The "save-info" collection member attributes are:

**Table 7 - "save-info" member attributes**

| Member Attribute Name | Request | Printer Support |
|---|---|---|
| save-location | MUST | MUST |

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| | | |
|---|---|---|
| save-name | MAY | MAY |
| save-document-format | MAY | MUST |

#### 5.3.9.4.1 save-location (uri)

This member attribute specifies the path to the directory as a URI where the Printer MUST save the Document Data and other information.

The "save-location" and (“save-location-default” and “save-location-supported”) attribute value MUST be an Absolute URI [RFC2396]. Absolute URIs are specified with a URI scheme, an optional authority component, and an absolute path (e.g., ‘ftp://printhost.printco.com/var/spool/jobdir/’ or ‘file:///job-repository/jobdir/’).

Note: As any other member attribute of a Job Template attribute, the Printer validates the “save-location” member attribute as follows: If the Client supplies the “save-location” member attribute, the value MUST match one of the values of the Printer’s “save-location-supported” (1setOf uri) attribute. If the value does not match, the Printer’s action depends on the value of the job’s “ipp-attribute-fidelity” (boolean) attribute: If “ipp-attribute-fidelity” is ‘false’ or omitted, the Printer MUST accept the job, return the ‘successful-ok-ignored-or-substituted-attributes’ status code, return the ignored attributes in the Unsupported Attributes Group, and perform one of the following actions DEPENDING ON IMPLEMENTATION:

1. Ignore the attribute and not save the job;
2. Put the Job in the ‘held’ state and let the operator fix the problem, either by changing the job’s “save-location” attribute value or adding the value to the Printer’s “save-location-supported” attribute; or
3. Substitute the job’s “save-location” value with one of the values of the Printer’s “save-location-supported” values.

If “ipp-attribute-fidelity” is ‘true’, the Printer MUST reject the request, return the ‘client-error-attributes-or-values-not-supported’ status code, along with the “job-save-disposition” attribute in the Unsupported Attributes Group.

If the Client wants to put the saved Job in a sub-directory (whether it exists or not) of one of the directories specified by the “save-location-supported” Printer attribute, the Client supplies that sub-directory name as part of the “save-name” attribute (see "save-name" description below), not as part of the “save-location” member attribute.

Note: As with any other ‘name’, ‘integer’, ‘uri’, or ‘collection’ Job Template or Job Template member attribute, the administrator can suspend validation by configuring the Printer’s “user-defined-values-supported” attribute with the ‘save-location’ keyword (see “user-defined-values-supported” description in [PWG5100.3]), so that the user can specify an arbitrary path and the Printer will accept the job. If the Printer cannot process the Job using the specified value for "save-location", then the Printer MUST hold the Job so that an operator can attempt to create the

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necessary sub-directories to populate the path, if they don't already exist, or change the job's "save-location" attribute value. See Table 10 below entitled "Printer actions for various Job and Printer attribute values", at the end of the "job-save-disposition" description.

If the Client supplies the "save-info" member attribute but omits the "save-location" member attribute, the Printer supplies the "save-location" member attribute value from its "save-location-default" attribute (see "save-location-default" description below).

Table 8 lists the URI Schemes defined for use in the "save-location" member attribute.

**Table 8 - URI Schemes for "save-location" member attribute**

| URI Scheme | Description | Printer Support |
|---|---|---|
| ftp | Use IETF FTP protocol [RFC959], [RFC2228], [RFC2640] | MUST |
| file | Use the Printer's configured file system. Since the 'file:' URI scheme cannot be separated from the Printer object's native file system, the semantic of the 'file:' URI scheme is IMPLEMENTATION DEPENDENT. Also, the 'file:' URI scheme on some Printer objects MAY be limited to the local file system, while on other Printer objects it MAY be configured to use a network file system.<br><br>The Printer implementation MAY allow the system administrator to configure where the 'file:' scheme is based in the file system. However, the base for the 'file:' scheme MUST be the same as for all other uses of the 'file': scheme, such as the value of the "document-uri" operation attribute in a Printer-URI operation [STD92]. | MAY |
| http | Use HTTP protocol with the Put operation to save the job. | MUST |

It is RECOMMENDED that for each URI scheme supported for saving jobs, that all of these values have the first token in the file path be 'job-repository'. Then an administrator that has to manage the saved jobs for several Printers will have a consistent naming schemes for locating all the saved jobs by whatever means used to access the saved jobs. For example, for the 'file:' scheme, all of the values SHOULD start out with: file:///job-repository/ and for the 'ftp:' scheme, all of the values SHOULD start out with: ftp://xxx/job-repository/. (Note: in URIs, the final "/" is redundant, and the Printer MUST behave the same whether or not the final "/" is present).

#### 5.3.9.4.2 save-name (name(MAX))

This member attribute specifies the name of the saved Job in the directory specified by the "save-location" member attribute. The Client can supply a "save-name" attribute value that is either a simple file name or a relative path where each component of the path is separated by a FORWARD SLASH ("/") character. The "save-name-subdirectory-supported" Printer

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Description attribute indicates whether or not the Printer supports a FORWARD-SLASH (“/”) in the “save-name” value. Whether the FORWARD SLASH when supported is actually implemented as a sub-directory is IMPLEMENTATION DEPENDENT.

There is no requirement that the "save-name" attribute value in combination with the "save-location" attribute value specify an identification that is unique. Thus, if the "save-name" attribute value in combination with the "save-location" attribute value specifies a handle that already exists, the Printer MUST accept the Job and save the Job with the duplicate “save-name” value. This requirement is because a Saved Job is referenced for re-printing using the “job-id” attribute value assigned by the Printer that is unique at least with respect to that Printer.

If the “save-name” member attribute is not specified by the Client in the “job-save-disposition” Job Template attribute, the Printer object MUST generate a “save-name” attribute value for the Job using the job’s “job-name” attribute value.

> Note: Printers MUST generate a “job-name” value, when the Client does not supply a “job-name” operation attribute [STD92], to ensure there is always a “job-name” value.

#### 5.3.9.4.2.1 Why there is no “save-name-default” Printer attribute

There is no “save-name-default”. If the Client omits the “save-name” member attribute when supplying the “save-info” member attribute, the Printer uses the job’s “job-name” attribute as the value of the “save-name” attribute (described above).

#### 5.3.9.4.3 save-document-format (mimeMediaType)

This member attribute indicates the document format in which the Job content (Document Data) MUST be saved. If the "job-save-disposition" attribute is supported, the Printer object MUST support the "save-document-format" member attribute.

If the Client supplies the “save-info” member attribute but omits the “save-document-format” member attribute, the Printer MUST use the value of its “save-document-format-default” attribute (see above "save-info" description).

Although there can be a many-to-one relationship of documents to a job, all documents in a Job specified with a disposition of 'save' or 'print-save' MUST be saved in the same format as specified by the "save-document-format" attribute value. A Job MAY be saved to multiple formats by specifying multiple collection values for the "save-info" member attribute.

The “job-save-disposition” member attribute (and the “save-document-format” member attribute) is NOT defined to be used with the “page-overrides” attribute (see [PWG5100.6]). Thus, all documents MUST be saved in the same document format in each saved job.

The ‘mimeMediaType’ values defined for the “save-document-format” attribute are listed below. All values MUST include saving PDL data. A Printer MUST support at least one value.

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However, at this time, this specification does NOT REQUIRE a Printer to support any particular formats for saving jobs.

If the saved Job is submitted to a different make-and-model Printer that supports the same document-format (i.e., the same value of the “document-format” operation attribute in the Document Creation request), then the Printer MUST be able to print the job, but the output cannot be guaranteed to appear exactly the same as the original output.

| MIME Media Type | Description |
|---|---|
| **Any PDL document format** | If any PDL document-format value is supplied from the Printer’s “document-format-supported” attribute, such as ‘application/postscript’, then the Printer MUST save the PDL data in that document format.<br><br>Printer implementations are free to store the saved data in any form they want for convenient, fast, and/or compact re-printing using Reprocess-Job or Resubmit-Job, and NEED NOT be identified by a distinct mimeMediaType value in the “save-document-format-supported” Printer attribute.<br><br>The ‘application/octet-stream’ value MUST NOT be supplied for this attribute since it doesn’t make any sense for saving jobs. |

The referenced specifications that define the saved format MUST meet the conformance requirements listed in section 12.4.2.1.

#### 5.3.9.4.4 Printer actions for various combinations of attributes

This section lists the Printer actions for various combinations of "save-location" (uri), "save-name" (name(MAX)), "save-location-supported" (1setOf uri), existing saved jobs, ipp-attribute-fidelity (boolean), "user-defined-values-supported" (1setOf keyword) and Printer actions.

The possible Printer actions are (see above descriptions of "save-location" and "save-name" for details):

1. reject: The Printer rejects the Job Creation request, returns the ‘client-error-attributes-or-values-not-supported’ status code and the “job-save-disposition” attribute and value in the Unsupported Attributes group.

2. accept-save: The Printer accepts the Job Creation request, returns the ‘successful-ok’ status code, and attempts to create all necessary files and sub-directories.

3. accept-substitute: The Printer accepts the Job Creation request, returns the ‘successful-ok-ignored-or-substituted-attributes’ status code and the “job-save-

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disposition" attribute and value in the Unsupported Attributes group, and, DEPENDING ON IMPLEMENTATION: (1) ignores the attribute and does not perform the save, (2) puts the Job in the 'held' state and let the operator fix the problem, either by changing the job's "save-location" attribute value or adding the value to the Printer's "save-location-supported" attribute, or (3) substitutes the job's "save-location" value with one of the values of the Printer's "save-location-supported" values.

4. accept-hold: The Printer accepts the Job Creation request, returns the 'successful-ok' status code, and holds the Job for the operator to resolve the conflict so that the Job can be saved.

Table 10 shows the Printer actions for the various possible value combinations of the other Job and Printer attributes. In the example, there is already one saved job: 'a/bar'. The Printer supports three save-location directories: a, b, c.

**Table 9 - Printer actions for various Job and Printer attribute values**

| MIME Media Type | save-name | save-location-supported | existing saved jobs | ipp-attribute-fidelity | user-defined-values-supported | Printer action |
|---|---|---|---|---|---|---|
| a | foo | a,b,c | a/bar | T \| F | none | accept-save |
| a | d/foo | a,b,c | a/bar | T \| F | none | accept-save |
| a | bar | a,b,c | a/bar | T \| F | none | accept-hold |
| d | foo | a,b,c | a/bar | F | none | accept-substitute |
| d | foo | a,b,c | a/bar | T | none | reject |
| | | | | | | |
| a | foo | a,b,c | a/bar | T \| F | save-location | accept-save |
| a | d/foo | a,b,c | a/bar | T \| F | save-location | accept-save |
| a | bar | a,b,c | a/bar | T \| F | save-location | accept-hold |
| d | foo | a,b,c | a/bar | F | save-location | accept-hold |
| d | foo | a,b,c | a/bar | T | save-location | accept-hold |
| a/d | foo | a,b,c | a/bar | F | save-location | accept-hold |
| a/d | foo | a,b,c | a/bar | T | save-location | accept-hold |

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#### 5.3.9.4.5 Why there is no save-info-default Printer Description attribute

There is no “save-info-default” Printer attribute. If the Client supplies the “job-save-disposition” Job Template attribute but omits the “save-info” member attribute, the Printer creates a single collection value for the “save-info” member attribute using from the Printer’s “save-location-default” and “save-document-format-default” Printer attributes and the job’s “job-name” attribute (see "save-info" description above).

### 5.3.10 media-col (collection)

The following member attributes in Table 15 and their semantic descriptions have been added to the existing IPP “media-col” Job Template attribute [PWG5100.3].

**Table 10 - Additional "media-col" member attributes**

| Member Attribute Name | Request | Printer Support |
|---|---|---|
| media-tooth | MAY | MAY |
| media-grain | MAY | MAY |
| media-thickness | MAY | MAY |

These additional "media-col" collection member attributes definitions are:

#### 5.3.10.1 media-tooth (type2 keyword | name(MAX))

The "media-tooth" member attribute indicates the desired tooth (or roughness) of the media being specified. The source for this attribute is [ISO10175].

The tooth of a medium is particularly important for those marking engines that use pens (e.g. plotters) to mark the medium. The type of pen used shall match the tooth of the medium for best resolution.

Standard keyword values for "media-tooth" are:

| Keyword | Description |
|---|---|
| 'antique' | Rougher than vellum surface [1] |
| 'calendared' | Extra smooth or polished uncoated paper [1] |
| 'coarse' | The specified media should have a coarse tooth or rough finish. |
| 'fine' | The specified media should have a fine tooth or smooth finish. |
| 'linen' | Texture of coarse woven cloth [1] |
| 'medium' | The specified media should have a medium tooth or regular finish. |

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| | |
|---|---|
| 'smooth' | Smooth [1] |
| 'stipple' | Fine pebble finish [1] |
| **'uncalendared'** | Rough, unpolished and uncoated papers [1] |
| 'vellum' | Slightly rough surface [1] |

[1] - From [JDF1.4] Media/@Texture attribute

The Administrator can define a custom media tooth using the 'name' (MAX) attribute syntax of the "media-tooth-supported" (1setOf (type2 keyword | name(MAX))) Printer attribute. Note: as with other Job Template and member attributes, the user can also supply user-defined tooth names that are not among the values of the “media-tooth-supported” Printer attribute, if the Administrator has configured the Printer's "user-defined-values-supported" attribute (see [PWG5100.3]) to contain the 'media-tooth' attribute keyword value.

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

The "media-tooth-supported" (1setOf (type2 keyword | name(MAX))) Printer attribute identifies the values of this "media-tooth" member attribute that the Printer supports, i.e., the media tooth supported.

### 5.3.10.2 media-grain (type2 keyword | name(MAX))

The "media-grain" member attribute indicates the desired grain of the media being specified. The source for this attribute is [ISO10175].

Grain affects the curl and the folding of the medium. Some marking engines are sensitive to the resulting curl. Standard keyword values for "media-grain" are:

| Keyword | Description |
|---|---|
| 'x-direction' | The direction of the paper fibers is in the short dimension (i.e. the x-direction) of the medium. |
| 'x-direction' | The direction of the paper fibers is in the long dimension (i.e. the y-direction) of the medium. |

See section 2.4 of [PWG5100.3] regarding the coordinate system.

The Administrator can define a custom media grain using the 'name' (MAX) attribute syntax of the "media-grain-supported" (1setOf (type2 keyword | name(MAX))) Printer attribute. Note: as with other Job Template and member attributes, the user can also supply user-defined grain names that are not among the values of the “media-grain-supported” Printer attribute, if the Administrator has configured the Printer's "user-defined-values-supported" attribute (see [PWG5100.3]) to contain the 'media-grain' attribute keyword value.

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

The "media-grain-supported" (1setOf (type2 keyword | name(MAX))) Printer attribute identifies the values of this "media-grain" member attribute that the Printer supports, i.e., the media grain supported.

The Administrator can define custom media types using the 'name' (MAX) attribute syntax of the "media-supported" (1setOf (type2 keyword | name(MAX))) Printer attribute. Note: as with other Job Template and member attributes, the user can also supply user-defined material names that are not among the values of the “media-supported” Printer attribute, if the Administrator has configured the Printer's "user-defined-values-supported" attribute (see [PWG5100.3]) to contain the 'media' attribute keyword value.

### 5.3.10.3 media-thickness (integer(1:MAX))

The "media-thickness" member attribute indicates the thickness of the media being specified. The source for this attribute is JDF v1.0.

The unit of measure for the "media-thickness" member attribute is one hundredth of a millimeter. This unit is equivalent to 1/2540th of an inch resolution.

#### 5.3.10.3.1 media-thickness-supported (rangeOfInteger(1:MAX))

The "media-thickness-supported" (rangeOfInteger(1:MAX)) Printer attribute identifies the values of this "media-thickness" member attribute that the Printer supports.

### 5.3.11 pdl-init-file (1setOf collection)

This attribute controls initialization of the Printer’s Page Description Language (PDL) interpreter. This attribute specifies the files that the Printer uses to initialize the PDL interpreter before it starts interpreting each Input Document (i.e. file) in a Job with one exception. When the value of "multiple-document-handling" is 'single-document' or ‘single-document-new-sheet’, a PDL interpreter processes all of the Input-Documents of a Job as if the Input Documents were a single file. In this case, the PDL interpreter is initialized just before processing the first Input Document only.

Some PDLs (i.e. PostScript and HP PCL) have the ability to define reusable macros, code fragments, fonts, and other resources. These components may reside either within the body of the document file to be printed or within files that can be sent to the Printer’s PDL interpreter separately. Having the ability to send these “pre-initialization” (prep) files separately from the main body of the Job to be printed, enables an application to “pre-condition” the PDL interpreter with these definitions ahead of time. This in turn makes it possible to reduce the size of a given document data file to be printed and to reuse the components on other jobs.

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The exact mechanism by which an initialization file (or list of initialization files) is installed on the Printer is implementation dependent and outside of the current scope of IPP.

Upon receipt of the "pdl-init-file" collection attribute(s) the Printer will send the initialization file (or list of files) referenced to the Printer's PDL interpreter for processing BEFORE starting to process the document(s) attached to the Job (in the Print-Job request) or referenced by the Job (in the Print-URI request).

If the Printer receives more than one "pdl-init-file" collection in a given print request, then the list of initialization files will be sent to the Printer's PDL interpreter in the order that they are encountered in the Job Template attributes.

Table 11 lists the member attributes of the "pdl-init-file" Job Template attribute and specifies whether Clients MUST supply them in collection values and whether Printers MUST support them if supporting this collection attribute. The following sub-sections define these member attributes.

**Table 11 - "pdl-init-file" member attributes**

| Member Attribute Name | Request | Printer Support |
|---|---|---|
| pdl-init-file-location | MAY | MUST |
| pdl-init-file-name | MUST | MUST |
| pdl-init-file-entry | MAY | MAY |

### 5.3.11.1 pdl-init-file-location (uri)

This member attribute must be an Absolute URI [RFC 2396] that specifies the path to the directory where the initialization file to be sent to the Printer's PDL interpreter will be found. According to RFC 2396, an Absolute URI MUST have a URI scheme, MAY have an authority (host name) component, and MUST have an absolute path (e.g., 'ftp://printhost.printco.com/var/spool/jobinitfiledir/initfile1' or 'file:///jobinitfiledir/initfile1').

### 5.3.11.2 pdl-init-file-name (name(MAX))

This member attribute specifies the name of the initialization file within the directory specified by the "pdl-init-file-location" member attribute that the Printer MUST send to its PDL interpreter prior to processing the document.

The "pdl-init-file-subdirectory-supported" Printer Description attribute indicates whether or not the Printer supports a FORWARD-SLASH ("/") in the "pdl-init-file-name" value. Whether the FORWARD SLASH when supported is actually implemented as a sub-directory is IMPLEMENTATION DEPENDENT.

A well-formed request MUST include at least the name of the initialization file to be used (i.e. the "pdl-init-file-location" or directory containing the initialization file need not be supplied

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by the Client and in fact, might not be known to the client). The Client can supply a "pdl-init-file-name" attribute value that is either a simple file name or a relative path where each component of the path is separated by a FORWARD SLASH (“/”) character. The "pdl-init-file-name" member attribute value concatenated with the “pdl-init-file-location” attribute value (supplying a “/” between them, if necessary) specifies the initialization file to be used. For example, if “pdl-init-file-location” is ‘a/b’ or ‘a/b/’ and "pdl-init-file-name" is ‘c/d’, the resulting file path is: ‘a/b/c/d’.

#### 5.3.11.3 pdl-init-file-entry (name(MAX))

This member attribute is an optional member of the collection that, if present, specifies an entry point within the init file that the PDL interpreter starts at.

### 5.3.12 proof-print (collection) REQUIRED Job Template attribute

This attribute allows a user to specify the attributes of the proof print(s) of the Job that are to be printed prior to the printing the full run of the job. After the proof prints have been produced, the Printer MUST retain the completed Job as a Proof Print Job for a period of time sufficient to allow users to proof the job, rather than aging it out after an implementation-defined period which SHOULD be longer than the period for ordinary completed jobs [STD92]. When a Proof Print Job is reprinted using any of the operations that reprint a Retained Job (e.g., Reprocess-Job or Resubmit-Job), the Printer MUST NOT copy the “proof-print” attribute from the Proof Print Job to the copy of the Proof Print Job so that the Job is not re-proofed again. Only if the Resubmit-Job operation supplies its own “proof-print” attribute, will the copied Job be proofed. .

A Client MUST be able to supply and a Printer MUST support this attribute in order to claim support of this IPP Job and Printer Extensions – Set 2 v2.0 Specification, respectively. See section 12.5 Conformance Requirements for the REQUIRED "proof-print" Job Template attribute for additional conformance requirements for clients and Printer.

Table 12 lists the member attributes of the "job-sheets-col" collection attribute:

**Table 12 - "proof-print" member attributes**

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

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### 5.3.13 proof-print-copies (integer (0:MAX))

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

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

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

### 5.3.14 media (type2 keyword | name(MAX)) or media-col (collection)

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

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

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

Since this "media-col" member attribute has the same name as the "media-col" Job Template attribute [PWG5100.3], the "media-col-supported" Printer attribute identifies the keyword names of the member attributes supported in this "media-col" member attribute (as well as the keyword names of the "media-col" Job Template attribute), i.e., the names of the member attributes that the Printer supports.

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## 5.4 Printer Description Attributes

### 5.4.1 feed-orientation-default (type2 keyword)

This attribute specifies the default value of "feed-orientation" when not supplied in a request. This default depends upon the media-size being requested and is Printer implementation dependent upon how the default value is calculated.

### 5.4.2 feed-orientation-supported (1setOf (type2 keyword))

This attribute specifies which values of "feed-orientation" that the Printer supports.

### 5.4.3 font-name-requested-default (name(MAX))

This attribute specifies the default value of "font-name-requested" when not supplied in a request.

### 5.4.4 font-name-requested-supported (1setOf name(MAX))

This attribute specifies which values the Printer supports for the "font-name-requested" Job Template attribute.

### 5.4.5 font-size-requested-default (integer (1:MAX))

This attribute specifies the default value of "font-size-requested" when not supplied in a request.

### 5.4.6 font-size-requested-supported (1setOf rangeOfInteger (1:MAX))

This attribute specifies which values or ranges of values the Printer supports for the "font-size-requested" Job Template attribute.

### 5.4.7 job-creation-attributes-supported (1setOf type2 keyword)

This attribute enables a Client to query the Printer for the set of Job attributes that can be set by the Client during a Create-Job, Print-Job, Validate-Job, or Print-URI operation.

This attribute allows the Client to dynamically determine all the Job attributes that it can specify at the time of Job creation.

The list of attribute names in “job-creation-attributes-supported” MUST include:

- All Job Template attributes that may be supplied by the Client at the Job level
- All operation attributes that are written to the Job object as Job Description attributes (e.g., "job-name") at the Job level

The list of attribute names in “job-creation-attributes-supported” MUST NOT include:

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- Collection member attribute names

  Note: The Client can determine which member attributes of “xxx” collection attributes are supported by querying the “xxx-supported” Printer attribute (see [RFC3382]).

- Operation attributes that are not Job attributes

  Note: The only mechanism previously available for a Client to query the Printer for supported attributes is to specify the ‘job-template’ group value on a Get-Printer-Attributes operation. This has been problematic because: 1) it returns the entire list of “xxx-default” and “xxx-supported” attributes and values which will be excessively burdensome for production printing systems with extensive functionality, and 2) it does not include operation attributes that are written to the Job object as Job description attributes (i.e., "job-name").

  Note: See also the description of the Get-Printer-Attributes operation [STD92] and the distinction between "xxx-default", "xxx-ready", and "xxx-supported" attributes when "xxx" is any Job Template attribute that a Client can supply as a top-level attribute vs. (see [RFC3382]) when "xxx" is a member attribute for a Job Template 'collection' attribute (e.g. The "media-color-supported" Printer attribute lists the values of the “media-color” member attribute of the “media-col” collection attribute, but does not belong to the 'job-template' attribute group, or to the ‘printer-description’ attribute group).

### 5.4.8 job-ids-supported (boolean)

This attribute indicates whether the Printer supports the “job-ids” Operation in the following existing operations: Purge-Jobs (if supported) and Get-Jobs. A Printer MUST support the "job-ids-supported " Printer Description attribute in order to claim support of this Job and Printer Extensions - Set 2 Specification.

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

This attribute specifies the default value supplied by the Printer if the Client omits the ‘job-delay-output-until” Job Template attribute.

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

This attribute specifies the values supported by the Printer for the "job-delay-output-until" Job Template attribute. See the values defined for the "job-hold-until" Job Template attribute [STD92].

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

This attribute specifies the span of relative amount of time in seconds into the future that the Printer supports keeping the output from being produced. The Printer MUST use the time range to validate a Job that is submitted with a “job-delay-output-until-time” attribute.

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### 5.4.12 job-hold-until-time-supported (rangeOfInteger(0:MAX))

This attribute specifies the span of relative amount of time in seconds into the future that the Printer supports keeping the submitted Job in the 'pending-held' state. The Printer MUST use the time range to validate a Job that is submitted with a "job-hold-until-time" attribute.

### 5.4.13 job-password-supported (integer(0:255))

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

### 5.4.14 job-password-encryption-supported (1setOf (type2 keyword | name(MAX)))

This attribute specifies which encryption methods the Printer supports for Secure Print.

If the "job-password" operation attribute is supported, then this attribute MUST be supported. Standard keyword values are:

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

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

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[1] - Deprecated

### 5.4.15 job-phone-number-default (uri)

This attribute specifies the Printer's default value for "job-phone-number" that the Printer will apply to a Job if the Client omits the ‘job-phone-number” Job Template attribute.

### 5.4.16 job-phone-number-supported (boolean)

This attribute, when supported and its value is 'true', indicates that the Printer accepts the “job-phone-number” attribute.

### 5.4.17 job-recipient-name-default (name(MAX))

This attribute specifies the Printer's default value for "job-recipient-name" that the Printer will apply to a Job if the Client omits the ‘job-recipient-name” Job Template attribute.

### 5.4.18 job-recipient-name-supported (boolean)

A true value indicates that the Printer accepts the “job-recipient-name” attribute.

### 5.4.19 job-save-disposition-default (collection)

The "job-save-disposition-default (collection)" attribute specifies the “job-save-disposition” member attributes and values that the Printer will provide, if any, if the Client omits the "job-save-disposition" collection attribute. A Printer MUST support the same member attributes for these default attributes as it supports for the corresponding Job Template attributes (see Table 7).

The "save-info" (1setOf collection) member attribute of the “job-save-disposition-default” Printer attribute specifies the save information member attributes and values that the Printer will provide, if any, if the Client omits the “job-save-disposition” Job Template attribute entirely. A Printer MUST support the same member attributes for these default attributes as it supports for the corresponding Job Template attributes (see Table 7 and Table 8), with the single exception, that the “save-name” member attribute MUST NOT be supported (since the Printer MUST use the “job-name” attribute to generate the default “save-name”).

If the Client supplies the “job-save-disposition” Job Template attribute, but omits the “save-info” member attribute, the Printer uses its “save-location-default” and “save-disposition-default” Printer attributes and the job’s “job-name” attribute to create the job’s “save-info” member attribute, rather than using the “save-info” member attribute of the Printer’s “job-save-disposition-default” attribute (see "save-info" description above).

### 5.4.20 job-save-disposition-supported (1setOf type2 keyword)

The "job-save-disposition-supported (1setOf type2 keyword)" attribute identifies the names of the member attributes supported in the "job-save-disposition" collection attribute, i.e., the names of the member attributes in Table 7 that the Printer supports. The RECOMMENDED

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1443 way for a Client to determine whether or not a Printer support saving jobs, is to query this
1444 Printer attribute.

1445 **5.4.21 job-spooling-supported (type2 keyword)**

1446 This attribute indicates whether or not jobs are spooled before the document data is
1447 interpreted (RIPped). In other words, this attribute indicates when jobs are processed by the
1448 Printer with respect to when the Printer receives and returns responses to Job Creation
1449 requests (i.e., Print-Job, Print-URI), receives and returns responses to Document Creation
1450 requests (i.e., Send-Document and Send-Uri requests) and "receives" or "fetches" such
1451 document data.

1452 The value of this attribute returned in a Get-Printer-Attributes response MAY depend on the
1453 "document-format" attribute supplied in the Get-Printer-Attributes request [STD92]. If the
1454 Printer does not support this attribute, then the spooling behavior is implementation
1455 dependent.

1456 The Get-Printer-Supported-Values operation [RFC3380] returns a '1setOf type2 keyword' so
1457 that all possible values that the implementation is capable of supporting are indicated.

1458 The standard keyword values are:

| Keyword | Description |
|---|---|
| 'spool' | The Printer starts processing a Job until the Printer has (1) accepted and responded to the Job Creation request and all Document Creation requests (for a multi-document job) and (2) has "received" or "fetched" all document data for the job, i.e., spool rather than stream. |
| 'stream' | The Printer starts processing a Job (1) before the Printer has accepted all Document Creation requests and (2) before the Printer has "received" or "fetched" all document data, i.e., stream rather than spool. |
| 'automatic' | The Printer chooses whether to process a Job before or after the Printer has accepted all Document Creation requests and has "received" or "fetched" all document data, i.e., the Printer MAY spool and/or stream depending on policy and other factors, such as the document format, including a combination of spooling and streaming. |

1459 **5.4.22 max-save-info-supported (integer(1:MAX))**

1460 The "max-save-info-supported" Printer Description attribute specifies the maximum number
1461 of “save-info” member attribute collections that a Printer can accept in a Job request. If the
1462 number of “save-info” member attribute collections supplied by a Client in a Job Creation

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operation exceeds the value of this attribute, the Printer MUST accept or reject the request as described in the "save-info" description in the "job-save-disposition" description (see description in section 7.9). If the Printer only supports one “save-info” collection, then the Printer MAY either (1) support this attribute with a value of ‘1’ or (2) omit support of this attribute. The RECOMMENDED way for a Client to determine whether or not a Printer supports saving jobs, is to query the “job-save-disposition-supported” Printer attribute (see description in section 7.9.3).

### 5.4.23 media-col-database (1setOf collection)

The OPTIONAL "media-col-database" Printer Description attribute enables a Client to query the set of pre-defined media collections available in the printer’s media database, if the “media-col” attribute is supported. This attribute is identical in format and syntax to “media-col-ready” but returns the entire set of pre-defined media collections known by the Printer instead of just the media collections currently in the Printer trays. If this attribute is supported, the members of the collections correspond to the supported members of the “media-col” attribute.

The Printer MUST NOT return this attribute in the response to the Get-Printer-Attributes operation when the Client requested the 'all' or 'printer-description' group names. Therefore, the Client must request this attribute explicitly in order to get the media collections. The reason for this recommendation is that the amount of data returned in the response would be very large when combined with all of the other attributes.

### 5.4.24 pdl-init-file-location-supported (1setOf uri)

The "pdl-init-file-location-supported (1setOf uri)" Printer attribute specifies the path(s) to the directory (directories) of the supported initialization file(s) that the Client MAY ask the Printer to send to its PDL interpreter prior to processing the document.

### 5.4.25 pdl-init-file-name-supported (1setOf name(MAX))

The "pdl-init-file-name-supported (1setOf name(MAX))" Printer attribute specifies the name(s) of the supported initialization file(s) that the Client MAY ask the Printer to send to its PDL interpreter prior to processing the document.

### 5.4.26 pdl-init-file-name-subdirectory-supported (boolean)

The “pdl-init-file-name-subdirectory-supported” (boolean) Printer Description attribute indicates whether or not the Printer will accept a FORWARD SLASH (“/”) character in the value of the “pdl-init-file-name” member attribute. If the value is ‘false’ and the Client supplies a FORWARD-SLASH (“/”) in the “save-name” value, the Printer MUST reject the request and return the ‘client-error-attributes-or-values-not-supported’.

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### 5.4.27 pdl-init-file-default (1setOfcollection)

The "pdl-init-file-default" Printer Description attribute collection specifies the default initialization file (or list of files) and related information that the Printer will use if the Client omits the "pdl-init-file" Job Template attribute in a Job Creation operation. The member attributes are defined in Table 11. A Printer MUST support the same member attributes and values for this default collection attribute as it supports for the corresponding "pdl-init-file" Job Template attribute.

A "pdl-init-file-name" within "pdl-init-file-default" collection with a “0 length value” will be used to indicate that Printer has no default initialization file (see description of “none” values in Section 2.7 in [PWG5100.3]).

### 5.4.28 pdl-init-file-supported (1setOf type2 keyword)

The "pdl-init-file-supported" Printer Description attribute identifies the keyword names of the member attributes supported in the "pdl-init-file" collection Job Template attribute, i.e., the keyword names of the member attributes in Table 11 that the Printer supports.

### 5.4.29 pdl-init-file-entry-supported (1setOf name(MAX))

The "pdl-init-file-entry-supported (1setOf name(MAX))" Printer attribute specifies the name(s) of the supported initialization file(s) that the Client MAY ask the Printer to send to its PDL interpreter prior to processing the document.

### 5.4.30 printer-detailed-status-messages (1setOf text(MAX))

The OPTIONAL "printer-detailed-status-messages" Printer Description attribute specifies additional detailed and technical information about the printer, in the same way “job-detailed-status-messages” provides additional information about a job. Printer-specific information such as fault and warning messages can be captured, and the 1setOf syntax supports multiple messages. The Printer NEED NOT localize the message(s), since they are intended for use by the system administrator or other experienced technical persons. Clients MUST NOT attempt to parse the value(s) of this attribute.

### 5.4.31 proof-print-default (collection)

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

### 5.4.32 proof-print-supported (1setOf type2 keyword)

The "proof-print-supported" (1setOf (type2 keyword)) Printer Description attribute specifies which member attributes of "proof-print" that the Printer supports.

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### 5.4.33 save-disposition-supported (1setOf type2 keyword)

The “save-disposition-supported (1setOf type2 keyword)” Printer attribute defines the save dispositions supported by the Printer for the “save-disposition” member attribute (see standard keyword values in above table).

### 5.4.34 save-info-supported (1setOf type2 keyword)

The "save-info-supported (1setOf type2 keyword)" attribute identifies the names of the member attributes supported in the "save-info" collection attribute, i.e., the names of the member attributes in Table 8 that the Printer supports.

### 5.4.35 save-location-default (uri)

The “save-location-default (uri)” Printer attribute indicates the value that the Printer supplies, if the Client omits the “save-location” member attribute from the “save-info” member attribute.

### 5.4.36 save-location-supported (1setOf uri)

The “save-location-supported (1setOf uri)” Printer attribute defines a list of URI values supported by the Printer object for the "save-location" member attribute (see above description). The Client MUST supply a value of the "save-location" member attribute that completely matches one of these values. Note: The administrator can configure the “save-location-supported” to have separate directories for individuals, groups, projects, or MAY just have one directory for all saved jobs. Whether or not access control is applied to these directories is IMPLEMENTATION DEPENDENT.

### 5.4.37 save-name-supported (boolean)

The “save-name-supported (boolean)” attribute indicates support for the OPTIONAL "save-name" member attribute of the "save-info" member attribute. Note: The means to query the Printer to see what saved jobs it has is a potential future extension.

### 5.4.38 save-name-subdirectory-supported (boolean)

The “save-name-subdirectory-supported” (boolean) Printer Description attribute indicates whether the Printer supports a FORWARD SLASH (“/”) character in the “save-name” (name(MAX)) member attribute. If the value is ‘false’ and the Client supplies a FORWARD-SLASH (“/”) in the “save-name” value, the Printer MUST reject the request and return the ‘client-error-attributes-or-values-not-supported’.

### 5.4.39 save-document-format-default (mimeMediaType)

If the Client supplies the “save-info” member attribute but omits the “save-document-format” member attribute (see above description), the Printer MUST use the value of its “save-document-format-default” (mimeMediaType) attribute.

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### 5.4.40 save-document-format-supported (1setOf mimeMediaType)

The "save-document-format-supported" (1setOf mimeMediaType) attribute specifies the document formats which a Printer supports for saving jobs.

If a Printer supports this Job Save & Reprint Feature, the Printer SHOULD be able to Reprint using the Resubmit-Job operation (see Section 4.3.1.2) for all the formats in which it is capable of saving jobs, i.e., the mimeMediaType values of the Printer's "document-format-supported" Printer Description attribute SHOULD be a superset of the values of the Printer's "save-document-format-supported" attribute. For example, if a Printer supports the 'application/X-single-page-tiff' format for saving jobs, it SHOULD also accept and support a Resubmit-Job operation to reprint that job.

### 5.4.41 which-jobs-supported (1setOf type2 keyword)

The "which-jobs-supported" Printer Description attribute enables a Client to query the Printer for the set of values that can be supplied one at a time as a value of the "which-jobs" operation attribute of the Get-Jobs operation. Current allowed values for "which-jobs" are 'completed' and 'not-completed', and the "which-jobs" extensions described above extend the values to include keywords corresponding to the symbolic names of all IPP "job-state" enum values and to include Proof Print Jobs and Saved Jobs. The Printer MUST support the "which-jobs-supported" Printer Description attribute if it supports the "proof-print" and/or "job-save-disposition" Job Template attributes. See section 11.2 for the values).

If this attribute is supported, then the Printer MUST support both 'completed' and 'not-completed' as valid values.

# 6. New Operations

This section defines the following IPP REQUIRED operations:

1. Cancel-Jobs - allows the operator or administrator for the Printer to cancel selected or all Not Completed Jobs.

2. Cancel-My-Jobs - allows a user to cancel selected or all his/her Not Completed Jobs.

3. Close-Job - allows a Client to close a multi-document Job without supplying any additional documents.

4. Resubmit-Job - allows a user to request the Printer to process a copy of a Retained Job with optional additional or modified attributes.

5. Reprocess-Job - allows a user to re-process an exact copy of a Retained Job. This operation is defined in [RFC3998]

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## 6.1 Cancel-Jobs Operation

The REQUIRED Cancel-Jobs operation allows the Operator or Administrator for the Printer to cancel a list of Not Completed Jobs or all Not Completed Jobs on the Printer. This operation works like the Cancel-Job operation [STD92], except that it works on a number of Jobs at once. If the Printer cannot cancel all of the requested Jobs successfully, it MUST NOT cancel any and MUST return an error code along with the list of offending Jobs' "job-id" values. A Client MUST be able to supply and a Printer MUST support this operation in order to claim support of this IPP Job and Printer Extensions – Set 2 v2.0 Specification, respectively.

This operation allows a Client to cancel one or more Print Jobs from the time the Job is created up to the time it is completed, canceled, or aborted. Since a specified Job might already be printing by the time a Cancel-Jobs operation is received, some media sheet pages might be printed before the Job is actually terminated.

The Client specifies the set of candidate jobs to be canceled by supplying and/or omitting the “job-ids” (1setOf integer(1:MAX)) (see section 5.1.1 below), First, the Printer MUST check the access rights of the requesting user to endure that it is the Operator or Administrator of the Printer (see *Access Rights* below). If this check succeeds, then (and only then) the Printer MUST accept or reject the request based on the current state of each of the candidate jobs and transition each Job to the indicated new state as shown in Table 3 (copied verbatim from [RFC2911], including the Rule 1 and 2 for the convenience of the reader). If any of the candidate jobs cannot be canceled, the Printer MUST NOT cancel any jobs and MUST return the indicated error status code along with the list of offending “job-id” values in the “job-ids” operation attribute (see section 5.1.2).

**Table 13 - Legal Job state transitions for Cancel-Jobs and Cancel-My-Jobs Operations**

| Current "job-state" | New "job-state" | IPP object's response status code and action |
|---|---|---|
| 'pending' | 'cancelled' | 'successful-ok' |
| 'pending-held' | 'cancelled' | 'successful-ok' |
| 'processing' | 'cancelled' | 'successful-ok' |
| 'processing' | 'processing' | 'successful-ok' See Rule 1 |
| 'processing-stopped' | 'cancelled' | 'successful-ok' |
| 'processing-stopped' | 'processing-stopped' | 'successful-ok' See Rule 1 |
| 'completed' | 'completed' | 'successful-ok-ignored-or-substituted-attributes' |
| 'cancelled | 'cancelled' | 'successful-ok-ignored-or-substituted-attributes' |
| 'aborted' | 'aborted' | 'successful-ok-ignored-or-substituted-attributes' |

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Rule 1: If the implementation requires some measurable time to cancel a Job in the 'processing' or 'processing-stopped' Job states, the Job MUST add the 'processing-to-stop-point' value to its "job-state-reasons" attribute and then transition itself to the 'canceled' state when processing ceases [STD92].

### 6.1.1 Access Rights

The authenticated user [STD92] performing this operation MUST be an operator or administrator of the Printer object [STD92]. Otherwise, Printer MUST reject the operation without canceling any jobs, MUST return 'client-error-not-authorized' status code for its response, and MUST NOT return the "job-ids" operation attribute in its response.

### 6.1.2 Cancel-Jobs Request

The following groups of attributes are part of the Cancel-Jobs Request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes-charset" and "attributes-natural-language" attributes [STD92].

Target:

The "printer-uri" (uri) operation attribute MUST be supplied by the Client which defines the target for this operation [STD92]. The Client MUST NOT supply and the Printer MUST NOT support the “job-uri” (uri) operation attribute for this operation.

The “job-ids” (1setOf integer(1:MAX)) MAY be supplied by the Client in the request to explicitly indicate the “job-id” values of the candidate jobs to be canceled. If the "job-ids" attribute is not supplied, the Printer MUST consider all jobs that are cancelable according to Table 3 above as the candidate jobs and cancel them all. The Client MUST be able to supply this attribute in order to claim conformance to this operation. The Printer MUST support this attribute with a list of “job-id” values.

"requesting-user-name" (name(MAX)):

The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the Client [STD92].

"message" (text(127)):

The Client OPTIONALLY supplies this attribute. The Printer object OPTIONALLY supports this attribute. It is a message to the operator. This "message" attribute is not the same as the "job-message-from-operator" attribute. That attribute is used to report a message from the operator to the

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end user that queries that attribute. This "message" operation attribute is used to send a message from the Client to the operator along with the operation request. It is an implementation decision of how or where to display this message to the operator (if at all).

### 6.1.3 Cancel-Jobs Response

The following sets of attributes are part of the Cancel-Jobs Response:

Group 1: Operation Attributes

Status Message:

In addition to the REQUIRED status code returned in every response, the response OPTIONALLY includes a "status-message" (text(255)) and/or a "detailed-status-message" (text(MAX)) operation attribute [STD92].

Natural Language and Character Set:

The "attributes-charset" and "attributes-natural-language" attributes [STD92].

Group 2: Unsupported Attributes

If the Client had supplied the "job-ids" operation attribute in the request, and one or more of those specified jobs were in the 'completed', 'canceled'. or 'aborted' states (see Table 3 above), the Printer MUST (1) accept the request, (2) return the 'successful-ok-ignored-or-substituted-attributes' status code, (3) return the “job-ids” operation attribute with the “job-id” values of the jobs that could not be canceled [STD92].

## 6.2 Cancel-My-Jobs operation

The REQUIRED Cancel-My-Jobs operation permits a user to cancel a list of their own Not Completed jobs or all their own Not Completed jobs on the Printer. This operation works like the Cancel-Job operation [STD92], except that it works on a number of jobs at once. If the Printer cannot cancel all of the requested jobs successfully, it MUST NOT cancel any and MUST return an error code along with the list of offending job-ids. A Client MUST be able to supply and a Printer MUST support this operation in order to claim support of this Job and Printer Extensions - Set 2 Specification, respectively.

This operation allows a Client to cancel one or more Print Jobs from the time the Job is created up to the time it is completed, canceled, or aborted. Since a specified Job might already be printing by the time a Cancel-My-Jobs operation is received, some media sheet pages might be printed before the Job is actually terminated.

The Client specifies the set of candidate jobs to be canceled by supplying and/or omitting the “job-ids” (1setOf integer(1:MAX)) (see section 5.2.1 below), First, the Printer MUST

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check the access rights of the requesting user against all of the candidate jobs (see Access Rights below). If any of the candidate jobs are not owned by the requesting user, the Printer MUST NOT cancel any jobs and MUST return the 'client-error-not-authorized' error status code along with the list of offending “job-id” values in the “job-ids” operation attribute (see section 5.1.2). If this check succeeds, then (and only then) the Printer MUST accept or reject the request based on the current state of each of the candidate jobs and transition each Job to the indicated new state as shown in Table 3 above. If any of the candidate jobs cannot be canceled, the Printer MUST NOT cancel any jobs and MUST return the indicated error status code along with the list of offending “job-id” values in the “job-ids” operation attribute (see section 5.1.2).

### 6.2.1 Access Rights

If the Client supplied the "job-ids" attribute, the authenticated user [STD92] performing this operation MUST be the Job owner of all the candidate jobs. If any of the supplied "job-ids" specify jobs that do not belong to the requesting user, the IPP object MUST (1) reject the operation without canceling any jobs, (2) return: 'client-error-not-authorized', and (3) MUST return the "job-ids" operation attribute with any specified jobs that are not owned by the requesting user (see section 5.2.2 below).

### 6.2.2 Cancel-My-Jobs Request

The following groups of attributes are part of the Cancel-My-Jobs Request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes-charset" and "attributes-natural-language" attributes as described in section 3.1.4.1.

Target:

The "printer-uri" (uri) operation attribute MUST be supplied by the Client which defines the target for this operation [STD92]. The Client MUST NOT supply and the Printer MUST NOT support the “job-uri” (uri) operation attribute for this operation.

The “job-ids” (1setOf integer(1:MAX)) MAY be supplied by the Client in the request to explicitly indicate the “job-id” values of the candidate jobs to be canceled. If the "job-ids" attribute is not supplied, the Printer MUST consider all jobs that are both (1) owned by the requesting user AND (2) are cancelable according to Table 3 above as the candidate jobs and cancel them all. The Client MUST be able to supply this attribute in order to claim conformance to this operation. The Printer MUST support this attribute with a list of “job-id” values.

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"requesting-user-name" (name(MAX)):

The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the Client [STD92].

"message" (text(127)):

The Client OPTIONALLY supplies this attribute. The Printer object OPTIONALLY supports this attribute. It is a message to the operator. This "message" attribute is not the same as the "job-message-from-operator" attribute. That attribute is used to report a message from the operator to the end user that queries that attribute. This "message" operation attribute is used to send a message from the Client to the operator along with the operation request. It is an implementation decision of how or where to display this message to the operator (if at all).

### 6.2.3 Cancel-My-Jobs Response

The following sets of attributes are part of the Cancel-My-Jobs Response:

Group 1: Operation Attributes

Status Message:

In addition to the REQUIRED status code returned in every response, the response OPTIONALLY includes a "status-message" (text(255)) and/or a "detailed-status-message" (text(MAX)) operation attribute [STD92].

Natural Language and Character Set:

The "attributes-charset" and "attributes-natural-language" attributes [STD92]

Group 2: Unsupported Attributes

If the Client had supplied the "job-ids" operation attribute in the request, and one or more of those specified jobs failed the Job status check defined in Table 3 above, the Printer MUST (1) accept the request, (2) return the 'successful-ok-ignored-or-substituted-attributes' status code, (3) return the “job-ids” operation attribute with the “job-id” values of the jobs that could not be canceled [STD92].

## 6.3 Close-Job Operation

The REQUIRED Close-Job operation allows a Client to close a multi-document job, i.e., a Job that was opened with a Create-Job operation [STD92] followed by zero or more Send-Document and/or Send-URI operations [STD92]. It is semantically similar to a Send-Document operation with the "last-document" operation attribute supplied with a 'true' value

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with no document data (except that with the Close-Job operation the Printer MUST NOT add an additional document object) [STD92].

A Client SHOULD check to see if the Printer supports the Close-Job operation by querying the values of the "operations-supported" Printer Description attribute.

### 6.3.1 Access Rights

The authenticated user [STD92] performing this operation must either be the Job owner (as determined in the Create-Job operation) or an operator or administrator of the Printer object [STD92]. Otherwise, the IPP object MUST reject the operation and return: 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as appropriate.

### 6.3.2 Close-Job Request

The following attributes are part of the Close-Job Request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes-charset" and "attributes-natural-language" attributes [STD92].

Target:

The "printer-uri" (uri) plus "job-id" (integer(1:MAX)) which define the target for this operation [STD92]. The Client MUST NOT supply and the Printer MUST NOT support the “job-uri” (uri) operation attribute for this operation.

"requesting-user-name" (name(MAX)):

The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the Client [STD92].

### 6.3.3 Close-Job Response

The following attributes are part of the Close-Job Response:

Group 1: Operation Attributes

Status Message:

In addition to the REQUIRED status code returned in every response, the response OPTIONALLY includes a "status-message" (text(255)) and/or a "detailed-status-message" (text(MAX)) operation attribute [STD92].

Natural Language and Character Set:

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The "attributes-charset" and "attributes-natural-language" attributes [STD92].

Group 2: Unsupported Attributes

See [RFC8011] section 4.1.7 for details on returning Unsupported Attributes.

Group 3: Job Object Attributes

This is the same set of attributes as described in the Print-Job response [STD92].

## 6.4 Resubmit-Job Operation

The REQUIRED Resubmit-Job operation allows a Client to start a copy of a Retained Job that is retained in the queue after processing has completed [STD92], supply changes to attributes that were supplied in the original jobs and to supply additional attributes for that copy before starting. A Client MUST be able to supply and a Printer MUST support this operation in order to claim support of this IPP Job and Printer Extensions – Set 2 v2.0, respectively.

The new Job's state is set to 'pending' or 'pending-held' and restarts at the beginning on the same IPP Printer object. If any of the Documents in the Job were passed by reference (Print-URI or Send-URI), the Printer MUST re-fetch the data, since the semantics of Resubmit-Job are to repeat all Job processing. The Job Description attributes that accumulate Job progress, such as "job-impressions-completed", "job-media-sheets-completed", and "job-k-octets-processed", MUST be reset to 0 so that they give an accurate record of the new job. The Job object MUST use new values for the "job-uri" and "job-id" attribute values as assigned by the Printer.

If the Retained Job already contains the same operation or Job Template attribute with a different value, the value supplied in the Resubmit-Job operation MUST override (if supported by the Printer). If the Retained Job does not contain such an Operation or Job Template attribute, the value supplied with the Resubmit-Job operation MUST apply (if supported by the Printer). When reprinting a Saved Job, the Printer MUST NOT copy the “job-save-disposition” attribute to the copy; otherwise, the Job would be saved again. Only if the Client supplies the “job-save-disposition” attribute in the Resubmit-Job operation will the Job be saved again. Similarly, when reprinting a Proof Print Job, the Printer MUST NOT copy the “proof-print” attribute to the Job copy; otherwise, the Job would be proofed again. Only if the Client supplies the “proof-print” attribute in the Resubmit-Job operation will the Job be proofed again.

The Printer MUST accept or reject the Resubmit-Job request based on the original Job's current state as follows:

**Table 14 - State Transition Table for the Resubmit-Job operation**

| "job-state" | IPP object's response status code and action |
|---|---|

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| | |
|---|---|
| 'pending' | 'client-error-not-possible' |
| 'pending-held' | 'client-error-not-possible' |
| 'processing' | 'client-error-not-possible' |
| 'processing-stopped' | 'client-error-not-possible' |
| 'completed' | 'successful-ok' - A copy of the Job is started over. |
| 'completed' | 'client-error-not-possible' - see Rule 1 |
| 'cancelled' | 'successful-ok' - A copy of the Job is started over. |
| 'cancelled' | 'client-error-not-possible' - see Rule 1 |
| 'aborted' | 'successful-ok' - A copy of the Job is started over.<br>The new copy of the Job will abort again, if the abort condition is still true. |
| 'aborted' | 'client-error-not-possible' - see Rule 1 |

Rule 1: If the Job Retention Period has expired for the Job in this state, then the IPP object rejects the operation [STD92].

Note: In order to prevent a user from inadvertently restarting a Job in the middle, the Resubmit-Job request is rejected when the Job is in the 'processing' or 'processing-stopped' states. If in the future an operation is needed to hold or restart jobs while in these states, it will be added as an additional operation, rather than overloading the Resubmit-Job operation, so that it is clear that the user intended that the current Job not be completed.

### 6.4.1 Access Rights

The authenticated user [STD92] performing this operation must either be the Job owner or an operator or administrator of the Printer object [STD92]. Otherwise, the IPP object MUST reject the operation and return: 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as appropriate.

### 6.4.2 Resubmit-Job Request

The groups and attributes are the same as for a Print-Job request [STD92], except that the Client MUST NOT supply the “document-format” attribute and MUST NOT append document data to the request. If the Client does supply “document-format”, the Printer MUST return: ‘client-error-bad-request’. The following additional Group 1 Operation attributes are defined:

Target:

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The "printer-uri" (uri) plus "job-id" (integer(1:MAX)) which define the target for this operation [STD92]. The Client MUST NOT supply and the Printer MUST NOT support the “job-uri” (uri) operation attribute for this operation.

### 6.4.3 Resubmit-Job Response

The groups and attributes are the same as for a Cancel-Job response [STD92].

## 6.5 Reprocess-Job operation

The REQUIRED Reprocess-Job operation allows a user to re-process an exact copy of a Retained Job. This operation is defined in [RFC3998].

# 7. New Values for Existing Attributes

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

## 7.1 pdl-override-supported (type2 keyword)

The following additional OPTIONAL value is defined for the “pdl-override-supported” (type2 keyword) Printer Description attribute [STD92]: 'guaranteed': This value indicates that the Printer object:

1. Guarantees that the IPP Job Template attribute values take precedence over instructions of any form embedded anywhere in the document data.

2. Guarantees that no PDL instruction is performed that does not correspond to a current value in the corresponding "xxx-supported" Printer attribute. In such a situation, the Printer MAY (a) abort the job, (b) stop the Printer, (c) hold the job, or (d) substitute on the fly with one of the current values of its "xxx-supported" attribute. This choice MAY be fixed by the implementation or configurable by the system administrator and MAY depend on the attribute.

3. Provides the "queue override" semantics as described below, if the "xxx-supported" Printer attribute is configured with only a single value.

See [STD92] for a full description of how this attribute interacts with and affects other IPP attributes, especially the "ipp-attribute-fidelity" attribute.

### 7.1.1 Additional semantics for 'guaranteed' value of "pdl-override-supported" attribute

If a Printer's "pdl-override-supported" is 'guaranteed', then the Printer MUST follow these additional semantics for Job Creation requests and Get-Job-Attributes or Get-Jobs responses.

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Whether or not the Client supplied the "xxx" Job attribute in the Job Creation operation, the Printer MUST accept or reject the Job based on "ipp-attribute-fidelity" as usual. However, if "ipp-attribute-fidelity" was 'false' and the supplied "xxx" value did not match any of the "xxx-supported" values, the Printer MUST accept the Job as usual, but MUST NOT store that attribute on the Job object. The Printer MUST return an "xxx" Job attribute in subsequent Get-Job-Attributes and Get-Jobs responses according to the following rules:

a) If the Client did not supply the "xxx" Job attribute in the Job Creation operation and the current value of the Printer's "xxx-supported" attribute has only a single value (the so-called queue override case), then the Printer MUST return an "xxx" attribute with that current single value in a Get-Job-Attributes or Get-Jobs, response, as if the Client had supplied "xxx" Job attribute with that value.

   **Rationale for this new behavior**: because the printed result will be the same as if the Client had supplied the "xxx" Job attribute with that single value (since that value will override a corresponding PDL instruction), the response should reflect those (new) semantics.

b) If the Client did not supply the "xxx" Job attribute in the Job Creation operation and the current value of the Printer's "xxx-supported" attribute has more than one value, then the Printer MUST NOT return that "xxx" attribute in a Get-Job-Attributes or Get-Jobs response.

   **Rationale for this new behavior**: Same behavior as for the other values of "pdl-override-supported".

c) If the Client did supply the "xxx" Job attribute in the Job Creation operation and the current value of the Printer's "xxx-supported" attribute has only a single value (the so-called queue override case), then the Printer MUST return that "xxx" Job attribute with the Printer's current "xxx-supported" value in a Get-Job-Attributes or Get-Jobs response, as if the Client had supplied "xxx" with that value.

   **Rationale for this new behavior**: because the behavior of the Printer is to enforce that "xxx" Job attribute with the Printer's current single (override) value.

d) If the Client did supply the "xxx" attribute in the Job Creation operation and the current value of the Printer's "xxx-supported" attribute has more than one value and one of them match, then the Printer MUST return that "xxx" Job attribute with the Client-supplied value in a Get-Job-Attributes or Get-Jobs response.

   **Rationale for this new behavior**: Same behavior as for the other values of "pdl-override-supported".

e) If the Client did supply the "xxx" attribute in the Job Creation operation and the current value of the Printer's "xxx-supported" attribute has more than one value but none of them match, then the Printer MUST NOT return that "xxx" Job attribute with the Client-supplied value in a Get-Job-Attributes or Get-Jobs response. It MUST

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1915 either (1) not return the attribute at all or return it with one of the supported values,
1916 depending on implementation.
1917
1918 **Rationale for this new behavior**: Same behavior as for the other values of "pdl-
1919 override-supported".

1920 The above five cases are represented in Table 13.

1921 **Table 15 - Rules for 'guaranteed' value of "pdl-override-supported" attribute**

| Client Supplies | Printer supports "xxx-supported" | Printer's response to Job query request | Queue override? |
|---|---|---|---|
| omits "xxx" | 'a' | "xxx" = 'a' | yes |
| omits "xxx" | 'a', 'b' | nothing is returned | no |
| supplies "xxx" = ? | 'a' | "xxx" = 'a' | yes |
| supplies "xxx" = 'a' | 'a', 'b' | "xxx" = 'a' | no |
| supplies "xxx" = 'c' | 'a', 'b' | Either nothing is returned or "xxx" = one of the supported values, depending on implementation. | no |

1922 ### 7.1.2 Examples of queue override

1923 The queue override extension allows an implementation to guarantee that only advertised
1924 supported attribute values are actually performed, and that unsupported values embedded
1925 as instructions in the document data, will not be performed. This extension is also a further
1926 step in making a Printer object indicate what it really supports in both the protocol and the
1927 PDL and what it does not, i.e., "truth in advertising". In other words, the absence of a value
1928 in the Printer's "xxx-supported" attribute indicates a guarantee that the value cannot be
1929 performed.

1930 For example, an administrator that wants to force two-sided printing could set the Printer's
1931 "sides-supported" to one of the two values: 'two-sided-long', 'two-sided-short' [STD92]. Thus,
1932 a PDL that contained an embedded simplex (one-sided) instruction would be overridden in
1933 one of the following ways: (1) aborted, (2) held, or (3) automatically forced to two-sided,
1934 depending on implementation and/or site policy.

1935 As another example, an administrator could set up an IPP Printer that always staples by
1936 setting the "finishings-supported" to 'staple' only, i.e. by removing the 'none' keyword value
1937 [STD92]. In order to allow jobs not to be stapled on the same physical piece of hardware,
1938 the administrator would use fan-in (if supported) to set up another IPP Printer that does
1939 include the 'none' keyword value in its "finishings-supported" attribute.

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The values of the Printer's "xxx-supported" attribute are not only what the Printer will accept in the print protocol (e.g. IPP) as attributes, but also as corresponding values of embedded PDL instructions. If a value that is not in the "xxx-supported" list is encountered in either the print protocol or the PDL, it MUST NOT be performed (no matter what the value of "ipp-attribute-fidelity" is).

The four combinations of unsupported IPP attribute values and unsupported PDL instruction values are:

1. Unsupported attribute value in the protocol and "ipp-attribute-fidelity" = 'false' (independent of "pdl-override-supported"):

   The Printer object MUST accept the Job with the unsupported attribute value. However, the Printer object will always return only one of its "xxx-supported" values in response to Get-Jobs or Get-Job-Attributes. Depending on implementation, the Printer can perform this substitution once at Job submission time, or each time the Job is queried.

2. Unsupported attribute value in the protocol and "ipp-attribute-fidelity" = 'true' (independent of "pdl-override-supported"):

   The Printer MUST reject the job.

3. Unsupported embedded instruction value in the PDL and "pdl-override-supported" = 'attempted' or 'not-attempted' (and independent of "ipp-attribute-fidelity"):

   When an implementation encounters a value that is not in the "xxx-supported" list, it makes no special action and allows it to be performed. See the definition of "Supports" in [STD92] that indicates that performing a PDL instruction that is not supported in the protocol is an allowed behavior.

4. (New case) Unsupported embedded instruction value in the PDL and "pdl-override-supported" = 'guaranteed' (and independent of "ipp-attribute-fidelity"):

   The unsupported embedded instruction value MUST NOT be performed. The behavior is implementation-dependent if an unsupported embedded instruction value is encountered. For example, the Printer MAY abort the Job or substitute on the fly with one of the current values of its "xxx-supported" attribute. This choice MAY be fixed by the implementation or configurable by the system administrator and MAY depend on the Job Template attribute.

## 7.2 which-jobs (type2 keyword)

This section defines additional keyword values for the IPP "which-jobs" (type2 keyword) Operation attribute of the Get-Jobs operation [STD92] and the “which-jobs-supported” (1setOf type2 keyword) Printer Description attribute (see section 10.9) to include keywords

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corresponding to the symbolic names of all IPP “job-state” enum values [PWG5100.3], an ‘all’ value, and values to correspond to Proof Print Jobs and Saved Jobs. The following keywords are OPTIONAL to support, unless indicated otherwise in their descriptions.

| Keyword | Description |
|---|---|
| 'aborted' | This includes any Job object whose state is 'aborted'. This value corresponds to the symbolic name of the corresponding value for the “job-state” attribute. |
| 'all' | This includes all Job objects, that is any Job object that is considered 'completed' or 'not-completed' as defined by these values above. |
| 'canceled' | This includes any Job object whose state is 'canceled'. This value corresponds to the symbolic name of the corresponding value for the “job-state” attribute. |
| 'pending' | This includes any Job object whose state is 'pending'. This value corresponds to the symbolic name of the corresponding value for the “job-state” attribute. |
| 'pending-held' | This includes any Job object whose state is 'pending-held'. This value corresponds to the symbolic name of the corresponding value for the “job-state” attribute. |
| 'processing' | This includes any Job object whose state is 'processing'. This value corresponds to the symbolic name of the corresponding value for the “job-state” attribute. |
| 'processing-stopped' | This includes any Job object whose state is 'processing-stopped'. This value corresponds to the symbolic name of the corresponding value for the “job-state” attribute. |
| 'proof-print' | Proof Print Jobs, i.e., jobs that have been submitted using the "proof-print" Job Template attribute and which are in the ‘completed’, ‘canceled’, or ‘aborted’ state. If the "proof-print" Job Template attribute is supported, this value MUST be supported. |
| 'saved' | Saved Jobs, i.e., jobs that have been saved using the "job-save-disposition" Job Template attribute and which are in the ‘completed’, ‘canceled’, or ‘aborted’ state. If the "job-save-disposition" Job Template attribute is supported, this value MUST be supported. |

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## 7.3 job-state-reasons (1setOf type2 keyword)

The following table defines additional keyword values for the IPP “job-state-reasons” Job Description attribute [STD92] [RFC3998] [PWG5100.3] [PWG5100.6]. The descriptions indicate conditional conformance, if any.

| Keyword | Description |
|---|---|
| 'job-printed-successfully' | The Job was successfully printed but was not successfully saved as indicated by ‘job-saved-with-warnings’ or ‘job-saved-with-errors’. If the Job was not requested to be saved, then use the ‘job-completed-successfully’ value instead. If the "job-save-disposition" Job Template attribute is supported, this value MUST be supported. |
| 'job-printed-with-errors' | The Job was printed with errors but was successfully saved as indicated by ‘job-saved-successfully’ or was not successfully saved as indicated by ‘job-saved-with-warnings’ or ‘job-saved-with-errors’. If the Job was not requested to be saved, then use the ‘job-completed-with-errors’ value instead. If the "job-save-disposition" Job Template attribute is supported, this value MUST be supported. |
| 'job-resuming' | The Printer is in the process of moving the Job from a suspended condition to a candidate for processing. If the Resume-Job operation [RFC3998] is supported, this value MUST be supported. |
| 'job-saved-successfully' | The Job was successfully saved. The Printer MUST also supply ‘job-completed-successfully’, except when “save-disposition” = ‘save-only’. If the "job-save-disposition" Job Template attribute is supported, this value MUST be supported. |
| 'job-saved-with-errors' | The Job did not save successfully (whether or not it was printed successfully, printed with warnings, printed with errors, or not printed). The Printer MUST ensure that none of the saved Job is accessible, if it was unable to successfully save all of the job. If the "job-save-disposition" Job Template attribute is supported, this value MUST be supported. |
| 'job-saved-with-warnings' | The Job was saved with warnings. If the "job-save-disposition" Job Template attribute is supported, this value MUST be supported. |
| 'job-saving' | The Printer is transmitting the Job to the save location. This is similar to the 'job-printing' value. If the "job-save-disposition" Job Template attribute is supported, this value MUST be supported. |

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| | |
|---|---|
| 'job-spooling' | Same as 'job-incoming' with the specialization that the Printer is spooling the document data before processing it. This value corresponds to the 'spool' or 'automatic' value of the "job-spooling-supported" Printer Description attribute. |
| 'job-streaming' | Same as 'job-incoming' with the specialization that the Printer is processing the document data as it is being received (that is, the Job is not being spooled, but rather is being processed in chunks by the output device and is being imaged during reception). This value corresponds to the 'stream' or 'automatic' value of the "job-spooling-supported" Printer Description attribute. |
| 'job-suspended-by-operator' | The Job has been indefinitely suspended by the Printer operator. If the Suspend-Current-Job operation [RFC3998] is supported, this value MUST be supported. |
| 'job-suspended-by-system' | The Job has been indefinitely suspended by the Printer's system software during normal processing of the job. |
| 'job-suspended-by-user' | The Job has been indefinitely suspended by the user. If the Suspend-Current-Job operation [RFC3998] is supported, this value MUST be supported. |
| 'job-suspending' | The Printer is in the process of moving the Job from a processing condition to a suspended condition where other jobs can be processed. If the Suspend-Current-Job operation [RFC3998] is supported, this value MUST be supported. |

Note: The semantics of this attribute or the set of valid values may be different for different document formats.

### 7.3.1 Additional Semantics for "job-state-reasons" attribute for "job-save-disposition" attribute

This section defines additional values that are defined in support of the "job-save-disposition" attribute in section 7.9).

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

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There are also new four new "job-state-reasons" keyword values REQUIRED that support a saved Job -- 'job-saving', 'job-saved-successfully', 'job-saved-with-warnings', and 'job-saved-with-errors' -- and these have been added to the list defined above. The existing 'job-completed-successfully', job-completed-with-warnings', and 'job-completed-with-errors' values are also clarified in the list above for implementations that support the "job-save-disposition" Job Template attribute, in such a way that these values remain compatible with Printers and clients that do not support Job saving.

Table 14 enumerates the possible combinations of print and save success, warning, and error conditions. Note that two values occur only when there are print warnings/errors and a save error.

**Table 16 - Values of "job-state-reasons" attribute for various Job conditions**

| | Not saving | Save was successful | Save was unsuccessful |
|---|---|---|---|
| Not printing | <not possible> | 'job-completed-successfully' | 'job-saved-with-errors' |
| Print successful | 'job-completed-successfully' | 'job-completed-successfully' | 'job-saved-with-errors' |
| Print warnings | 'job-completed-with-warnings' | 'job-completed-with-warnings' | 'job-completed-with-warnings', 'job-saved-with-errors' |
| Print errors | 'job-completed-with-errors' | 'job-completed-with-errors' | 'job-completed-with-errors', 'job-saved-with-errors' |
| Print warnings and errors | 'job-completed-with-errors' | 'job-completed-with-errors' | 'job-completed-with-errors', 'job-saved-with-errors' |

# 8. Deprecated Attributes

The following attributes are deprecated as of IPP Job and Printer Extensions - Set 2 v2.0.

- ???

# 9. Additional Semantics for Existing Operations

This section adds additional semantics to the following existing operations that are defined in other documents:

1. Get-Jobs [STD92]

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2. Hold-Job [STD92]

3. Set-Job-Attributes [RFC3380]

## 9.1 Get-Jobs: which-jobs (type2 keyword)

The "which-jobs" attribute If supplied and the keyword specified is supported by the Printer's "which-job-supported" attribute (section 7.2), the Printer MUST only return job-id values for those Jobs that match the semantics of the Client specified keyword.

## 9.2 Hold-Job: job-hold-until-time (dateTime)

The "job-hold-until-time" attribute MAY be supported as a Group 1 Operation attribute by the OPTIONAL Hold-Job operation [STD92], in addition to or as a substitute for the "job-hold-until" attribute [STD92]. If the Client does not supply either the "job-hold-until" or the "job-hold-until-time" Operation attributes in the Hold-Job request, the Job MUST create a "job-hold-until" attribute and set its value to 'indefinite' and hold the Job indefinitely, until a Client performs a Release-Job operation [STD92] or a Set-Job-Attributes operation as discussed in section 9.3.

If supplied and supported as specified in the Printer's "job-hold-until-time-supported" attribute, the Job MUST replace its previous "job-hold-until" or "job-hold-until-time" attribute, if present, MUST add the 'job-hold-until-specified' value to its "job-state-reasons" attribute, and MUST make itself a candidate for scheduling after the specified dateTime value.

If the Client supplies a value that specifies a dateTime that has already occurred, and the Job also supports the "job-hold-until-time" operation attribute, the Job MUST accept the request, and MUST remove the 'job-hold-until-specified' value from its "job-state-reasons" attribute, if present. If there are no other reasons to hold the Job, the Job MUST make itself a candidate for processing immediately [STD92].

If supplied, but either the "job-hold-until-time" Operation attribute itself or the value supplied is not supported, i.e., is out of range, the Job MUST accept the request, MUST add the "job-hold-until" = 'indefinite' attribute, MUST add the 'job-hold-until-specified' value to its "job-state-reasons" attribute, MUST return the unsupported attribute or value in the Unsupported Attributes Group [STD92], MUST return 'successful-ok-ignored-or-substituted-attributes' as the operation response status code, and the Printer MUST hold the Job indefinitely until a Client performs a subsequent Release-Job operation.

## 9.3 Set-Job-Attributes

The following Job Template attributes MAY be settable using the Set-Job-Attributes operation [RFC3380], in which case they MUST be so indicated as values returned by the Printer's "job-settable-attributes-supported" attribute [RFC3380]:

1. "job-delay-output-until" (type2 keyword | name(MAX)) - see section 7.4

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2. "job-delay-output-until-time" (dateTime) - see section 7.5.

3. "job-hold-until" (type2 keyword | name(MAX)) - see [STD92]

4. "job-hold-until-time" (dateTime) - see section 7.6

### 9.3.1 Set-Job-Attributes: job-delay-output-until (type2 keyword | name(MAX)) and job-delay-output-until-time" (dateTime)

If either the "job-delay-output-until" or the "job-delay-output-until-time" operation attribute is supplied in the Set-Job-Attributes operation request, and is specified in the Printer's "job-settable-attributes-supported" attribute [RFC3380], the Job object MUST update its previous "job-delay-output-until" or "job-delay-output-until-time" attribute values, if present, MUST add the 'job-delay-output-until-specified' value to the job's "job-state-reasons" attribute, and MUST make the Job a candidate for scheduling after the specified date-time.

The "job-delay-output-until" and "job-delay-output-until-time" attributes are mutually exclusive. If one is set on the Job and the other is supplied in a Set-Job-Attributes operation, the one supplied replaces the other on the job. Furthermore, as with Job Creation operations, a Client MUST NOT supply both a "job-delay-output-until" and a "job-delay-output-until-time" attribute in the same Set-Job-Attributes request. If a Client does supply such a malformed request, the Printer MUST reject the request and return the 'client-error-conflicting-attributes' status code [STD92].

If the Client (1) supplies a value that specifies a period or date-time that has already occurred and (2) the IPP object supports the "job-delay-output-until" or "job-delay-output-until-time" operation attribute, respectively, the IPP object MUST accept the request, MUST remove the 'job-delay-output-until-specified' value from the job's "job-state-reasons" attribute, if present. If there are no other reasons to hold the job, the IPP object MUST make the Job be a candidate for processing immediately [STD92].

If supplied, but either the "job-delay-output-until" or the "job-delay-output-until-time" operation attribute itself or the value supplied is not supported, i.e., is out of range, the IPP object MUST accept the request, MUST add the "job-delay-output-until" = 'indefinite' attribute, MUST add the 'job-delay-output-until-specified' value to the job's "job-state-reasons" attribute, MUST return the unsupported attribute or value in the Unsupported Attributes Group [STD92], MUST return the 'successful-ok-ignored-or-substituted-attributes' operation status code [STD92], and MUST hold the Job indefinitely until a Client performs a subsequent Release-Job operation [STD92].

### 9.3.2 Set-Job-Attributes: job-hold-until (type2 keyword | name(MAX)) and job-hold-until-time (dateTime) operation attributes

If either the "job-hold-until" or the "job-hold-until-time" operation attribute is supplied in the Set-Job-Attributes operation and supported as specified in the Printer's "job-settable-attributes-supported" attribute [RFC3380], the IPP object MUST copy the supplied operation attribute to the Job object, replacing the job's previous "job-hold-until" or "job-hold-until-time"

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attribute, if present, MUST add the 'job-hold-until-specified' value to the job's "job-state-reasons" attribute, and MUST make the Job a candidate for scheduling after the specified date-time.

The "job-hold-until" and "job-hold-until-time" attributes are mutually exclusive. If one is set on the Job and the other is supplied in a Set-Job-Attributes operation, the one supplied replaces the other on the job. Furthermore, as with Job Creation operations, a Client MUST NOT supply both a "job-hold-until" and a "job-hold-until-time" attribute in the same Set-Job-Attributes request. If a Client does supply such a malformed request, the Printer MUST reject the request and return the 'client-error-conflicting-attributes' status code [STD92].

If the Client supplies a value that specifies a period or dateTime that has already occurred and the Job supports the "job-hold-until" or "job-hold-until-time" operation attribute, respectively, the Job MUST accept the Set-Job-Attributes request and MUST remove the 'job-hold-until-specified' value from its "job-state-reasons" attribute, if present. If there are no other reasons to hold the job, the IPP object MUST make the Job be a candidate for processing immediately [STD92].

If supplied, but either the "job-hold-until" or "job-hold-until-time" operation attribute itself or the value supplied is not supported, i.e., is out of range, the Job MUST accept the request, MUST add the "job-hold-until" attribute to itself and set its value to 'indefinite', MUST add the 'job-hold-until-specified' value to its "job-state-reasons" attribute, MUST report it as unsupported by listing the unsupported attribute or value in the Unsupported Attributes Group in the operation response [STD92], MUST return the 'successful-ok-ignored-or-substituted-attributes' status code, and MUST hold the Job indefinitely until a Client performs a subsequent Release-Job operation [STD92].

# 10. Conformance Requirements

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

## 10.1 Conformance Requirements for this specification

In order for a client and a Printer to claim conformance to this IPP Job and Printer Extensions – Set 2 v2.0 Specification, a client MUST be able to supply and a Printer MUST support the following:

1. The Cancel-Jobs operation (section 5.1)
2. The Cancel-My-Jobs operation (section 5.2)
3. The Close-Job operation (section 5.3)
4. The Resubmit-Job operation (section 5.4)

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5. The Reprocess-Job operation [RFC3998]

6. The "job-ids" Operation attribute (section 6.3) in the Get-Jobs operation [STD92] (section 3.2.6)

7. The "job-ids" Operation attribute (section 6.3) in the Purge-Jobs operation [STD92], if Purge-Jobs operation is supported (section 6.4)

8. The "proof-print" Job Template attribute (sections 7.11). See also section 12.5 Conformance Requirements for the REQUIRED "proof-print" Job Template attribute

9. The "job-ids-supported" Printer Description attribute (section 10.2)

10. The "which-jobs-supported" Printer Description attribute (see section 10.9 for which values)

The other attributes defined in this specification are OPTIONAL for a client to be able to supply and for a Printer to support.

## 10.2 Conditional Conformance Requirements for Printer objects

The following conditional conformance requirements are defined:

| If the Printer supports: | then the Printer MUST also support: |
|---|---|
| "job-hold-until-time" Job Template attribute in Job Creation operations | "job-hold-until" Job Template attribute [STD92] and the Hold-Job operation with the "job-hold- until" [STD92] and "job-hold-until-time" (see section 8.1 above) Operation attributes and the Release-Job operation. |
| "job-delay-output-until-time" Job Template attribute in Job Creation operations | "job-delay-output-until" Job Template attribute (see section 7.4 above) and the Set-Job-Attributes operation (see section 8.2 above). |
| "job-delay-output-until" Job Template attribute in Job Creation operations | Set-Job-Attributes operation (see section 8.2 above). |

Each of the collection attribute definitions indicate which member attributes are REQUIRED and which are OPTIONAL for a Printer to support and is not repeated here.

If a Printer supports the 'collection' attribute syntax of a Job Template attribute , then it MUST support the distinguished none value defined for that collection. See section 2.7 of [PWG5100.3].

Support of the 'name' attribute syntax for Job Template attributes and collection member attributes is OPTIONAL, as in IPP/1.1 [STD92].

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## 10.3 Conformance Requirements for Clients

Clients that support a "xxx" collection Job Template attribute SHOULD use the Get-Printer-Attributes request to obtain the "xxx-default" collection and display that to the user, so that the user can make any changes before submitting the Job. Then the client submits values for all member attributes, rather than depending on the Printer's defaulting for omitted member attributes, since such defaulting is implementation dependent and will vary from Printer to Printer.

## 10.4 Conformance Requirements for the OPTIONAL "job-save-disposition" Job Template attribute

This section specifies the conformance requirements for Printers and clients if they support the OPTIONAL "job- save-disposition" Job Template attribute. It also defines the conformance requirements for Job Save Format specifications.

### 10.4.1 Client Conformance Requirements for the 'job-save-disposition" attribute

In order to claim conformance for the OPTIONAL "job-save-dispositions" Job Template attribute, clients:

1. MUST support the “job-save-disposition” (collection) attribute according to the description in section 7.9, including the member attributes as REQUIRED by Table 7.

2. MUST support the “save-info” (collection) member attribute according to the "job-save-disposition" attribute description in section 7.9, including the member attributes as REQUIRED by Table 8.

3. MUST support the Reprocess-Job and Resubmit-Job operations for printing saved jobs according to section 4.3 above.

### 10.4.2 Printer Conformance Requirements for the 'job-save-disposition" attribute

In order to claim conformance for the OPTIONAL "job-save-dispositions" Job Template attribute, Printers:

1. MUST support the “job-save-disposition” (collection) Job Template attribute according to the description in section 7.9, including the member attributes as REQUIRED by Table 7 and the “job-save-disposition- default” attribute and the “job-save-disposition-supported” attribute.

2. MUST support all of the “save-disposition” member attribute values defined in the "job-save-disposition" description section 7.9.

3. MUST support the “save-info” (collection) member attribute according to the "job-save-disposition" attribute description in section 7.9, including the member attributes

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as REQUIRED by Table 8 and the “save- location-supported”, “save-name-supported”, “save-document-format-supported”, and “save-info- supported” Printer attributes.

4. SHOULD support the ‘ftp:’, and ‘http:’ schemes and MAY support 'file:' scheme for use in the “save- location” member attribute as defined in the "job-save-disposition" attribute description in section 7.9.

5. MUST support at least one “save-document-format” (mimeMediaType) attribute value, as defined in the "job-save-disposition" attribute description in section 7.9, for use in the “save-document-format” member attribute.

6. SHOULD support a superset of the values of the Printer’s “save-document-format-supported” attribute (section 7.9.1.2.3.3.2) as the values of the Printer’s “document-format-supported” attribute [STD92].

7. MUST support the "job-save-printer-make-and-model" Job Description attribute (see section 9.1).

8. MUST support the "which-jobs-supported" Printer Description attribute (see section 10.9) and the 'saved' keyword values (see section 11.2).

9. MUST support the ‘job-saving’, 'job-saved-successfully', 'job-saved-with-warnings', and ‘job-saved-with- errors’ values of the “job-state-reasons” Job Description attribute as defined in the "job-state-reasons" attribute description in section 11.3.

### 10.4.3 Job Save Format Specification Conformance Requirements

Documents that define a Job Save format MUST contain the following information:

1. MUST specify the mimeMediaType value that identifies the Job Save Format, e.g., 'application/X-single- page-tiff'.

2. MUST define the representation for PDL data.

3. MUST specify the formats of the document content and how the Job Save Format file references the document content, e.g., using Relative URI value (see [RFC2396]) to reference the document content in the “document-uri” operation attribute.

4. MUST define whether or not Printers with differing values of their “printer-make-and-model” Printer attributes are expected to print saved jobs with the same appearance, i.e., whether or not a Printer MUST omit the “job-printer-make-and-model” Job Description attribute when saving the job in the defined format (see the "job-printer-make-and-model" attribute description in section 9.1).

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## 10.5 Conformance Requirements for the REQUIRED "proof-print" Job Template attribute

Conforming Printers and clients MUST support the REQUIRED "proof-print" Job Template attribute.

### 10.5.1 Client Conformance Requirements for the 'proof-print" attribute

Conforming clients:

1. MUST support the “proof-print” (collection) attribute according to the description in section 7.11, including the member attributes as REQUIRED by Table 12.

2. MUST support the Reprocess-Job and Resubmit-Job operations for printing saved jobs according to section 4.4 above.

### 10.5.2 Printer Conformance Requirements for the 'proof-print" attribute

Conforming Printers:

1. MUST support the “proof-print” (collection) Job Template attribute according to the description in section 7.11, including the member attributes as REQUIRED by Table 12 and the “proof-print-default” attribute and the “proof-print-supported” attribute.

2. MUST support the "which-jobs-supported" Printer Description attribute (see section 10.9) and the 'saved' keyword values (see section 11.2).

# 11. Internationalization Considerations

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

1. The Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8) [STD63] encoding of Unicode [UNICODE] [ISO10646]; and

2. The Unicode Format for Network Interchange [RFC5198] which requires transmission of well-formed UTF-8 strings and recommends transmission of normalized UTF-8 strings in Normalization Form C (NFC) [UAX15].

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

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

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

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

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

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

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

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

Unicode Collation Algorithm [UTS10] – sorting

Unicode Locale Data Markup Language [UTS35] – locale databases

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

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

Unicode Character Property Model [UTR23] – character properties

Unicode Conformance Model [UTR33] – Unicode conformance basis

# 12. Security Considerations

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

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

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

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

Unicode Security FAQ [UNISECFAQ] – common Unicode security issues

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# 13. IANA Considerations

## 13.1 IPP Attribute and Keyword Value Registrations

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

The registry entries will contain the following information:

| Job Template attributes: | Reference |
|---|---|
| feed-orientation (type2 keyword) | [PWG5100.11] |
| font-name-requested (name(MAX)) | [PWG5100.11] |
| font-size-requested (integer (1:MAX)) | [PWG5100.11] |
| job-delay-output-until (type2 keyword \| name(MAX)) | [PWG5100.11] |
| job-delay-output-until-time (dateTime) | [PWG5100.11] |
| job-hold-until-time (dateTime) | [PWG5100.11] |
| job-phone-number (uri) | [PWG5100.11] |
| job-recipient-name (name(MAX)) | [PWG5100.11] |
| job-save-disposition (collection) | [PWG5100.11] |
| save-disposition (type2 keyword) | [PWG5100.11] |
| save-info (1setOf collection) | [PWG5100.11] |
| save-document-format (mimeMediaType) | [PWG5100.11] |
| save-location (uri) | [PWG5100.11] |
| save-name (name(MAX)) | [PWG5100.11] |
| pdl-init-file (1setOf collection) | [PWG5100.11] |
| pdl-init-file-entry (name(MAX)) | [PWG5100.11] |
| pdl-init-file-location (uri) | [PWG5100.11] |
| pdl-init-file-name (name(MAX)) | [PWG5100.11] |
| proof-print (collection) | [PWG5100.11] |
| media (type2 keyword \| name(MAX)) | [PWG5100.11] |
| media-col (collection) | [PWG5100.11] |
| proof-print-copies (integer (0:MAX)) | [PWG5100.11] |
| media-col (collection) | [PWG5100.11] |
| media-grain (type2 keyword \| name(MAX)) | [PWG5100.11] |
| media-thickness (integer(1:MAX)) | [PWG5100.11] |
| media-tooth (type2 keyword \| name(MAX)) | [PWG5100.11] |

| Operation attributes: | Reference |
|---|---|
| job-ids (1setOf integer(1:MAX)) | [PWG5100.11] |
| job-password (octetString(255)) | [PWG5100.11] |
| job-password-encryption (type2 keyword \| name(MAX)) | [PWG5100.11] |

| Job Description attributes: | Reference |
|---|---|
| job-save-printer-make-and-model (text(127)) | [PWG5100.11] |

| Printer Description attributes: | Reference |
|---|---|
| feed-orientation-default (type2 keyword) | [PWG5100.11] |
| feed-orientation-supported (1setOf (type2 keyword)) | [PWG5100.11] |
| font-name-requested-default (name(MAX)) | [PWG5100.11] |
| font-name-requested-supported (1setOf name(MAX)) | [PWG5100.11] |
| font-size-requested-default (integer (1:MAX)) | [PWG5100.11] |
| font-size-requested-supported (1setOf rangeOfInteger (1:MAX)) | [PWG5100.11] |

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```
job-creation-attributes-supported (1setOf type2 keyword)                    [PWG5100.11]
job-delay-output-until-default (type2 keyword | name(MAX))                  [PWG5100.11]
job-delay-output-until-supported (1setOf (type2 keyword | name(MAX))        [PWG5100.11]
job-delay-output-until-time-supported (rangeOfInteger(0:MAX))               [PWG5100.11]
job-hold-until-time-supported (rangeOfInteger(0:MAX)                        [PWG5100.11]
job-ids-supported (boolean)                                                 [PWG5100.11]
job-password-encryption-supported (1setOf (type2 keyword | name(MAX)))      [PWG5100.11]
job-password-supported (integer(0:255))                                     [PWG5100.11]
job-phone-number-default (uri)                                              [PWG5100.11]
job-phone-number-supported (boolean)                                        [PWG5100.11]
job-recipient-name-default (name(MAX))                                      [PWG5100.11]
job-recipient-name-supported (boolean)                                      [PWG5100.11]
job-spooling-supported (type2 keyword)                                      [PWG5100.11]
max-save-info-supported (integer(1:MAX))                                    [PWG5100.11]
media-col-database (1setOf collection)                                      [PWG5100.11]
pdl-init-file-default (1setOf collection)                                   [PWG5100.11]
pdl-init-file-entry-supported (1setOf name(MAX))                            [PWG5100.11]
pdl-init-file-location-supported (1setOf uri)                               [PWG5100.11]
pdl-init-file-name-subdirectory-supported (boolean)                         [PWG5100.11]
pdl-init-file-name-supported (1setOf name(MAX))                             [PWG5100.11]
pdl-init-file-supported (1setOf type2 keyword)                              [PWG5100.11]
printer-detailed-status-messages (1setOf text(MAX))                         [PWG5100.11]
proof-print-default (collection)                                            [PWG5100.11]
proof-print-supported (1setOf type2 keyword)                                [PWG5100.11]
save-disposition-supported (1setOf (type2 keyword))                         [PWG5100.11]
save-document-format-default (mimeMediaType)                                [PWG5100.11]
save-document-format-supported (1setOf mimeMediaType)                       [PWG5100.11]
save-location-default (uri)                                                 [PWG5100.11]
save-location-supported (1setOf uri)                                        [PWG5100.11]
save-name-subdirectory-supported (boolean)                                  [PWG5100.11]
save-name-supported (boolean)                                               [PWG5100.11]
which-jobs-supported (1setOf type2 keyword)                                 [PWG5100.11]
```

## 13.2 Attribute Value Registrations

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

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

The registry entries will contain the following information:

```
Attribute (attribute syntax)
  Keyword Attribute Value                                                   Reference
--------------------------------                                            -------------
feed-orientation (type2 keyword)                                            [PWG5100.11]
  long-edge-first                                                           [PWG5100.11]
  short-edge-first                                                          [PWG5100.11]

job-creation-attributes-supported  (1setOf type2 keyword)                   [PWG5100.11]
  <all Job template attributes supported at the Job level>
  <all operation attributes supported at the Job level>

job-password-encryption  (type2 keyword | name(MAX))                        [PWG5100.11]
job-password-encryption-supported  (1setOf (type2 keyword | name(MAX)))     [PWG5100.11]
  md2                                                                       [PWG5100.11]
  md4                                                                       [PWG5100.11]
  md5                                                                       [PWG5100.11]
  none                                                                      [PWG5100.11]
```

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```
    sha                                                                    [PWG5100.11]

job-save-disposition-supported  (1setOf type2 keyword)                     [PWG5100.11]
    save-disposition                                                       [PWG5100.11]
    save-info                                                              [PWG5100.11]

job-spooling-supported  (type2 keyword)                                    [PWG5100.11]
    automatic                                                              [PWG5100.11]
    spool                                                                  [PWG5100.11]
    stream                                                                 [PWG5100.11]

job-state-reasons (type2 keyword):                                         [PWG5100.11]
    job-delay-output-until-specified                                       [PWG5100.11]
    job-password-wait                                                      [PWG5100.11]
    job-printed-successfully                                               [PWG5100.11]
    job-printed-with-errors                                                [PWG5100.11]
    job-printed-with-warnings                                              [PWG5100.11]
    job-resuming                                                           [PWG5100.11]
    job-saved-successfully                                                 [PWG5100.11]
    job-saved-with-errors                                                  [PWG5100.11]
    job-saved-with-warnings                                                [PWG5100.11]
    job-saving                                                             [PWG5100.11]
    job-spooling                                                           [PWG5100.11]
    job-streaming                                                          [PWG5100.11]
    job-suspended-by-operator                                              [PWG5100.11]
    job-suspended-by-system                                                [PWG5100.11]
    job-suspended-by-user                                                  [PWG5100.11]
    job-suspending                                                         [PWG5100.11]

media-grain (type2 keyword | name(MAX))                                    [PWG5100.11]
    x-direction                                                            [PWG5100.11]
    y-direction                                                            [PWG5100.11]


media-tooth (type2 keyword | name(MAX))                                    [PWG5100.11]
    antique                                                                [PWG5100.11]
    calendared                                                             [PWG5100.11]
    coarse                                                                 [PWG5100.11]
    fine                                                                   [PWG5100.11]
    linen                                                                  [PWG5100.11]
    medium                                                                 [PWG5100.11]
    smooth                                                                 [PWG5100.11]
    stipple                                                                [PWG5100.11]
    uncalendared                                                           [PWG5100.11]
    vellum                                                                 [PWG5100.11]

media-type (type2 keyword)                                                 [PWG5100.11]
    aluminum                                                               [PWG5100.11]
    cardboard                                                              [PWG5100.11]
    cd                                                                     [PWG5100.11]
    corrugated-board                                                       [PWG5100.11]
    disc                                                                   [PWG5100.11]
    double-wall                                                            [PWG5100.11]
    dry-film                                                               [PWG5100.11]
    dvd                                                                    [PWG5100.11]
    end-board                                                              [PWG5100.11]
    embossing-foil                                                         [PWG5100.11]
    film                                                                   [PWG5100.11]
    flexo-base                                                             [PWG5100.11]
    flexo-photo-polymer                                                    [PWG5100.11]
    flute                                                                  [PWG5100.11]
    foil                                                                   [PWG5100.11]
```

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```
    gravure-cylinder                                                    [PWG5100.11]
    image-setter-paper                                                  [PWG5100.11]
    imaging-cylinder                                                    [PWG5100.11]
    laminating-foil                                                     [PWG5100.11]
    letterhead                                                          [PWG5100.11]
    mounting-tape                                                       [PWG5100.11]
    other                                                               [PWG5100.11]
    paper                                                               [PWG5100.11]
    plate                                                               [PWG5100.11]
    polyester                                                           [PWG5100.11]
    screen                                                              [PWG5100.11]
    self-adhesive                                                       [PWG5100.11]
    single-face                                                         [PWG5100.11]
    single-wall                                                         [PWG5100.11]
    sleeve                                                              [PWG5100.11]
    shrink-foil                                                         [PWG5100.11]
    tractor                                                             [PWG5100.11]
    triple-wall                                                         [PWG5100.11]
    wet-film                                                            [PWG5100.11]

  pdl-init-file-supported (1setOf type2 keyword)                        [PWG5100.11]
    pdl-init-file-entry                                                 [PWG5100.11]
    pdl-init-file-location                                              [PWG5100.11]
    pdl-init-file-name                                                  [PWG5100.11]

  pdl-override-supported (type2 keyword):                               [PWG5100.11]
    guaranteed                                                          [PWG5100.11]

  proof-print-supported (1setOf type2 keyword)                          [PWG5100.11]
    media                                                               [PWG5100.11]
    media-col                                                           [PWG5100.11]
    proof-print-copies                                                  [PWG5100.11]


  save-disposition (type2 keyword)                                      [PWG5100.11]
    none                                                                [PWG5100.11]
    print-save                                                          [PWG5100.11]
    save-only                                                           [PWG5100.11]

  save-info-supported (1setOf type2 keyword)                            [PWG5100.11]
    save-document-format                                                [PWG5100.11]
    save-location                                                       [PWG5100.11]
    save-name                                                           [PWG5100.11]

  which-jobs (type2 keyword)                                            [PWG5100.11]
    aborted                                                             [PWG5100.11]
    all                                                                 [PWG5100.11]
    canceled                                                            [PWG5100.11]
    pending                                                             [PWG5100.11]
    pending-held                                                        [PWG5100.11]
    processing                                                          [PWG5100.11]
    processing-stopped                                                  [PWG5100.11]
    proof-print                                                         [PWG5100.11]
    saved                                                               [PWG5100.11]
```

## 13.3 Type2 enum attribute value registrations

```
Attribute (attribute syntax)
    Enum Value  Enum Symbolic Name                                      Reference
    ----------  ------------------                                      -----------
  operations-supported (1setOf type2 enum)                              [PWG5100.11]
```

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| | | |
|---|---|---|
| 0x0038 | Cancel-Jobs | [PWG5100.11] |
| 0x0039 | Cancel-My-Jobs | [PWG5100.11] |
| 0x003B | Close-Job | [PWG5100.11] |
| 0x003A | Resubmit-Job | [PWG5100.11] |

## 13.4 Operation registrations

| Operation Name | Reference |
|---|---|
| Cancel-Jobs | [PWG5100.11] |
| Cancel-My-Jobs | [PWG5100.11] |
| Close-Job | [PWG5100.11] |
| Resubmit-Job | [PWG5100.11] |

# 14. References

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# 16. Overview of Changes

## 16.1 IPP Job and Printer Extensions - Set 2 v2.0

These changes were made to produce the IPP Job and Printer Extensions - Set 2 v2.0 revision.

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# 17. Change History

## 17.1 August 28, 2018

Initial revision of JPS2v2. A number of editorial changes to update references and move Printer Description attributes to their rightful section.

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