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IPP Enterprise Printer Extensions v2.0 (EPX)

Status: Interim

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

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1. Introduction

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

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

2. Terminology

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

2.1 Conformance Terminology

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

2.2 Printing Terminology

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

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

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

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

Output Device: a single Logical or Physical Device

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Physical Device: a hardware implementation of ~~a~~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 Job State Terminology

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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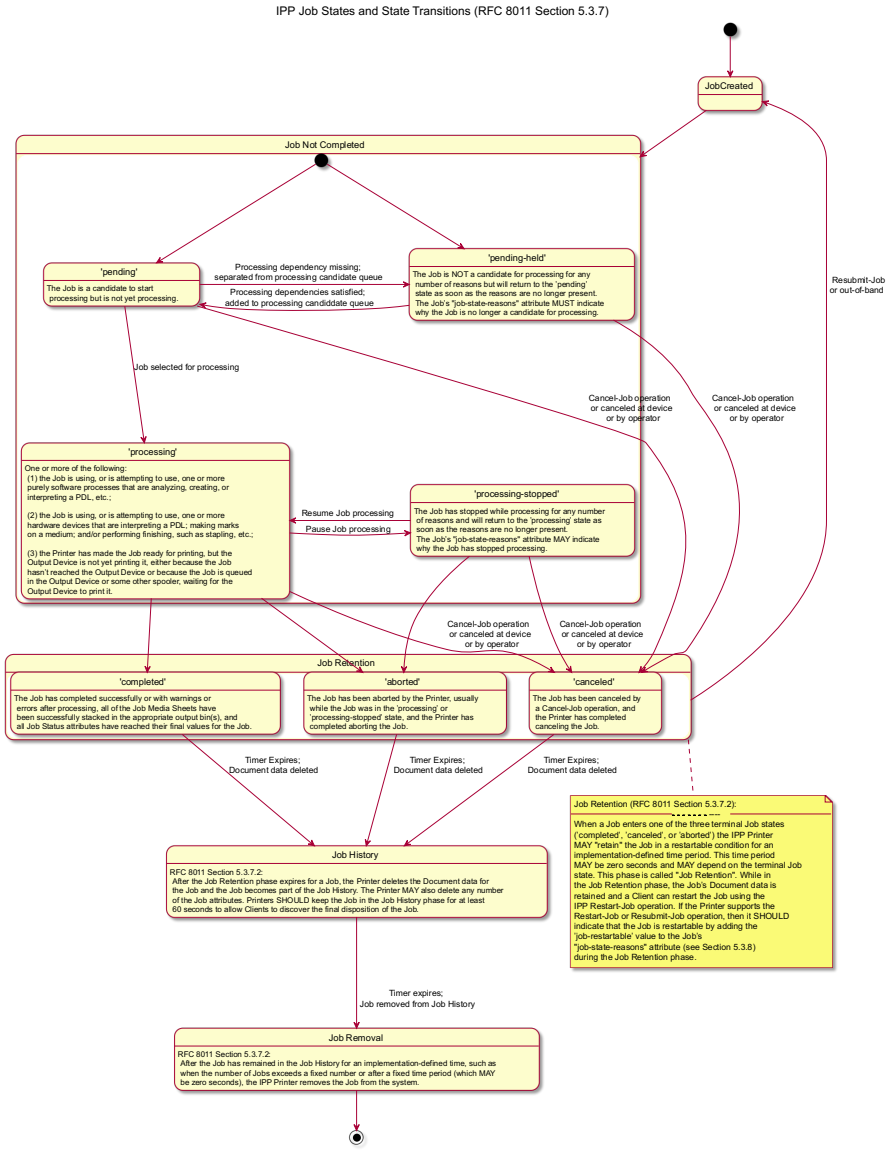

Figure 1 - IPP Job States and Transitions

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2.5 Other Terminology

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

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

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

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

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.

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

Proof Job: 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 bitmap representation of an image.

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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). An exact copy of a Retained Job can be created using a Reprocess-Job operation. A modifiable copy of a Retained Job can be created using a Resubmit-Job operation.

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

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

2.6 Acronyms and Organizations

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

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

3.1 Rationale for IPP Enterprise Printer Extensions v2.0

IETF and PWG IPP printing standards define 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]. Some IPP Printers already support proofing, saving, and reprinting of large Print Jobs via vendor proprietary operations and attributes.

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

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

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

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3.2 Use Cases

3.2.1 Job Protection Using a Job Password ~~Protected Job~~

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

3.2.2 Authenticated Job Release

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

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

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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.

3.2.4 Job Storage

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

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

3.3 Exceptions

3.3.1 Unauthorized Access Job Protection Using a Job Password ~~Protected Job~~

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

3.4 Out of Scope

The following are considered out of scope for this document:

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

3.5 Design Requirements

This IPP Enterprise Printer Extensions v2.0 design should:

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

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

(3) Define new attributes in support of the ~~Password Protected~~ Job ~~feature~~Protection Feature;

(4) Define new attributes in support of the Job Storage feature;

(5) Define new attributes in support of the Job Proof Print ~~feature~~Feature;

(6) Define additional attributes .

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4. Semantics Common to More Than One Attribute

4.1 Overview

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

4.2 Job Storage Feature

The Job Storage Feature enables a User to "store" a Job and its Documents in their originally submitted and unprocessed form, so that the Job mightcan be selected for reprinting at a later time. A Stored Job's visibility will depend on its access settings; it might be visible to all users, or might only be visible to the originating user, or a particular group. A Client requests a Job be treated as a Stored Job by supplying the “job-storage” Job Template attribute (section 6.5) when submitting the Job Creation operation.

As with the Job Save and Reprint Feature, the Printer retains the Job indefinitely in the 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, rather than aging the job out after an implementation-defined period.

4.2.1 Creating Stored Jobs

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

4.2.2 Identifying and Listing Stored Jobs

A Job indicates its Job Storage status using one of the "job-state-reasons" keywords for the Job Storage Feature defined in section 0. A Client can get a listing of Stored Jobs by specifying either the 'stored-public' or 'stored-owner' keyword for the "which-jobs" attribute (section 9.1) in a Get-Jobs operation [STD92].

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4.2.3 Reprinting Stored Jobs

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

4.2.3.1 Reprinting Stored Jobs using the Resubmit-Job operation

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

4.2.3.2 Reprinting Stored Jobs using the Printer Control Panel

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

4.3 ~~Password Protected~~ Job Protection Feature

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

The password is permanently attached to the Job and persists with the Job until it enters the Job History phase [STD92]. If the Job is copied, as in the case of reprinting a Stored Job, the password is preserved in the new copy. This feature can be combined with the Job Storage Feature and/or the Job Proof Print ~~feature~~Feature.

4.4 Job Proof Print Feature

~~4.4.1 Original~~

The Job Proof Print Feature enables a User to print a Proof 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 Job at a later time. A Client requests a Printer to print and save a Proof Job by supplying the “proof-print” Job Template attribute (section 6.6) when submitting the job. In this case, the Printer retains the Proof Job indefinitely in the so-called Job Retention Phase (see [STD92] section 5.3.7.2 Partitioning of Job Sates) in the job’s terminal state (‘completed’, ‘aborted’, or

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'canceled') after processing it, rather than aging the job out after an implementation-defined period. In other words, a Proof 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 Job using the Resubmit-Job operation [PWG5100.7]. See section 12.5 Conformance Requirements for the REQUIRED "proof-print" Job Template attribute for additional conformance requirements for Clients and Printers.

~~**4.4.2 New**~~

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

5. New Operation Attributes for Existing Operations

This section defines additional Operation attributes for existing IPP operations.

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

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

The Client encrypts the password acquired by the job submitting application using one of the methods specified by the "job-password-encryption-supported" attribute. The encrypted password value 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 disposition the Job according to the "job-password-action" operation attribute; if the "job-password-action" attribute is absent, the Printer MUST put the Job in the 'pending-held' state and add the 'job-password-wait' value to the Job's "job-state-reason" attribute.

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

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

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

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

5.2 job-password-action (type2 keyword)

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

Standard keyword values include:

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

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

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

The "job-password-encryption" Operation attribute specifies the type of encryption used to create the value specified by the "job-password" operation 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 value MUST be one of the values specified in the Printer's "job-password-encryption-supported" attribute (section 8.3).

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

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

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

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6. Job Template Attributes

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

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

This Job Template attribute specifies the maximum number of seconds that are allowed for processing a Job. The cancel timer does not begin until the Job enters the 'processing' state. If the Job is canceled because of this timer, the Printer MUST add the 'job-canceled-after-timeout' keyword ~~(section **Error! Reference source not found.**)~~ to the "job-state-reasons" Job Status attribute~~.~~ (section 9.3).

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

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

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

~~6.2~~6.3 job-phone-number (uri)

This Job Template 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.

~~6.3~~6.4 job-recipient-name (name(MAX))

This Job Template 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 Job Creation 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.

~~6.4~~6.5 job-storage (collection)

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

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

~~6.4.1~~6.5.1 job-storage-access (type2 keyword)

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

~~6.4.2~~6.5.2 job-storage-disposition (type2 keyword)

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

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

~~6.4.3~~6.5.3 job-storage-group (name(MAX))

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

~~6.5~~6.6 proof-print (collection)

This Job Template attribute indicates to the Printer that this Job is a Proof Job. 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 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 (see Job Retention phase in [STD92] section 5.3.7.2 Partitioning of Job States). When a Proof 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 Job to the copy of the Proof 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 Enterprise Printer Extensions 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 Printers.

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

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

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

Table 1 - "proof-print" member attributes

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

~~6.5.1~~6.6.1 proof-print-copies (integer (0:MAX))

The "proof-print-copies" 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.

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

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 Job, rather than aging the job out.

~~6.5.2~~6.6.2 media (type2 keyword | name(MAX)) or media-col (collection)

Either the "media" (see [STD92]) or the "media-col" 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 (see [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 (defined [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

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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 (defined in [PWG5100.3] and in section 11.5 of this specification), 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.

7. Job Status Attributes

7.1 job-storage (collection)

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

8. Printer Description Attributes

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

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

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

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

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

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

Standard password action keyword values include:

- 'hold-job': The Job is placed in the 'pending-held' state and is released when the "job-password" value is entered at the Printer's console. The Job MUST NOT be retained once it has reached its terminal state ('completed', aborted' or 'canceled').This is the semantic originally specified for the "job-password" operation attribute (section 5.1).

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- 'process-and-retain': The Job is placed in the 'pending' state and it scheduled for processing without waiting for the User to enter the "job-password" value at the Printer's console.

- 'retain-only': The Job is placed in the 'completed' state as soon as all Documents are received by the Printer. The Printer will require a matching password for all reprints.

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

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

The "job-password-encryption-supported" Printer Description 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 in Table 2. The 'md2', 'md4', 'md5', and 'sha' keywords have been DEPRECATED. Others may be deprecated in the future as the state of the art of cryptography evolves.

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

Keyword	Description
'none'	The "job-password" attribute value is passed in the clear. No encryption has been applied. This value might also be used when the entire Operation is sent over a secure connection.
'md2'	The encryption method uses the MD2 hash algorithm defined in RFC 1319. **[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.

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

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

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

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

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

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'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.

[1] - Deprecated

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

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

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

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

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

The keywords are named according to a 'REGISTRY_ENCODING_RANGE' naming structure convention. Table 3 lists the standard keywords. Vendor repertoire keywords, prefixed with "vendor_" to indicate a vendor-specific registry, may also be used. Vendor repertoire keywords SHOULD be registered with the PWG to achieve interoperability. As an example, a vendor may choose to register the 'vendor_us-ascii_lowercase' keyword to specify a repertoire limited to using only lowercase characters from the US ASCII encoding.

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

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

Keyword	*Description*
'iana_us-ascii_digits'	Value must consist of only ASCII digits (0x30-0x39)
'iana_us-ascii_letters'	Value must consist of only US ASCII letters (0x41-0x5A, 0x61-0x7A)
'iana_us-ascii_complex'	Value must consist of US ASCII letters and numbers, with at least one uppercase letter, one lowercase letter, and one digit (0x30-0x39, 0x41-0x5A, 0x61-0x7A)

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'iana_us-ascii_any'	Value must consist of US ASCII printable characters (0x20-0x7e)
'iana_utf-8_digits'	Value must consist of only UTF-8 numerical digits
'iana_utf-8_letters'	Value must consist of UTF-8 letters
'iana_utf-8_any'	Value must consist of UTF-8 printable characters

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

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

8.8 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.

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

This attribute lists the

~~8.9~~8.10 job-phone-number-default (uri)

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

~~8.10~~8.11 job-phone-number-supported (boolean)

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

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~~8.11~~8.12 job-recipient-name-default (name(MAX))

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

~~8.12~~8.13 job-recipient-name-supported (boolean)

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

~~8.13~~8.14 job-storage-supported (1setOf keyword)

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

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

~~8.14~~8.15 job-storage-access-supported (1setOf type2 keyword)

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

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

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

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~~8.15~~8.16 job-storage-disposition-supported (1setOf type2 keyword)

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

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

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

~~8.16~~8.17 job-storage-group-supported (1setOf name(MAX))

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

~~8.17~~8.18 proof-print-default (collection)

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

~~8.18~~8.19 proof-print-supported (1setOf ~~type2~~ keyword)

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

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

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

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

9. Additional Values and Semantics for Existing IPP Attributes

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

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

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

Table 6 - Additional Keywords for "job-hold-until"

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

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

Commented [KS(&SA13]: Minutes from April 2019 F2F said to drop this. But how should we then support the use case where a user's account credentials are used to release a held Job?

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

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

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Table 7 - Additional Keywords for "which-jobs" and "which-jobs-supported"

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

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

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

This section adds additional keywords to the "job-cancel-after" attribute (section 6.1) in support of the Job Storage Feature~~,~~ (section 4.2), the ~~Password Protected~~ Job Protection Feature~~,~~ (section 4.3) and the Job Proof Print Feature~~:~~ (section 4.4).

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-storage-disposition" attribute is store-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 Stored 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.

There are also new four new "job-state-reasons" keyword values REQUIRED that support a Stored Job: 'job-storing', 'job-stored-successfully', 'job-stored-with-warnings', and 'job-stored-with-errors'. 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 8 defines the meanings of these 4 new "job-state-reasons" keywords.

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Table 8 - Additional Keywords for "job-state-reasons"

Keyword	Description
'job-canceled-after-timeout'	The Job was canceled because the timer with a duration specified by the "job-cancel-after" attribute (section 7.4) to the "job-state-reasons" Job Status attribute.
'job-awaiting-password'	The Job is in the 'pending-held' state awaiting a password to be entered to allow it to be released to processing.
'job-awaiting-proof-release'	The Job is in the 'processing-stopped' state following the printing of the first copy, awaiting a signal of approval to allow the remaining copies to be produced.
'job-password-timeout'	The Job is in the 'aborted' state being retained and stored by the Printer, ready to be duplicated to produce a new reprint Job.
'job-stored-successfully'	The job was successfully saved. The Printer MUST also supply 'job- completed-successfully', except when "job-storage-disposition" = 'store-only'. If the "job-storage" Job Template attribute is supported, this value MUST be supported.
'job-stored-with-errors'	The job did not save successfully (whether or not it was printed successfully, printed with warnings, printed with errors, or not printed). The Printer MUST ensure that none of the saved job is accessible, if it was unable to successfully save all of the job. If the "job-storage" Job Template attribute is supported, this value MUST be supported.
'job-stored-with-warnings'	The job was saved with warnings. If the "job-storage" Job Template attribute is supported, this value MUST be supported.
'job-storing'	The Printer is transmitting the job to the save location. This is similar to the 'job-printing' value. If the "job-storage" Job Template attribute is supported, this value MUST be supported.

~~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-storage-disposition" attribute is store-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 Stored 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 now four new "job-state-reasons" keyword values REQUIRED that support a Stored Job: 'job-storing', 'job-stored-successfully', 'job-stored-with-warnings', and 'job-stored-with-errors'. 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. **Error! Reference source not found.** defines the meanings of these 4 new "job-state-reasons" keywords.~~

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

Table 9 - Values of "job-state-reasons" attribute for various job conditions

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

10. Obsolete Attributes and Values

10.1 Obsolete Attributes

Table 10 lists the attributes that are OBSOLETE.

Table 10 - Obsolete Attributes

Attribute	Explanation
job-save-disposition	The Job Save and Reprint Feature [PWG5100.11] has been deprecated

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pages-per-subset	Redundant with "job-pages-per-set" [PWG5100.1]
sheet-collate	

10.2 Obsolete Values

Table 11 lists the values that are OBSOLETE.

Table 11 - Obsolete Values

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

~~10.~~11. Conformance Requirements

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

~~10.1~~11.1 Conformance Requirements for this specification

In order for a client and a Printer to claim conformance to this IPP Enterprise Printer Extensions 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)~~

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~~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)~~

~~5.~~1. The "job-ids" Operation attribute (section 6.3) in the Get-Jobs operation [RFC2911] (section 3.2.6)

~~6.~~2. The "job-ids" Operation attribute (section 6.3) in the Purge-Jobs operation[RFC2911] (section 3.2.9), if Purge-Jobs operation is supported (section 6.4)

~~7.~~3. The "proof-print" Job Template attribute (sections 7.11). See also section 12.5 Conformance Requirements for the REQUIRED "proof-print" Job Template attribute

~~8.~~4. The "job-ids-supported" Printer Description attribute (section 10.2)

~~9.~~5. 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~~11.2 Conditional Conformance Requirements for Printers

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]) • Hold-Job operation with the "job-hold-until" ([STD92]) and "job-hold-until-time" (section **Error! Reference source not found.**) Operation attributes • Release-Job operation [STD92].
"job-delay-output-until-time" Job Template attribute in Job Creation operations	• "job-delay-output-until" Job Template attribute (section 6.1) • Set-Job-Attributes operation (section **Error! Reference source not found.**)
"job-delay-output-until" Job Template attribute in Job Creation operations	Set-Job-Attributes operation (section **Error! Reference source not found.**)

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~~11.~~ 12. Internationalization Considerations

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

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 [RFC 5198]
- 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 in XML and other Markup Languages [UTR20] – XML usage
- Unicode Character Property Model [UTR23] – character properties
- Unicode Conformance Model [UTR33] – Unicode conformance basis

~~12.~~ 13. Security Considerations

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

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

Unicode Security FAQ [UNISECFAQ] – common Unicode security issues

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~~13.~~14. IANA Considerations

~~13.1~~14.1 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
job-cancel-after (integer(1:MAX))	[IPPEPE]
job-phone-number (uri)	[IPPEPE]
job-recipient-name (name(MAX))	[IPPEPE]
job-storage (collection)	[IPPEPE]
job-storage-access (type2 keyword)	[IPPEPE]
job-storage-disposition (type2 keyword)	[IPPEPE]
job-storage-group (name(MAX))	[IPPEPE]
~~storage-access (type2 keyword)~~	~~[IPPEPE]~~
proof-print (collection)	[IPPEPE]
media (type2 keyword | name(MAX))	[IPPEPE]
media-col (collection)	[IPPEPE]
proof-print-copies (integer (0:MAX))	[IPPEPE]

Operation attributes:	Reference
job-password (octetString(255))	[IPPEPE]
job-password-action (type2 keyword)	[IPPEPE]
job-password-encryption (type2 keyword | name(MAX))	[IPPEPE]

Job Status attributes:	Reference
job-~~save-printer-make-and-model (text(127))~~storage (collection) [IPPEPE]	

Printer Description attributes:	Reference
job-cancel-after-default (integer(1:MAX))	[IPPEPE]
job-password-action-supported (1setOf (type2 keyword))	[IPPEPE]
job-password-encryption-supported (1setOf (type2 keyword | name(MAX)))	[IPPEPE]
job-password-repertoire-configured (1setOf (type2 keyword | name(MAX)))	[IPPEPE]
job-password-repertoire-supported (1setOf (type2 keyword | name(MAX)))	[IPPEPE]
job-password-supported (integer(0:255))	[IPPEPE]
job-phone-number-default (uri)	[IPPEPE]
job-phone-number-supported (boolean)	[IPPEPE]
job-print-password-supported (octetString(256))	[IPPEPE]
job-print-password-encryption-supported (type2 keyword)	[IPPEPE]
job-print-password-repertoire-supported (type2 keyword)	[IPPEPE]
job-recipient-name-default (name(MAX))	[IPPEPE]
job-recipient-name-supported (boolean)	[IPPEPE]
printer-detailed-status-messages (1setOf text(MAX))	[IPPEPE]
proof-print-default (collection)	[IPPEPE]
proof-print-supported (1setOf type2 keyword)	[IPPEPE]
proof-print-copies-supported (rangeOfInteger(0:MAX))	[IPPEPE]
proof-print-password-supported (1setOf type2 keyword) [IPPEPE]	

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```
save-disposition-supported (1setOf (type2 keyword))                    [IPPEPE]
save-document-format-default (mimeMediaType)                           [IPPEPE]
save-document-format-supported (1setOf mimeMediaType)                  [IPPEPE]
save-location-default (uri)                                            [IPPEPE]
save-location-supported (1setOf uri)                                   [IPPEPE]
save-name-subdirectory-supported (boolean)                             [IPPEPE]
save-name-supported (boolean)                                          [IPPEPE]
which-jobs-supported (1setOf type2 keyword)                            [IPPEPE]
```

~~13.2~~14.2 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
------------------------------                                         -------------
job-hold-until  (type2 keyword)                                        [IPPEPE]
job-hold-until-supported  (1setOf (type2 keyword))                     [IPPEPE]
  owner-authorized                                                     [IPPEPE]
  button-press                                                         [IPPEPE]

job-password-action  (type2 keyword)                                   [IPPEPE]
job-password-action-supported  (1setOf (type2 keyword))                [IPPEPE]
  hold-job                                                             [IPPEPE]
  process-and-retain                                                   [IPPEPE]
  retain-only                                                          [IPPEPE]

job-password-encryption  (type2 keyword | name(MAX))                   [IPPEPE]
job-password-encryption-supported  (1setOf (type2 keyword | name(MAX)))[IPPEPE]
  md2                                                                  [IPPEPE]
  md4                                                                  [IPPEPE]
  md5                                                                  [IPPEPE]
  none                                                                 [IPPEPE]
  sha                                                                  [IPPEPE]
  sha2-224                                                              [IPPEPE]
  sha2-256                                                              [IPPEPE]
  sha2-384                                                              [IPPEPE]
  sha2-512                                                              [IPPEPE]
  sha2-512_224                                                         [IPPEPE]
  sha2-512_256                                                         [IPPEPE]
  sha3-224                                                              [IPPEPE]
  sha3-256                                                              [IPPEPE]
  sha3-384                                                              [IPPEPE]
  sha3-512                                                              [IPPEPE]
  sha3-512_224                                                         [IPPEPE]
  sha3-512_256                                                         [IPPEPE]
  shake-256                                                            [IPPEPE]
  shake-512                                                            [IPPEPE]

job-save-disposition-supported  (1setOf type2 keyword)                 [IPPEPE]
  save-disposition                                                     [IPPEPE]
  save-info                                                            [IPPEPE]

job-spooling-supported  (type2 keyword)                                [IPPEPE]
```

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```
    automatic                                                    [IPPEPE]
    spool                                                        [IPPEPE]
    stream                                                       [IPPEPE]

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

job-storage-supported (type2 keyword)                            [IPPEPE]
    job-storage-access                                           [IPPEPE]
    job-storage-disposition                                      [IPPEPE]
    job-storage-group                                            [IPPEPE]

proof-print-supported (1setOf type2 keyword)                     [IPPEPE]
    media                                                        [IPPEPE]
    media-col                                                    [IPPEPE]
    proof-print-copies                                           [IPPEPE]

which-jobs (type2 keyword)                                       [IPPEPE]
    proof-print                                                  [IPPEPE]
    stored                                                       [IPPEPE]
```

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

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~~16.~~ 17. Change History

17.1 September 3, 2019

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

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

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- Removed the " | name(MAX)" from the syntax definition for job-password-encryption, since site-defined localized strings in that context would seem to be unlikely and of limited value
- Added "job-pause-after" and then questioned whether we ought to be adding it
- Added a MAY statement allowing "job-password" to be used with "proof-print", with corresponding conditional requirements, so that the Job Proof Print Feature and Job Protection Feature can be used with a single Job to make a Protected Proof Print Job.
- Added "proof-print-password-supported" and "proof-print-copies-supported"
- Various questions still to be resolved are in comments

~~16.1~~17.2 June 14, 2019

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

~~16.2~~17.3 March 27, 2019

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

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