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The Printer Working Group
Internet Printing Protocol (IPP): Document object

18 ISSUES are highlighted like this.
ISSUE 01: Need to add all new attributes to CIP4/PODi/FSG IPP mapping document. When?

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The Printer Working Group Standard for Internet Printing Protocol (IPP): Document Object

Abstract: This IPP specification extends the IPP Model and Semantics [RFC2911] object model by defining a Document object. The [RFC2911] Job object is extended to contain one or more Document objects which are passive objects operated on by the Job. The Document object is created by the [RFC2911] Send-Document and Send-URI operations and represents an Input Document to the Job. Theis extension specification also adds a Document Attributes group (and tag) to these Send-Document and Send-URI requests. The Document Attributes group which contains any Document Template attributes to be applied to this Document object being created, overriding any corresponding Job Template attribute supplied at the job level (including the "document-overrides" operation attributes at the Job or Document level). A new Create-Document operation allows a client to supply the Document Attributes without the data (like Create-Job does for a Job object). Then the client sends the data content to that Document object using the new Send-Data operation. The client can also supply Document Attributes with the existing Send-Document and Send-URI operations to create Document objects with content data or a document reference, respectively.

This specification Aalso there aredefines seven new operations defined for Document objects once they have been created: Cancel-Current-Document, Cancel-Document, Get-Document-Attributes, Get-Documents, Delete-Document, Set-Document-Attributes, and Validate-Document.

This specification also lists all of the attributes defined in other IPP specifications to show their relationship to corresponding attributes defined in this IPP specification for use with the Document object. The full semantics of the "document-state", and "document-state-reasons", and "document-state-message" Document Description attributes is are given along side of the corresponding [RFC2911] "job-state", and "job-state-reasons", and "job-state-message" Job Description attributes.

The purpose for specifying the Document object is so that we the print industry can have a common semantic specification for use in IPP, the PWG Semantic Model, the PWG Print Service Interface (PSI) project, and the Free Standards Group Job Ticket API which all have a Document object.

This document is available electronically at:

ftp://ftp.pwg.org/pub/pwg/ipp/new_DOC/IPP-document-object.pdf, .doc, .rtf

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1 Introduction and Summary

Abstract: This IPP specification extends the IPP Model and Semantics [RFC2911] object model by defining a Document object. The [RFC2911] Job object is extended to contain one or more Document objects which are passive objects operated on by the Job. The Document object is created by the [RFC2911] Send-Document and Send-URI operations and represents an Input Document to the Job. Th~~e~~is ~~extension~~ specification also adds a Document Attributes group (and tag) to these Send-Document and Send-URI requests. The Document Attributes group ~~which~~ contains any Document Template attributes to be applied to this Document object being created, overriding any corresponding Job Template attribute supplied at the job level (including the "document-overrides" operation attributes at the Job or Document level). A new Create-Document operation allows a client to supply the Document Attributes without the data (like Create-Job does for a Job object). Then the client can send the data content to that Document object using the new Send-Data operation.

This specification ~~A~~also ~~there are~~defines seven new operations ~~defined~~ for Document objects once they have been created: Cancel-Current-Document, Cancel-Document, Get-Document-Attributes, Get-Documents, Delete-Document, Set-Document-Attributes, and Validate-Document.

This specification also lists all of the attributes defined in other IPP specifications to show their relationship to corresponding attributes defined in this IPP specification for use with the Document object. The full semantics of the "document-state", ~~and~~ "document-state-reasons", and "document-state-message" Document Description attributes ~~is~~ are given along side of the corresponding [RFC2911] "job-state", ~~and~~ "job-state-reasons", and "job-state-message" Job Description attributes.

The intent is to propose this specification as an IPP extension and which will be referenced as part of the PWG Semantic Model. The purpose for specifying the Document object is so that ~~we~~ the print industry can have a common semantic specification for use in IPP, the PWG Semantic Model [pwg-sm], the PWG Print Service Interface (PSI) project [pwg-psi], and the Free Standards Group Job Ticket API [fsg-jt] which all have a Document object.

1.1 Scope

Part of the extension is to allow the client to supply printing instructions, called Document Template attributes, when creating each Document object. An IPP Printer object implementation MAY support most of the existing Job Template attributes as Document Template attributes as well. (The PWG Semantic Model [pwg-sm] currently calls the Job Template attributes and Document Template attributes simply "Job Processing" and "Document Processing" attributes). Note: There are a number of footnotes which relate this IPP specification to the PWG Semantic model and other PWG projects, such as the Print Service Interface (PSI) [pwg-psi].

The Document object is a passive object[1] and is operated upon by the Job. ~~However,~~ The client uses the new Create-Document operation or either of the existing Send-Document and Send-URI operations to create a Document object. In addition there are 8~~7~~ new operations that affect the Document object after it has been~~is~~ created as summarized in Table 1.

[1] The Document object is *not* a sub-job. If Job trees are desired where sub-jobs can be on different network nodes, such as in JDF, then a separate specification should be generated for Job trees.

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Table 1 - List of Document operations

Operation Name	Printer support	Brief Description
Create-Document[2]	REQUIRED	Creates a Document object with Document attributes, but no data.
Send-Data	REQUIRED	Sends data to the Document object created by Create-Document.
Send-Document *	REQUIRED	Creates a Document object with Document attributes and data.
Send-URI *	OPTIONAL	Creates a Document object with Document attributes and a URL reference to the data (print-by-reference).
Get-Document-Attributes	REQUIRED	Get requested attributes of specified Document in the specified Job.
Get-Documents	REQUIRED	Get requested attributes of all of the Documents in the specified Job.
Set-Document-Attributes	OPTIONAL	Set the supplied Document attributes on the specified Document.
Cancel-Document	OPTIONAL	Cancel the specified Document in the specified Job, but don't remove it.
Cancel-Current-Document	OPTIONAL	Cancel the current document that the Printer is printing.
Delete-Document	OPTIONAL	~~Delete~~ Remove the specified Document object and its data from the Job.
Validate-Document	REQUIRED	Validate that the supplied Document attributes are supported.

* The existing IPP/1.1 operations defined in [RFC2911] with an extension so the client can supply Document Template attributes.

~~This document specifies the semantics of these seven new operations by comparing them to the corresponding Job operations.~~

~~ISSUE 1a: Do we need formal definitions of each Operation or is the comparison with Job operations in sufficient?~~

This specification also specifies the life cycle of the Document object by defining the "document-state", ~~and~~ "document-state-reasons", and "document-state-message" attributes. ~~No "document-state-message" is defined since the Job's "job-state-message" text message can identify individual documents when that is needed.~~ Finally, the analogous Document Descriptions attributes that correspond to the Job Description attributes are ~~proposed~~defined.

2 Terminology

This section defines terminology used throughout this document.

2.1 Conformance Terminology

Capitalized terms, such as **MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, MAY, NEED NOT,** and **OPTIONAL**, have special meaning relating to conformance as defined in RFC 2119 [RFC2119] and [RFC2911] section 12.1. If an implementation supports the extension defined in this document, then these terms apply; otherwise, they do not. These terms define conformance to *this document (and [RFC2911]) only*; they do not affect conformance to other documents, unless explicitly stated otherwise. To be more specific:

REQUIRED - an adjective used to indicate that a conforming IPP Printer implementation MUST support the indicated operation, object, attribute, attribute value, status code, or out-of-band value in requests and responses. See [RFC2911] "Appendix A - Terminology for a definition of "support". *Since support of this entire Document Object specification is OPTIONAL for conformance to IPP/1.1, the use of the term REQUIRED in this document means "REQUIRED if this OPTIONAL Document Object specification is implemented".*

[2] The Create-Document operation maps to the PWG PSI Send-Document-By-Post operation and the Send-Data maps to the HTTP Post operation.

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RECOMMENDED - an adjective used to indicate that a conforming IPP Printer implementation is recommended to support the indicated operation, object, attribute, attribute value, status code, or out-of-band value in requests and responses. *Since support of this entire Document Object specification is OPTIONAL for conformance to IPP/1.1, the use of the term RECOMMENDED in this document means "RECOMMENDED if this OPTIONAL Document Object specification is implemented".*

OPTIONAL - an adjective used to indicate that a conforming IPP Printer implementation MAY, but is NOT REQUIRED to, support the indicated operation, object, attribute, attribute value, status code, or out-of-band value in requests and responses.

2.2 Other Terminology

This document uses the same terminology as [RFC2911], such as "**client**", "**Printer**", "**attribute**", "**attribute value**", "**keyword**", "**Job Template attribute**", "**Operation attribute**", "**operation**", "**request**", "**response**", and "**support**" with the same meaning. In addition, the following terms are defined for use in this document:

Document object - the object to represent the logical concept of a document in a Job. A **Job object** can contain one or more **Document objects**.

Job Creation operation - operations that create Job objects, specifically: Print-Job, Print-URI, and Create-Job as defined in [RFC2911].

Document Creation operation - operations that create Document objects. Specifically: Create-Document, Print-Job, Print-URI, Send-Document and Send-URI ~~as defined in [RFC2911]~~. Note: the Print-Job and Print-URI are both **Job Creation** and **Document Creation** operations, since they create both Job and a **Document object** at the same time. Also this specification does not extend the Print-Job and Print-URI operations. However, this specification does extend the Send-Document and Send-URI operations to allow the client to supply **Document Template** attributes in each request.

Job Level - attributes supplied in the Print-Job, Print-URI, and Create-Job are referred to as being supplied at the **Job Level**. Attributes supplied at the **Job Level** are a mixture of **Job attributes** and **Document attributes**. **Job attributes** apply to the Job as a whole, while **Document attributes** provide defaults for the **Document objects** in case the client does not supply a **Document attribute** at the **Document Level** for a **Document object**. Put another way, **Document objects** *inherit* **Document attributes** from the **Job object** which are used if the client didn't supply a corresponding attribute for the **Document object**.

Document Level - attribute supplied in the Send-Document, Send-URI, and Create-Document operations are referred to as being supplied at the **Document Level**. Note: attribute supplied in the Print-Job and Print-URI requests are considered as being supplied at the **Job Level** only, *not* also at the **Document Level**, even though Print-Job and Print-URI also create **Document objects**.

Attribute Precedence - the precedence rules which dictate which attribute value takes precedence when the same attribute is supplied at different points in the work flow with different values, such as at both the **Job Level** and the **Document Level**. See section 5.

Job Attribute - an **Operation attribute** or a **Job Template** attribute that applies to the Job (object) as a whole. For example, "job-name" is an **Operation attribute** and "job-priority" is a **Job Template attribute**.

Document Template attribute - an attribute that the client supplies in a ~~Document Creation~~ Create-Document, Send-Document, or Send-URI operation request in the Document Attributes group. For example, "media".

Document attribute - an **Operation attribute** or a **Document Template attribute** that applies to a **Document object** as a whole. For example, "document-format" is an Operation attribute and "media" is a Document Template attribute.

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Table 2 shows this terminology as applied to the six operations. Note that Print-Job and Print-URI are both Job Creation operations and Document Creation operations, though they only create single Document jobs. In other words, for Print-Job and Print-URI, there is only one document per job, so whether the attributes are considered to be submitted at the Job Level and then inherited by the Document object, is moot, since these operations do not have a separate Document group in which the client can supply Document attributes. Note also that for the "Level" concept, no operation supplies attributes at more than one level.[3]

Table 2 - Job Creation and Document Creation operations

Job Creation operation	Document Creation operation	Operation	Attribute Group in Request		Level
			Job	Document	
yes		**Create-Job**	Job attributes and Document attributes		Job Level
yes	yes	**Print-Job**	Job attributes and Document attributes		
yes	yes	**Print-URI**	Job attributes and Document attributes		
	yes	**Create-Document**		Document attributes	Document Level
	yes	**Send-Document**		Document attributes	
	yes	**Send-URI**		Document attributes	

~~ISSUE 1b: Should Print-Job and Print-URI also be called Document Creation operations since they create one Document object? The answer probably depends on the answer to the following issue: Yes~~

~~ISSUE 1c: We're adding a Document Attribute group (tag) to Send-Document and Send-URI so that a client can supply Document Template attributes. OK that we don't add this group to Print-Job and Print-URI? The problem with adding the Document Template attribute group to Print-Job and Print-URI requests is that there becomes two ways for a client to supply many of the Job Template attributes that are Document Processing attributes, such as "media", "number-up", etc., Those two ways in a Print-Job or Print-URI are (1) in the Job Template attribute group or (2) in the Document Template attribute group. The PWG Semantic Model is defining each Processing attribute to be either a Job Processing attribute or a Document Processing attribute, but not both, so that there will only be one way to submit each Processing attribute in a PrintJob operation according to whether it is defined to be a Job Processing Attribute or a Document Processing Attribute. But for backward compatibility, IPP's Job Template attributes are a mixture of Job and Document Processing attributes, i.e., "job-priority" and "job-hold-until" versus "media" and "number-up" are passed mixed together in the Job Template attribute group. Yes~~

Document Overrides - a way for a client to specify attributes to apply to specified documents in a multi-document job. Specifically, as member attributes of the "document-overrides" **Job Template attribute** in a **Job Creation**

[3] The PWG Semantic Model [pwg-sm] calls the Operation attributes supplied by the client: Job Description attributes or Document Description attributes for the Job Creation and Document Creation operations, respectively. The [pwg-sm] also calls Job Template attributes and Document Template attributes: Job Processing and Document Processing attributes, respectively. Each Processing attribute is defined to be a Job Processing or a Document Processing attribute, but is not both. The client can supply both Job Processing and Document Processing attributes in a Job Creation operation, in which case the Document Processing attributes server as defaults for the Document objects. The Printer copies all of these client's supplied attributes to the Job or Document object. Read-only Job and Document attributes that the system sets are called Job State and Document State attributes (instead of Description attributes).

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operation or the "document-overrides" **operation attribute** in a **Document Creation operation** as defined in [override]. Note: The **Document Template attributes** supplied in a Create-Document, Send-Document, or Send-URI operation also "override" any Document Template attributes supplied in the Job Creation operation.

3 Document Operations

The Document object semantics are as parallel to the Job object semantics as possible. Therefore, most of the Job operations have analogous Document operations as shown in Table 13 in section "Appendix A: Document operations compared to Job operations". Operations that can apply only to an entire job, have no analogous document operation as indicated. This extension adds 8~~7~~ new Document operations that operate on the Document object once it is created by the new Create-Document operation or either of the existing two operations: Send-Document and Send-URI operations.

Note: By Document object we mean the object once it become a contained part of a Job object, not before or after. So in this specification a Document object does not represent data in a repository.

~~compares the Job and Document operations. The two Conf. columns indicate the conformance requirements (REQUIRED = REQ, OPTIONAL = OPT) for the Job and Document operations respectively. A "REQ" in the Document Conformance column means if the Document object is supported. Whether a Document operation is a method on the Job object or the Document object depends on the modeling regime and is not an essential part of the semantics described here, since these semantics are intended to apply to both to object-oriented and object-based protocols, APIs, and implementations.~~

~~ISSUE 1d: Agree that the Cancel-Current-Document, Delete-Document, and Set-Document-Attributes operations are OPTIONAL and that the Cancel-Document, Get-Document-Attributes, Get-Documents, and Validate-Document operations are REQUIRED as indicated in when supporting the Document object? Agreed.~~

~~ISSUE 1a repeated: Do we need formal definitions of each Operation or is the comparison with Job operations in sufficient? Yes.~~

~~Table 2 - Document operations compared to Job operations~~

~~Job operations~~	~~Job Conf.~~	~~Document operations~~	~~Doc Conf~~
~~Cancel-Current-Job~~ ~~Sets "job-state" to 'canceled' and "job-state-reasons" to 'canceled-by-xxx'.~~ ~~Sets "document-state" to 'canceled' and "document-state-reasons" to 'canceled-by-xxx' for any documents that have not yet reached a terminal state ('completed', 'canceled', or 'aborted').~~	~~OPT~~	**~~Cancel-Current-Document~~** ~~Cancels processing of the current Document no matter for which Job, set the "document-state" attributes of the current documents in the job to 'canceled', and proceed with processing the next Document of the current Job or with the next Job if the current Job has no more Document objects. Its an operator emergency method. In some modeling regimes, it may be a Device method, rather than a Job or Document method.~~ ~~Inputs: same as Cancel-Current-Job, plus an OPTIONAL "document-number" operation attribute which the Printer checks to see if the current document being processed is the specified document, else the Printer rejects the operation in a manner analogous to the handling of the OPTIONAL "job-id" input parameter to both Cancel-Current-Job and Cancel-Current-Document, if supplied.~~ ~~Outputs: same as Cancel-Current-Job~~	~~OPT~~
~~Cancel-Job~~	~~REQ~~	**~~Cancel-Document~~**	~~OPT~~

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Job operations	Job Conf.	Document operations	Doc Conf
Sets "job-state" to 'canceled' and "job-state-reasons" to 'canceled-by-xxx'. Sets "document-state" to 'canceled' and "document-state-reasons" to 'canceled-by-xxx' for any documents that have not yet reached a terminal state ('completed', 'canceled', or 'aborted').		Cancels the processing of the document content for the specified Document object in the job, sets the specified document's "document-state" attribute to 'canceled', but does not remove the document from the Job, so that the Job can be resubmitted later. Thus Cancel-Document has the same semantics as Cancel-Job, which only cancels the processing of the job, and doesn't delete the job/document itself. See Delete-Document to delete the Document object itself immediately. This operation does not affect the states of any of the other documents in the job. If the job was processing and there are no further documents to process, the job moves to the 'completed' state as usual whenever there is no more processing to be done. Note: Unlike Reprocess-Job, there is no Reprocess-Document. However, the Reprocess-Job and Restart-Job operations will process all documents in the job, including ones that have been canceled by Cancel-Document. Inputs: same as Cancel-Job, plus a REQUIRED "document-number" operation attribute. Outputs: same as Cancel-Job.	
Create-Job The operation and Job Template attributes remain at the job level on the Job object. Document objects inherit the job level attributes unless the Document Creation operation supplies the attribute. However, the Printer MUST NOT copy down job level attributes to the Document object, including "document-overrides" (except operation attributes that initialize Document Description attributes marked with an "*" in Table 6)	OPT	*N/A. See Send-Document and Send-URI*	
Get-Job-Attributes	REQ	**Get-Document-Attributes** Returns all or selected attributes and values of the specified Document object. Two new group names are defined: 'document-template' and 'document-description'. Only attributes that were supplied by any client explicitly for the Document object, i.e., in a Send-Document, Send-URI, or Set-Document-Attributes operations are returned. Document attributes supplied as members of the "document-overrides" operation attribute on the Job Creation operations are not returned. In other words, a client sees what clients submitted at the Document level; the Printer MUST NOT merge the attributes that were supplied at the Job level in this response (except Document Description attributes marked with an "*" in Table 6). Inputs: same as Get-Job-Attributes, plus a REQUIRED "document-number" operation attribute. Outputs: same as Get-Job-Attributes.	REQ
Get-Jobs	REQ	**Get-Documents**	REQ

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Job operations	Job Conf.	Document operations	Doc Conf
		Returns all or selected attributes and values of all Document objects in the specified Job. Two new group names are defined: 'document-template' and 'document-description'. Only attributes that were supplied by any client explicitly for the Document object, i.e., in a Send-Document, Send-URI, or Set-Document-Attributes operations are returned. Document attributes supplied as members of the "document-overrides" operation attribute on the Job Creation operations are not returned. In other words, a client sees what clients submitted at the Document level; the Printer MUST NOT merge the attributes that were supplied at the Job level in this response (except Document Description attributes marked with an "*" in Table 6). Inputs: same as Get-Jobs, except a "which-documents" operation attribute (instead of "which-jobs" with values: 'completed', 'not-completed', and 'all' (default) and no equivalent to "my-jobs". Outputs: same as Get-Jobs.	
Hold-Job Sets "job-state" to 'pending-held' and "job-state-reasons" to 'job-hold-until-specified'. The Documents' "document-state" and "document-state-reasons" are unaffected.		*N/A, can only hold an entire job.*	
Print-Job	REQ	**Send-Document** (existing operation - see [RFC2911]) Adds a Document object to the Job that include actual document content. The extension is to add the Document Attributes group (and tag) to the request which contains any Document Template attributes to be applied to this document, overriding any corresponding Job Template attribute supplied at the job level (including "document-overrides" operation attributes at the Job or Document level). It is a method on the Job object.	REQ[4]
Print-URI	OPT	**Send-URI** (existing operation - see [RFC2911]) Adds a Document object to the Job that contains a URL for the specified document content. The extension is to add the Document Attributes group (and tag) to the request which contains any Job Template attributes to be applied to this document, overriding any corresponding Job Template attribute supplied at the job level (including "document-overrides" operation attributes at the Job or Document level). The device then pulls the document content data as needed. It is a method on a Job object.	OPT
Promote-Job	OPT	*N/A, can only promote an entire job*	
Purge-Jobs Requires operator/administrator privileges.	OPT	**Delete-Document** Deletes the specified Document object and its data immediately if the Document is still in the 'pending' state (there is no 'pending-held' state for Documents), else reject the request. The "document-number" values are not re-assigned, so that the deleted document leaves a hole in the document numbering space for the job. A subsequent Get-Document-Attributes request for this document will return a 'client-error-not-found' status code. This operation is similar to the Purge-Jobs operation which immediately deletes all jobs from the Printer.	OPT

[4] The Send-Document operation is OPTIONAL for a Printer to conform to [RFC2911], but is REQUIRED for a Printer to conform to this Document object specification.

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Job operations	Job Conf.	Document operations	Doc Conf
		However, Delete-Document only deletes a single Document from the Job. Requires operator/administrator privileges, otherwise a rogue client could submit, then delete, at will using up valuable spooling space. Unprivileged users use Cancel-Document which go through the normal accounting, if any. Inputs: Same as Cancel-Document. Outputs: Same as Cancel-Document.	
Release-Held-New-Jobs	OPT	*N/A, can only release entire jobs*	
Release-Job	OPT	*N/A, can only release an entire job*	
Reprocess-Job	OPT	*N/A, can only reprocess an entire job*	
Restart-Job	OPT	*N/A, can only restart an entire job*	
Resume-Job If there are no other reasons to hold the job, changes "job-state" to 'pending' and removes 'job-hold-until-specified' value from "job-state-reasons". The Documents' "document-state" and "document-state-reasons" are unaffected.	OPT	*N/A, can only resume an entire job*	
Schedule-Job-After	OPT	*N/A, can only schedule an entire job*	
Set-Job-Attributes	OPT	**Set-Document-Attributes** Changes the values of the specified Document object attributes. If the specified Document object didn't have the attribute, the attribute is added to the Document object. Such set attributes override any corresponding attributes supplied at the job level, including any "document-overrides" operation attributes supplied at the job or document level. Inputs: same as Set-Job-Attributes, plus a REQUIRED "document-number" operation attribute. Outputs: same as Set-Job-Attributes.	OPT
Suspend-Current-Job Sets "job-state" to 'processing-stopped' and "job-state-reasons" to 'job-suspended-by xxx'. The Documents' "document-state" and "document-state-reasons" are unaffected.	OPT	*N/A, can only suspend an entire job in order to run another one*	
Validate-Job	REQ	**Validate-Document** Checks that the print instructions and the document data are available. Note: The PWG PSI has added this operation for documents. The document data is not sent. However, if the client supplies the "document-uri" operation attribute, the Printer MUST validate that the Document exists and is accessible. Inputs: Same as Validate-Job, with the addition of an OPTIONAL "document-uri" operation attribute to be checked. Outputs: same as Validate-Job.	REQ

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3.1 Create-Document Operation

This REQUIRED operation allows a client to create a Document object, supply Document attributes, and have the Printer validate those attributes without sending any document content data. If the Printer rejects the request, the client won't have sent the possibly time-consuming data. The client MUST perform the operations in the following order: (1) Create-Job to create the Job object, (2) Create-Document to create the Document object, (3) Send-Data (see section 3.2) to send the content data for the Document object.

The client can supply multiple documents for a single Job using pairs of Create-Document and Send-Data operations. The order of the corresponding Send-Data operations is not important, so that the client can send pairs of Create-Document and Send-Data operations or can send a number of Create-Document operations followed by the corresponding Send-Data operations. The latter approach is useful if the client wants to make sure that all Documents will be accepted by the Printer before sending any of the Document data to the Printer.

If a Printer supports the Document object, the Printer:

1. MUST also support the Create-Document and Send-Data operations
2. MUST support the "multiple-operation-time-out" Printer Description attribute (see [RFC2911] section 4.4.31).
3. MUST support the "multiple-document-jobs-supported" Printer Description attribute (see [RFC2911] section 4.4.16) with a 'true' value, that is the Printer MUST support multiple document jobs.
4. MUST support the "multiple-document-handling" Job Template job attribute with at least one value (see [RFC2911] section 4.2.4) and the associated "multiple-document-handling-default" and "multiple-document-handling-supported" Job Template Printer attributes (see [RFC2911] section 4.2). ISSUE 02: Do we want to say which values of "multiple-document-handling" a Printer MUST support? The defined values are: 'single-document', 'single-document-new-sheet', 'separate-documents-uncollated-copies', and 'separate-documents-collated-copies'.
5. MUST support the Attribute Precedence semantics specified in section 5 for the levels that the Printer supports.

The Printer sets the value of the Document's "document-state" Document Description attribute to 'pending', if the Printer accepts the Create-Document request. A Printer MAY set the 'job-data-insufficient' value of the Document's "document-state-reason" Document Description attribute to indicate that processing cannot begin until sufficient data has arrived and set the "document-state" to 'pending'. A non-spooling printer that doesn't implement the 'pending' document state may even set the "document-state" to 'processing', even though there is not yet any data to process. See sections 8.3 and 8.5.

Access Rights: The authenticated user (see [RFC2911] section 8.3) 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 (see [RFC2911] sections 1 and 8.5). Otherwise, the Printer MUST reject the operation and return: 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as appropriate.

3.1.1 Create-Document Request

The client supplies the following groups as part of the Create-Document Request:

Group 1: Operation Attributes

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Natural Language and Character Set:

First, the client MUST supply the "attributes-charset" and "attributes-natural-language" Operation attributes as described in [RFC2911] section 3.1.4.1. The Printer object MUST copy these values to the corresponding Job Description attributes described in [RFC2911] sections 4.3.19 and 4.3.20.

Target:

Next, the client MUST supply either (1) the "printer-uri" (uri) plus "job-id" (integer(1:MAX)) or (2) the "job-uri" (uri) operation attribute(s) which define the target Job object for this operation as described in [RFC2911] section 3.1.5. The client MAY supply the remaining Operation attributes in any order following:

3.1.1.1 "document-number" (integer(1:MAX)) operation attribute:

The client MAY supply the "document-number" Operation attribute to indicate which Document object in the Job this Create-Document is to apply. Usually the client omits this Operation attribute, so that the Printer assigns the next integer value starting at 1 for each Job. A client that is creating multiple Document objects in parallel MAY wish to supply this attribute in order to control the order of the Documents in the job. If supplied, the Printer copies the value to the Document object's "document-number" Document Description attribute.

3.1.1.2 "last-document" (boolean):

The client MUST supply this attribute (as in the Send-Document and Send-URI operation requests). The Printer object MUST support this attribute. This attribute is a boolean flag that the client supplies with a 'true' value if this is the last document for the Job, 'false' otherwise.

Additional Operation attributes in any order:

Any of the other Operation attributes indicated in the "Level Supplied" column labeled with a "y" in the "Doc" column in Table 5, such as "document-name" and "document-format". These operation attributes are said to be supplied at the Document Level and apply to the Document object, overriding any operation attributes supplied at the Job Level. For example, if "document-format" = 'application/postscript' at the Job Level and "document-format" = 'text/plain' in this Create-Document request, this Document will be 'text/plain'. If the next Create-Document request for this Job omits the "document-format" operation attribute, that Document will be 'application/postscript'.

Group 2: Document Template Attributes

Any Document Template attributes in any order:

The client OPTIONALLY supplies a set of Document Template attributes, that is any attributes indicated in Table 7 in the "Defined for use" column labeled with a "y" in the "D" column. These Document Template attributes are said to be supplied at the Document Level and apply to the Document object, overriding any Document Template attributes supplied at the Job Level. For example, if "media" = 'na-letter-white' at the Job Level and "media" = 'na-letter-transparency' in this Create-Document request, this Document will be 'na-letter-transparency'. If the next Create-Document operation for this Job omits the "media" operation attribute, that Document will be 'na-letter-white' which it inherits from the Job.

If the client is not supplying any Document Template attributes in the request, the client SHOULD omit Group 2 rather than sending an empty group. However, a Printer object MUST be able to accept an empty group.

The client MUST NOT supply the document data in this operation request. See Send-Data operation.

In addition to the MANDATORY parameters required for every operation request (see [RFC2911]), the simplest Create-Document request consists of just the "attributes-charset" and "attributes-natural-language" operation attributes; either (1) the "printer-uri" target operation attribute and the "job-id" or (2) the "job-uri" and nothing else. In this simple case, the Printer object:

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- creates a new Document object and adds it to the specified Job object,

- assigns the lowest document number not yet used by this Job, if the client did not supply a “document-number” operation attribute (see section 3.1.1.1). Copy the document number assigned or supplied to the Document object’s “document-number” Document Description attribute.

- stores a generated Document name in the "document-name" Document Description attribute in the natural language and charset requested (see [RFC2911] section 3.1.4.1) (if those are supported, otherwise using the Printer object's default natural language and charset), and

- at job processing time, uses its corresponding default value attributes for the supported Document Template attributes that were (1) not supplied by the client as IPP attributes and (2) not embedded instructions in the document data.

3.1.2 Create-Document Response

The Printer object MUST return the following sets of attributes to the client as part of the Create-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 as described in [RFC2911] sections 13 and 3.1.6. If the client supplies unsupported or conflicting Job Template attributes or values, the Printer object MUST reject or accept the Print-Job request depending on the whether the client supplied a 'true' or 'false' value for the "ipp-attribute-fidelity" operation attribute or the name of one of the attributes with unsupported values in the “job-mandatory-attributes” operation attribute. See the Implementer's Guide [RFC3196] for a complete description of the suggested steps for processing the attributes in a create request.

Natural Language and Character Set:

The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911] section 3.1.4.2.

Group 2: Unsupported Attributes

See [RFC2911] section 3.1.7 for details on returning Unsupported Attributes.

The value of the "ipp-attribute-fidelity" and “job-mandatory-attributes” operation attributes supplied by the client does not affect what attributes the Printer object returns in this group. The value of these two operation attributes only affects whether the Create-Job operation is accepted or rejected. If the Document is accepted, the client may query the Document object using the Get-Document-Attributes operation requesting the unsupported attributes that were returned in the create response to see which attributes were ignored (not stored on the Document object) and which attributes were stored with other (substituted) values.

Group 3: Document Object Attributes

The Printer returns the following Document Description Attributes and Job Description Attributes:

3.1.2.1 document-number (integer(1:MAX)) Document Description attribute

The Printer MUST return the document number of this Document object that was either assigned by the Printer (see section 3.1.1) or supplied by the client (see section 3.1.1.1).

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3.1.2.2 document-state (type1 enum) Document Description attribute

The Printer MUST return the state of this Document object (see section 8.3).

3.1.2.3 document-state-reasons (1setOf type2 keyword) Document Description attribute

The Printer MUST return the associated state reasons for this Document (see section 8.5).

3.1.2.4 document-state-message (text(MAX)) Document Description attribute

The Printer MAY return the localized description of the “document-state” and “document-state-reasons” values for this Document (see section 8.7).

In addition, the Printer MUST return the same attributes that [RFC2911] REQUIRES for the Send-Document and Send-URI operations (which is the same as for the Print-Job response): "**job-uri**" (uri), "**job-id**" (integer(1:MAX)), "**job-state**" (type1 enum), "**job-state-reasons**" (1setOf type2 keyword). The Printer MAY return: "**job-state-message**" (text(MAX)) and/or "**number-of-intervening-jobs**" (integer(0:MAX)).

3.2 Send-Data Operation

This REQUIRED operation allows the client to create a Document object using the Create-Document operation (see section 3.1) that the Printer validates before the client sends any document content data. Then the client can skip sending the data to the Printer, if the Printer rejects the Document Creation operation.

Since the Create-Document and the Send-Data operation that follows could occur over an arbitrarily long period of time for a particular Document, a client MUST send the Send-Data operation within an IPP Printer defined minimum time interval after the receipt of the previous request for the job. If a Printer object supports the Document object, the Printer object MUST support the "multiple-operation-time-out" attribute (see [RFC2911] section 4.4.31). This attribute indicates the minimum number of seconds the Printer object will wait for the next send operation before taking some recovery action. See the description under Send-Document in [RFC2911] section 3.3.1, for the possible Printer actions, if the client does not supply a Send-Data request in time.

Access Rights: The authenticated user (see [RFC2911] section 8.3) 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 (see [RFC2911] sections 1 and 8.5). Otherwise, the Printer MUST reject the operation and return: 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as appropriate.

3.2.1 Send-Data request

The following attribute sets are part of the Send-Data Request:

Group 1: Operation Attributes

Natural Language and Character Set:
The "attributes-charset" and "attributes-natural-language" attributes as described in section [RFC2911] 3.1.4.1.

Target:
The “document-number” (integer(1:MAX)) MUST be supplied along with either (1) the "printer-uri" (uri) plus "job-id" (integer(1:MAX)) or (2) the "job-uri" (uri) and “operation attribute(s) which define the target Document object for this operation as described in section [RFC2911] 3.1.5.

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Requesting User Name:

The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as described in [RFC2911] section 8.3.

Group 2: Document Content

The client MUST supply the document data in-line to be processed for this Document.

3.2.2 Send-Data Response

The following sets of attributes are part of the Send-Data 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 as described in [RFC2911] sections 13 and 3.1.6.

Natural Language and Character Set:

The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911] section 3.1.4.2.

Group 2: Unsupported Attributes

See [RFC2911] section 3.1.7 for details on returning Unsupported Attributes.

Group 3: Job Object Attributes

This is the same set of attributes as described in the Create-Job response (see [RFC2911] section 3.2.1.2).

3.3 Send-Document Operation

This REQUIRED[5] operation allows a client to submit multiple documents in a single Job by making a Send-Document request for each Document. In this specification, the Send-Document creates a Document object ([RFC2911] did not have a Document object). A Printer MUST support this operation with the semantics specified in [RFC2911] and with the extension defined in this specification, since this specification REQUIRES the Printer to support multiple document jobs.

See [RFC2911] section 3.3.1 for the semantics of the Send-Document operation not reproduced here.

Access Rights: The authenticated user (see [RFC2911] section 8.3) 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 (see [RFC2911] sections 1 and 8.5). Otherwise, the Printer MUST reject the operation and return: 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as appropriate.

3.3.1 Send-Document Request

The following attribute sets are part of the Send-Document Request:

[5] The Send-Document operation is REQUIRED in this specification while it was OPTIONAL in [RFC2911]. This difference is because this specification REQUIRES Printer support of multiple document jobs, while [RFC2911] did not.

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Group 1: Operation Attributes (as in [RFC2911])

As specified in [RFC2911] section 3.3.1, plus any extensions indicated in Table 5. For example, "compression", "document-format", and "document-name".

Group 2: Document Attributes (new - not in [RFC2911])

The client OPTIONALLY supplies a set of Document Template attributes as listed in Table 7. For example, "media" and "number-up". If the client is not supplying any Document Template attributes in the request, the client SHOULD omit Group 2 rather than sending an empty group. However, a Printer object MUST be able to accept an empty group.

Group 3: Document Content (as in [RFC2911])

The client MUST supply the document data in-line to be processed for this Document if the "last-document" flag is set to 'false'. However, since a client might not know that the previous Document object created with a Create-Job, Send-Document, or Send-URI operation was the last document (i.e., the "last-document" attribute was set to 'false'), it is legal to send a Send-Document request with no document data where the "last-document" flag is set to 'true'. For this case, the Printer MUST NOT increment the value of the Job object's "number-of-documents" attribute, since no Document object was added to the job. In addition, it is not an error for a client to submit a job with no actual document data, i.e., only a single Create-Job and Send-Document request with a "last-document" operation attribute set to 'true' with no document data; it is only an empty job which is scheduled and processed normally.

3.3.2 Send-Document Response

The following sets of attributes are part of the Send-Document Response:

Group 1: Operation Attributes (as in [RFC2911])

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 as described in [RFC2911] sections 13 and 3.1.6.

Natural Language and Character Set:
The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911] section 3.1.4.2.

Group 2: Unsupported Attributes (as in [RFC2911])

See [RFC2911] section 3.1.7 for details on returning Unsupported Attributes.

Group 3: Job Object Attributes (as in [RFC2911])

The Printer returns the same set of attributes as described in the Print-Job response (see [RFC2911] section 3.2.1.2).

Group 4: Document Object Attributes (new - as in Create-Document Group 3 - see section 3.1.2)

The Printer returns the same set of attributes as described in the Create-Document response (see section 3.1.2).

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3.4 Send-URI Operation

This OPTIONAL operation is identical to the Send-Document operation (see section 3.2) except that a client MUST supply a URI reference ("document-uri" operation attribute) rather than the document data itself. If a Printer object supports this operation, clients can use both Send-URI or Send-Document operations to add new documents to an existing multi-document Job object. However, if a client needs to indicate that the previous Send-URI or Send-Document was the last document, the client MUST use the Send-Document operation with no document data and the "last-document" flag set to 'true' (rather than using a Send-URI operation with no "document-uri" operation attribute).

If a Printer object supports this operation, it MUST also support the Print-URI operation (see [RFC2911] section 3.2.2).

The Printer object MUST validate the syntax and URI scheme of the supplied URI before returning a response, just as in the Print-URI operation. The IPP Printer MAY validate the accessibility of the document as part of the operation or subsequently (see [RFC2911] section 3.2.2).

3.5 Get-Document-Attributes Operation

This REQUIRED operation allows a client to request the values of selected attributes of a Document object. This operation is almost identical to the Get-Job-Attributes operation (see [RFC2911] section 3.3.4). The only differences are that the operation is directed at a Document object rather than a Job object and the returned attribute group is a set of Document object attributes rather than a set of Job object attributes.

The Printer MUST return the attributes that a client supplied in the Create-Document, Send-Document, or Send-URI operations, plus any Document Description attributes that the Printer has generated. The Printer MUST NOT return any Job Level attributes that the Document object inherits, including “document-overrides” (1setOf collection) member attributes (see [override]), and MUST NOT factor out common Document object attributes and return them as Job object attributes. Thus the Get-Document-Attributes returns to clients the attributes that clients submitted with the Job object and with the Document object.

The client MAY display to the user any Document attributes inherited from the Job object. However, such a client MUST query both the Job object using Get-Job-Attributes and the Document object using Get-Document-Attributes in order to be able to merge the inherited attributes with the explicitly-supplied Document attributes. Furthermore, the client MAY factor out common explicitly-supplied Document object attributes and display them once as Job object attributes, instead of with each Document object. However, any such regularization of the display for users is the policy of the client and is outside the scope of this client-Printer protocol specification. Note: specify any such regularization or canonicalization policy in the Printer response would have been impossible to agree to.

For Document objects, the possible names of attribute groups are:

- ‘document-template': the subset of the Document Template attributes that apply to a Document object (the “D” column in Table 7) that the implementation supports for Document objects.

- ‘document-description': the subset of the Document Description attributes specified in the “Doc” column of Table 8 that the implementation supports for Document objects.

- 'all': the special group 'all' that includes all attributes that the implementation supports for Document objects.

Since a client MAY request specific attributes or named groups, there is a potential that there is some overlap. For example, if a client requests, ‘document-name' and ‘document-description', the client is actually requesting the "document-name" attribute once by naming it explicitly, and once by inclusion in the ‘document-description' group. In

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such cases, the Printer object NEED NOT return the attribute only once in the response even if it is requested multiple times. The client SHOULD NOT request the same attribute in multiple ways.

It is NOT REQUIRED that a Document object to support all attributes belonging to a group (since some attributes are OPTIONAL). However, it is REQUIRED that the Printer support all these group names for the Document object.

3.5.1 Get-Document-Attributes Request

The following groups of attributes are part of the Get-Document-Attributes Request when the request is directed at a Document object:

Group 1: Operation Attributes

Natural Language and Character Set:
The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911] section 3.1.4.1.

Target:
The “document-number” (integer(1:MAX)) MUST be supplied along with either (1) the "printer-uri" (uri) plus "job-id" (integer(1:MAX)) or (2) the "job-uri" (uri) operation attribute(s) which define the target Document object for this operation as described in [RFC2911] section 3.1.5.

Requesting User Name:
The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as described in [RFC2911] section 8.3.

"requested-attributes" (1setOf keyword):
The client OPTIONALLY supplies this attribute. The Printer MUST support this attribute. It is a set of attribute names and/or attribute group names in whose values the requester is interested. If the client omits this attribute, the Printer MUST respond as if this attribute had been supplied with a value of 'all'.

3.5.2 Get-Document-Attributes Response

The Printer object returns the following sets of attributes as part of the Get-Document-Attributes 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 as described in [RFC2911] sections 13 and 3.1.6.

Natural Language and Character Set:
The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911] section 3.1.4.2. The "attributes-natural-language" MAY be the natural language of the Document object, rather than the one requested.

Group 2: Unsupported Attributes

See [RFC2911] section 3.1.7 for details on returning Unsupported Attributes.

The response NEED NOT contain the "requested-attributes" operation attribute with any supplied values (attribute keywords) that were requested by the client but are not supported by the Printer. If the Printer object does return unsupported attributes referenced in the "requested-attributes" operation attribute and that

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attribute included group names, such as 'all', the unsupported attributes MUST NOT include attributes described in the standard but not supported by the implementation.

Group 3: Document Object Attributes

This is the set of requested attributes and their current values. The Printer ignores (does not respond with) any requested attribute or value which is not supported. Furthermore, the Printer MUST NOT return Document Template attributes that were not supplied by a client in a Create-Document, Send-Document, or Send-URI request or set by a Set-Document-Attributes request. So the response reflects what was submitted. The Printer MAY omit returning attributes that are restricted by the Printer's security policy in force, including whether the requesting user is the user that submitted the job (job originating user) or not (see [RFC2911] section 8). However, the Printer MUST respond with the 'unknown' value for any supported attribute (including all REQUIRED attributes) for which the Printer does not know the value, unless it would violate the security policy. See the description of the "out-of-band" values in the beginning of [RFC2911] Section 4.1.

3.6 Get-Documents Operation

This REQUIRED operation allows a client to retrieve the list of Document objects belonging to the target Job object. The client MAY also supply a list of Document attribute names and/or attribute group names. A group of Document object attributes will be returned for each Document object in the Job.

This operation is similar to the Get-Document-Attributes operation (see section 3.5), except that this Get-Documents operation returns attributes from all Document objects contained in the Job object, instead of from a single selected Document object in the Job object. As with the Get-Document-Attributes operation the Printer MUST only return attributes that were submitted by a client when the Document object was created by the Create-Document, Send-Document, or Send-URI operations and possibly modified by the Set-Document-Attributes operation (see section 3.7).

3.6.1 Get-Documents Request

The client submits the Get-Documents request to a Printer object. The Get-Documents is similar to the Get-Jobs operations (see [RFC2911] section 3.2.6) except that there are no equivalents to the "which-jobs" and "my-jobs" operation attributes.

The following groups of attributes are part of the Get-Documents Request:

Group 1: Operation Attributes

Natural Language and Character Set:
The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911] section 3.1.4.1.

Target:
Either (1) the "printer-uri" (uri) plus "job-id" (integer(1:MAX)) or (2) the "job-uri" (uri) operation attribute(s) which define the target Job object for this operation as described in [RFC2911] section 3.1.5.

Requesting User Name:
The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as described in [RFC2911] section 8.3.

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"limit" (integer(1:MAX)):

The client OPTIONALLY supplies this attribute. The Printer object MUST support this attribute. It is an integer value that determines the maximum number of Documents that a client will receive from the Printer. The limit is a "stateless limit" in that if the value supplied by the client is 'N', then only the first 'N' Documents are returned in the Get-Documents Response. There is no mechanism to allow for the next 'M' Documents after the first 'N' Documents. If the client does not supply this attribute, the Printer object responds with all Documents.

"requested-attributes" (1setOf type2 keyword):

The client OPTIONALLY supplies this attribute. The Printer object MUST support this attribute. It is a set of Document attribute names and/or attribute groups names in whose values the requester is interested. This set of attributes is returned for each Document object that is returned. The allowed attribute group names are the same as those defined in the Get-Document-Attributes operation in section 3.5.1.

If the client does not supply this attribute, the Printer MUST respond as if the client had supplied this attribute with the three values: 'document-number', 'document-state', and 'document-state-reasons'. ISSUE 03: Are the 3 attributes: 'document-number', 'document-state', and 'document-state-reasons' the right attributes to return when the client does not supply the "requested-attributes" operation attribute? Should we include the "document-id-uri" (uri) attribute that the Printer generates as well?

3.6.2 Get-Documents Response

The Printer object returns all of the Document objects up to the number specified by the "limit" attribute that match the criteria as defined by the attribute values supplied by the client in the request. If the client requests any Document attributes at all, there is a set of Document Object Attributes returned for each Document object.

It is not an error for the Printer to return 0 Documents. If the response returns 0 Documents because there are no Documents in the Job, then the status code for 0 Documents MUST be 'successful-ok'.

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 as described in [RFC2911] sections 13 and 3.1.6.

Natural Language and Character Set:

The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911] section 3.1.4.2.

Group 2: Unsupported Attributes

See [RFC2911] section 3.1.7 for details on returning Unsupported Attributes.

The response NEED NOT contain the "requested-attributes" operation attribute with any supplied values (attribute keywords) that were requested by the client but are not supported by the IPP object. If the Printer object does return unsupported attributes referenced in the "requested-attributes" operation attribute and that attribute included group names, such as 'all', the unsupported attributes MUST NOT include attributes described in the standard but not supported by the implementation.

Groups 3 to N: Document Object Attributes

The Printer object responds with one set of Document Object Attributes for each returned Document object. The Printer object ignores (does not respond with) any requested attribute or value which is not supported or

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which is restricted by the security policy in force, including whether the requesting user is the user that submitted the job (job originating user) or not (see [RFC2911] section 8). However, the Printer object MUST respond with the 'unknown' value for any supported attribute (including all REQUIRED attributes) for which the Printer object does not know the value, unless it would violate the security policy. See the description of the "out-of-band" values in the beginning of [RFC2911] section 4.1.

The Printer MUST return the Groups in order of increasing “document-number” attribute value.

3.7 Set-~~Job~~Document-Attributes Operation

This OPTIONAL operation allows a client to set the values of the attributes of a ~~Job~~Document object after the Document object was submitted to the Printer. In the request, the client supplies the set of ~~Job~~Document keyword attribute names and values that are to be set. In the response, the IPP object returns success or rejects the entire request with indications of which attribute or attributes could not be set.

This operation is almost identical to the Set-~~Printer~~Job-Attributes operation and follows the same rules for validation (see [set-ops] section 4.2~~4.1~~). The only differences are that the Set-~~Job~~Document-Attributes operation is directed at a ~~Job~~Document object rather than a ~~Printer~~ Job object. ~~As with the Set-Job-Attributes operation, , there is no "document-format" operation attribute used when setting a Job object, the~~ The Set-Document-Attributes operation can add an attribute to the ~~(Job)~~ Target object, accepts the 'delete-attributes' out-of-band value ~~is permitted~~ to remove an attribute from the Target object. In addition~~, and~~ the validation is the same as the Create-Document, Send-Document, and Send-URI operations that create Document objects~~Job Creation operations (Print-Job, Print-URI, and Create-Job)~~, i.e., the Printer validation depends on the "xxx-supported" Printer Description attributes (see [RFC2911] section 3.1). ~~Using the Set-Printer-Attributes operation, the administrator can set arbitrary 'name' values to those "xxx-supported" Printer attributes that include the 'name' attribute syntax if the implementation supports the 'admin-define' out-of-band value for that "xxx-supported" attribute (see 8.3 and Appendix A). However, the Set-Job-Attributes cannot be used to add unsupported names to the Job object.~~

If a client supplies a ~~job~~document attribute in a Set-~~Job~~Document-Attributes request that the Printer supports, and the ~~job~~document was originally submitted without supplying that attribute, the Printer adds the attribute to the ~~Job~~Document object.

If the client supplies a ~~job~~document attribute with the "out-of-band" value 'delete-attribute' (see [set-ops] section 8.2~~8.2~~), then the Printer MUST remove the attribute and all of its values from the ~~Job~~Document object, if present. The semantic effect of the client supplying the 'delete-attribute' value in a Set-~~Job~~Document-Attributes operation MUST be the same as if the attribute had not been supplied with the ~~Job~~Document object in the ~~Job~~Document Creation operation, i.e., the Printer applies its default attribute or behavior with lower precedence that the PDL (see the beginning of [RFC2911] section 4.2 and [RFC2911] 3.2.1.1). Any subsequent query of the ~~Job~~Document object using Get-~~Job~~Document-Attributes or Get-~~Job~~Documents MUST NOT return any attribute that has been deleted using the 'delete-attribute' out-of-band value. However, a client can re-establish such a deleted ~~Job~~Document attribute with any supported value(s) using a subsequent Set-~~Job~~Document-Attributes operation.

If the client supplies an attribute in a Set-~~Job~~Document-Attributes request with the 'delete-attribute' value and that attribute is not present on the ~~Job~~Document object, the Printer ignores that supplied attribute in the request, does not return the attribute in the Unsupported Attributes group, and returns the 'successful-ok' status code, if there are no other problems with the request.

The validation of the Set-~~Job~~Document-Attributes request is performed by the Printer as if the ~~job~~document had been submitted originally with the new attribute values (and the deleted attributes removed) and with "ipp-attribute-fidelity" set to 'true', i.e., all modified attributes ~~Job~~Document attributes and values MUST be supported in combination with the ~~Job~~Document attributes not modified. If such a ~~Job~~Document Creation operation would have been accepted, then the Set-~~Job~~Document-Attributes MUST be accepted. If such a ~~Job~~Document Creation operation would have been rejected, then the Set-~~Job~~Document-Attributes MUST be rejected and the ~~Job~~Document MUST be unchanged. In addition, if any of the supplied attributes are not supported, are not settable, or the values are not supported, the

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Printer object MUST reject the entire operation; the Printer object MUST NOT partially set some of the supplied attributes. In other words, after the operation, all the supplied attributes MUST be set or none of them MUST be set, thus making the Set-~~Job~~Document-Attributes an atomic operation.

The IPP object MUST accept or reject this operations when the ~~Job~~Document's READ-ONLY "~~job~~document-state" attribute has the values shown in Table 4. The ~~job~~document's current state MUST affect whether the IPP object accepts or rejects the request. However, the Set-Document-Attributes operation MUST NOT change the state of the Document object (since the Document is a passive object and the Document state is a subset of the Job State). For example, in the case where the operation creates a request for unavailable resources, the Job (but not the Document) transitions to a new state. Table 4 shows the allowed behaviors in each ~~job~~document state ~~and the transitions~~.

Table 4 - ~~Job~~Document State ~~Transition~~ Table for the Set-~~Job~~Document-Attributes operation

Current "~~job~~document-state"	New "~~job~~document-state" (no change)	IPP object's response status code and "action":
'pending'	'pending'	'successful-ok'
'pending'	'pending~~-held~~'	'successful-ok' - needed resources are not ready (the Job MAY change state, but the Document MUST NOT).
~~'pending-held'~~	~~'pending-held'~~	~~'successful-ok'~~
~~'pending-held'~~	~~'pending'~~	~~'successful-ok' - needed resources are ready~~
'processing'	'processing'	'successful-ok' or 'client-error-not-possible' depending on implementation, including the attributes being set, whether the ~~job~~document has started marking media, etc.
~~'processing-stopped'~~	~~'processing-stopped'~~	~~'successful-ok' or 'client-error-not-possible' depending on implementation, including the attributes being set, whether the job has started marking media, etc.~~
'completed'	'completed'	'client-error-not-possible'
'canceled'	'canceled'	'client-error-not-possible'
'aborted'	'aborted'	'client-error-not-possible'

This operation MUST NOT change the value of attributes not specified in the operation unless the definition of the attribute explicitly specifies such side-effects. In general, ~~Job~~Document attribute definitions that are settable will not define side-effects on other attributes that are settable, only side effects on READ-ONLY attributes, if any.

3.7.1 Settable and READ-ONLY ~~Job~~Document Description attributes

~~If the Printer supports the "job-message-from-operator" Job Description attribute (see [RFC2911] section 4.3.16) and the client explicitly supplies a new value for the "job-message-from-operator" Job Description attribute in Group 2 in the Set-Job-Attributes request, then the Printer MUST set the "job-message-from-operator" Job Description attribute to this new value.~~

If the Printer supports the Set-~~Job~~Document-Attributes operation, then it SHOULD support setting of:

all ~~Job~~Document Template ~~job~~document ("xxx") attributes

that the implementation supports (see ~~[RFC2911] section 4.2 and extensions~~the column labeled "D" in Table 7).

~~Some~~ Almost all ~~Job~~Document Description attributes (see [RFC2911] section 4.3) MUST NOT be settable, i.e., they are defined to be READ-ONLY. Only Document Description attributes marked with "(r/w) in Table 7 MAY be settable

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using Set-Document-Attributes. The Printer MUST reject a Set-Document-Attributes request that attempts to set any attributes in Table 7 that is not marked "(r/w).~~An attribute marked as "READ-ONLY" in the Job Description attribute table in Appendix A is such an attribute. The Job attributes not marked as "READ-ONLY" MAY be settable using the Set-Job-Attributes operation, depending on implementation.~~

Note: From now on, all extensions that define new object attributes will indicate whether or not the attributes are READ-ONLY, by including the "READ-ONLY" adjective in their descriptions and/or explicitly stating whether they MAY be settable.

Access Rights: The authenticated user (see [RFC2911] section 8.3) performing this operation must either be the job owner (as determined in the Job Creation operation) or an operator or administrator of the Printer object (see [RFC2911] Sections 1 and 8.5).

3.7.2 Set-~~Job~~Document-Attributes Request

The following sets of attributes are part of the Set-~~Job~~Document-Attributes Request:

Group 1: Operation Attributes

Natural Language and Character Set:
The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911] section 3.1.4.1.

Target:
The "document-number" (integer(1:MAX)) MUST be supplied along with ~~E~~either (1) the "printer-uri" (uri) plus "job-id" (integer(1:MAX)) or (2) the "job-uri" (uri) operation attribute(s) which define the target Document object for this operation as described in [RFC2911] section 3.1.5. ISSUE 04: OK that we don't have a way to set all documents in a single request? The Printer MUST reject the request with 'client-error-bad-request', if the client does not supply the "document-number" operation attribute. There is no way to set all documents explicitly in a single request, since a failure would require the Printer to back out all changes in all documents. However, if the client sets the corresponding attribute at the Job Level using the Set-Job-Attributes operation, all documents in the job will be affected that don't have that attribute explicitly supplied at the Document Level.

Requesting User Name:
The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as described in [RFC2911] section 8.3.

Group 2: ~~Job~~Document Attributes

The client MUST supply a set of ~~Job~~Document Template attributes with one or more values (including explicitly allowed out-of-band values) as listed in column labeled "D" in Table 7 - Job Template and Document Template attributes and Document Description attributes flagged with "(r/w)" and listed in the column labeled "Doc" in Table 8 - Job and Document Description attributes~~defined in [RFC2911] section 4.2 Job Template Attributes ("xxx" attributes), section 4.3 Job Description Attributes~~, and any attribute extensions supported by the Printer. The value(s) of each ~~Job~~Document attribute supplied in Group 2 replaces the value(s) of the corresponding ~~Job~~Document attribute on the target ~~Job~~Document object. For attributes that can have multiple values (1setOf), all values supplied by the client replace all values of the corresponding ~~Job~~Document object attribute.

If the client supplies an "xxx" attribute with the 'delete-attribute' out-of-band value (see [set-ops] section 8.2~~8.2~~), the Printer MUST remove the "xxx" attribute from the ~~Job~~Document object, if present.

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3.7.3 Set-~~Job~~Document-Attributes Response

The IPP object returns the following sets of attributes as part of the Set-~~Job~~Document-Attributes 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 as described in [RFC2911] sections 13 and 3.1.6.

Natural Language and Character Set:
The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911] section 3.1.4.2.

Group 2: Unsupported Attributes

See [RFC2911] section 3.1.7 for details on returning Unsupported Attributes.

If some of the attributes in the operation fail to validate, the Printer MUST reject the operation, MUST NOT change any ~~Job~~Document attributes, and MUST return the indicated status code below. In this group, the Printer MUST also return all attributes that fail to validate. The following are the reasons that an attribute fails to validate and the value returned for the attribute, along with the indicated status code and order of detection:

1. The number of attributes supplied by the client exceeds the maximum number that the Printer supports in a Set-Printer-Attributes request: return the 'client-error-request-entity-too-large' (see [RFC2911] section 13.1.4.9).

2. The Printer doesn't support the attribute: return the attribute with the 'unsupported' out-of-band attribute value (see [RFC2911] section 3.1.7 and [RFC2910]) and the 'client-error-attributes-or-values-not-supported (see [RFC2911] section 13.1.4.12).

3. The attribute is READ-ONLY (in its definition) or is not-settable in this implementation: return the attribute with the 'not-settable' out-of-band attribute value (see [set-ops] section 8.1~~8.1~~) and the 'client-error-attributes-not-settable' status code (see [set-ops] section 7.1~~7.1~~).

4. The Printer doesn't support the value: if the attribute in the operation has a single value return it. If the attribute in the operation is multi-valued, return only those values in a 1setOf that are not supported. Return the 'client-error-attributes-or-values-not-supported' status code (see [RFC2911] section 13.1.4.12).

5. The values of some of the supplied attributes conflict with one another and/or other ~~Job~~Document attribute values not being set: if the conflicting attribute in the operation has a single value return the attribute and the value. If the attribute in the operation is multi-valued, return only the attribute and those values in a 1setOf that are conflicting with other attributes. Return the 'client-error-conflicting-attributes' status code (see [RFC2911] section 13.1.4.15).

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3.8 Cancel-~~Job~~Document Operation

This ~~REQUIRED~~ OPTIONAL[6] operation allows a client to cancel a specified Document in a specified Print Job from the time the ~~job~~ Document is created up to, but not including, the time it is completed, canceled, or aborted. Since a ~~Job~~Document might already be printing by the time a Cancel-~~Job~~Document is received, some media sheet pages might be printed before the ~~job~~document is actually terminated.

ISSUE 05: OK, that Cancel-Document operation is OPTIONAL, while the Cancel-Job operation is REQUIRED by [RFC2911]?

The Cancel-Document operation does not remove the Document from the Job and Printer, but only sets the specified Document's "document-state" Document Description attribute to 'canceled' and the Document's "document-state-reasons" Document Description attribute to 'canceled-by-user' or 'cancel-by-operator'. If the Job object is printed again using operations such as the Reprocess-Job operation (see [adm-ops] section 4.1) or the Restart-Job operation (see [RFC2911] section 3.3.7), any canceled Documents are also printed again. Thus Cancel-Document has the same semantics as Cancel-Job (see [RFC2911] section 3.3.3), which only cancels the processing of the job, and doesn't delete the Job object itself. See the Delete-Document operation (section 3.10) to remove the Document object itself immediately from the Job and Printer.

The Cancel-Document operation does not affect the states of any of the other Document objects in the job. If the Job was processing and there are more Documents to be processed, the Printer does so. If there are no further Documents to process, the Job moves to the 'completed' state as usual whenever there is no more processing to be done.

The IPP object MUST accept or reject the request based on the ~~job~~document's current state and transition the ~~job~~document to the indicated new state as follows:

Current "~~job~~document-state"	New "~~job~~document-state"	~~IPP~~ Printer object's response status code and action:
'pending'	'canceled'	'successful-ok'
~~'pending-held'~~	~~'canceled'~~	~~'successful-ok'~~
'processing'	'canceled'	'successful-ok'
'processing'	'processing'	'successful-ok' See Rule 1
'processing'	'processing'	'client-error-not-possible' See Rule 2
~~'processing-stopped'~~	~~'canceled'~~	~~'successful-ok'~~
~~'processing-stopped'~~	~~'processing-stopped'~~	~~'successful-ok' See Rule 1~~
~~'processing-stopped'~~	~~'processing-stopped'~~	~~'client-error-not-possible' See Rule 2~~
'completed'	'completed'	'client-error-not-possible'
'canceled'	'canceled'	'client-error-not-possible'
'aborted'	'aborted'	'client-error-not-possible'

Rule 1: If the implementation requires some measurable time to cancel the ~~job~~document in the 'processing' ~~or~~ ~~'processing-stopped'~~ ~~job~~document states, the ~~IPP~~ Printer object MUST add the 'processing-to-stop-point' value to the ~~job~~document's "~~job~~document-state-reasons" attribute and then transition the ~~job~~document to the 'canceled' state when the processing ceases (see [RFC2911] section 4.3.8~~4.3.8~~).

[6] The Cancel-Document operation is OPTIONAL, whereas the corresponding Cancel-Job is REQUIRED.

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Rule 2: If the ~~Job~~Document object already has the 'processing-to-stop-point' value in its "~~job~~document-state-reasons" attribute, then the Printer object MUST reject a Cancel-~~Job~~Document operation.

Access Rights: The authenticated user (see [RFC2911] section 8.3~~8.3~~) performing this operation must either be the job owner or an operator or administrator of the Printer object (see [RFC2911] ~~S~~sections 1~~1~~ and 8.5~~8.5~~). Otherwise, the IPP object MUST reject the operation and return: 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as appropriate.

3.8.1 Cancel-~~Job~~Document Request

The following groups of attributes are part of the Cancel-~~Job~~Document Request:

Group 1: Operation Attributes

Natural Language and Character Set:
The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911] section 3.1.4.1~~3.1.4.1~~.

Target:
The “document-number” (integer(1:MAX)) MUST be supplied along with ~~E~~either (1) the "printer-uri" (uri) plus "job-id" (integer(1:MAX)) or (2) the "job-uri" (uri) operation attribute(s) which define the target Document object for this operation as described in section [RFC2911] 3.1.5~~3.1.5~~.

Requesting User Name:
The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as described in [RFC2911] section 8.3~~8.3~~.

"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. The~~at~~ "job-message-from-operator" 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). ISSUE 06: OK to have the “message” operation attribute supplied in the Cancel-Document operation be sent to the operator in some unspecified way, like Cancel-Job, which could include setting the Job’s “message-to-operator” Job Template Job attribute or should we just do away with the “message” operation attribute in the Cancel-Document operation?

3.8.2 Cancel-~~Job~~Document Response

The following sets of attributes are part of the Cancel-~~Job~~Document 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 as described in [RFC2911] sections 13~~13~~ and 3.1.6~~3.1.6~~.

Natural Language and Character Set:
The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911] section 3.1.4.2~~3.1.4.2~~.

Group 2: Unsupported Attributes

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See [RFC2911] section 3.1.73.1.7 for details on returning Unsupported Attributes.

Once a successful response has been sent, the implementation guarantees that the JobDocument will eventually end up in the 'canceled' state. Between the time of the Cancel-JobDocument operation is accepted and when the jobdocument enters the 'canceled' jobdocument-state (see section 8.34.3.7), the "jobdocument-state-reasons" attribute SHOULD contain the 'processing-to-stop-point' value which indicates to later queries that although the JobDocument might still be 'processing', it will eventually end up in the 'canceled' state, not the 'completed' state.

3.9 Cancel-Current-Document Operation[7]

This OPTIONAL operation allows a client to cancel either (1) any the current dDocument of the current Job on the target Printer or (2) the specified document in a specified job if itthey are is the current document and job on the Printer. One of the uses of this operation is by operators in an emergency, where the job-id and document-number might be unknown to the operator. See [RFC2911] section 3.3.33.8 for the semantics of canceling a jobDocument and what values the Printer sets the Document's Document Description attributes. Since a JobDocument might already be marking by the time a Cancel-Current-JobDocument is received, some media sheet pages might be printed before the jobdocument is actually terminated.

If the client does not supply a "job-id" and "document-number" operation attributes, the Printer MUST accept the request and cancel the current jobdocument if there is a current jobdocument in the 'processing' or 'processing-stopped' state; otherwise, it MUST reject the request and return the 'client-error-not-possible' status code. If more than one jobdocument is in the 'processing' or 'processing-stopped' states, the one that is marking is canceled and the others are unaffected.

Warning: On a shared printer, there is a race condition. Between the time that a user issues this operation and its acceptance, the current jobdocument might change to a different document or even a different job. If the user or operator is authenticated to cancel the new job, the wrong jobdocument is canceled. To prevent this race from canceling the wrong jobdocument, the client MAY supply the "job-id" and "document-number" operation attributes which is checked against the current job's "job-id" and the current Document's "document-number". If the job identified by the "job-id" attribute is not the current job on the Printer and the "document-number" is not the current Document in that current Job, i.e., is not in the 'processing' or 'processing-stopped' states, the Printer MUST reject this operation and return the 'client-error-not-possible' status code. Otherwise, the Printer cancels the specified jobdocument.

Access Rights: The authenticated user (see [RFC2911] section 8.3) performing this operation must either be the job owner (as determined in the Job Creation operation) or an operator or administrator of the Printer object (see [RFC2911] Sections 1 and 8.5).

The Cancel-Current-JobDocument Request and Cancel-Current-JobDocument Response have the same attribute groups and attributes as the ResumePause-Printer operation (see [RFC2911] section 3.2.8), including the new "job-message-from-operator" operation attribute (see section 6), with the addition of the following Group 1 Operation attributes in the request:

"job-id" (integer(1:MAX)):
The client OPTIONALLY supplies this Operation attribute in order to verify that the identified job is still the current job on the target Printer object. The IPP object MUST supports this operation attribute, if it supports this operation.

[7] In some modeling regimes, the Cancel-Current-Document operation might be a Device method, rather than a Job or Document method.

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"document-number (integer(1:MAX))

The client OPTIONALLY supplies this Operation attribute in order to verify that the identified document is still the current document on the target Printer object. The IPP object MUST supports this operation attribute, if it supports this operation.

The Printer MUST ignore the new "job-message-from-operator" operation attribute (see [adm-ops] section 6), since that is a job only attribute and Cancel-Current-Document is a Document operation. ISSUE 07: OK not to have a "document-message-from-operator" for use with Document operations, like with the Cancel-Current-Document operation that an operator is likely to use?

3.10 Delete-Document Operation

This OPTIONAL operation removes the specified Document object and its data immediately from the specified Job. The Printer MUST reject the request if the Document is in any state, but 'pending" (there is no 'pending-held' state for Documents). The Printer does not reassign the "document-number" Document Description attribute values of the remaining Document objects in the Job, so that the deleted Document object leaves a gap in the document numbering space for the Job. The Printer MUST return a 'client-error-not-found' status code, in a subsequent Get-Document-Attributes operation for this Document object specifying its former "document-number". This operation is similar to the Purge-Jobs operation which immediately deletes all jobs from the Printer. However, the Delete-Document operation only deletes a single Document from the specified Job.

Access Rights: The authenticated user (see [RFC2911] section 8.3) performing this operation MUST be an operator or administrator of the Printer object (see [RFC2911] sections 1 and 8.5). Otherwise, the Printer MUST reject the operation and return: 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as appropriate. This operation requires operator/administrator privileges, otherwise a rogue client could submit, then delete, at will using up valuable spooling space. Unprivileged users use Cancel-Document which goes through the normal accounting, if any.

The Delete-Document request and Delete-Document response have the same attribute groups and attributes as the Cancel-Document operation (see section 3.8).

3.11 Validate-~~Job~~Document Operation

This REQUIRED operation allows the client to verify capabilities of a Printer against whatever attributes the client supplies in the Validate-Document request in combination with the previously submitted partial Job, if any. This operation is ~~similar~~ the same as ~~to~~ the ~~Print-Job~~Create-Document operation (section 3.1~~3.2.1~~) except ~~that a client supplies no document data and~~ the Printer ~~allocates no resources (i.e., it~~ does not create a new ~~Job~~Document object. The Printer performs the same validation for the Validate-Document operation as for the Create-Document operation (section 3.1), with the addition that the client MAY supply the "document-uri" operation attribute (defined in the Send-URI operation in [RFC2911] section 3.3.2). If the client supplies the "document-uri" operation attribute, the Printer MUST validate that the URI scheme is supported and that the referenced data is accessible~~)~~[8].

The client MAY supply a Job object Target, that is, either (1) a "printer-uri" and a "job-id" operation attribute or (2) a "job-uri" operation attribute. If supplied, the Job Target MUST identify a job that has been created by Create-Job ([RFC2911] section 3.2.4), but not yet closed, that is, the client hasn't yet supplied the "last-document" operation attribute with a 'true' value. When the client supplies the Job object Target, the Printer MUST validate that an identical Create-Document, Send-Document, or Send-URI operation would have been accepted in the context of the specified Job and its other Document objects. If the client omits the Job Target by including only the "printer-uri" operation attribute, the Printer performs the same validation as for a Create-Document in which there were no Job

[8] The PWG PSI [pwg-psi] specification includes a Validate-Document operation with the "document-uri" operation attribute that the Printer MUST validate.

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attributes supplied in the Create-Job and no other Documents. The Printer MUST support the Validate-Document operation with or without the Job object Target being present.

If the client discovers that a Validate-Document operation fails, it has the choice of (1) canceling the entire partially created job, if any, (2) closing the partially created Job as is (with a Send-Document supplying the "last-document" with a 'true' value) so that the Printer will process the Job, or (3) adding other Document objects (with Create-Document, Send-Document, and/or Send-URI) and then closing the Job.

By using the Validate-~~Job~~Document operation a client can validate that an identical ~~Print-Job~~Create-Document operation (or a Send-Document operation with the document data or a Send-URI operation) would be accepted by the Printer in the context of the partially submitted Job. The Validate-~~Job~~Document operation also performs the same security negotiation as the ~~Print-Job~~Create-Document operation (see [RFC2911[section 8~~8~~), so that a client can check that the client and Printer object security requirements can be met before performing a ~~Print-Job~~Create-Document, Send-Document, or Send-URI operation.

The Printer object returns the same status codes, Operation Attributes (Group 1) and Unsupported Attributes (Group 2) as the ~~Print-Job~~Create-Document operation (see section 3.1.2). However, no ~~Job~~ Document Object Attributes (Group 3) are returned, since no ~~Job~~ Document object is created.

4 Semantic extensions to Job operations

This section defines effects that Job operations have on the Document object. Printer and Subscription object (Event Notification [ntfy]) operations MUST have no effect on the Document object and the Document object has no effect on the semantics of the Printer and Subscription operations. The Job operations that MUST NOT have any effect on the Document object because they are defined to affect the Job object as a whole are: **Get-Job-Attributes**[9] ([RFC2911] section 3.3.4)**, Get-Jobs**[10] ([RFC2911] section 3.2.6)**, Hold-Job** ([RFC2911] section 3.3.5), **Promote-Job** ([adm-ops] section 4.4.1), **Release-Held-New-Jobs** ([adm-ops] section 3.3.2)**, Resume-Job** ([adm-ops] section 4.3.2)**, Schedule-Job-After** ([adm-ops] section 4.4.2)**, Set-Job-Attributes** ([set-ops] section 4.2), and **Validate-Job** ([RFC2911] section 3.2.3).

The Job operations that affect Document objects or that Document objects affect the semantics of the Job operations are, in alphabetical order:

4.1 Cancel-Current-Job ([adm-ops] section 4.2)

The Printer sets the "document-state" Document Description attribute to 'canceled' and the "document-state-reasons" Document Description attribute to 'canceled-by-xxx' for any documents in the current Job that have not yet reached a terminal state ('completed', 'canceled', or 'aborted'), where "xxx" is 'user' or 'operator'. See [adm-ops] section 4.2.

4.2 Cancel-Job ([RFC2911] section 3.3.3)

The Printer sets "document-state" Document Description attribute to 'canceled' and the "document-state-reasons" Document Description attribute to 'canceled-by-user' or 'canceled-by-operator' for *all* Document objects in the identified Job that have not yet reached a terminal state ('completed', 'canceled', or 'aborted').

[9] The Printer MUST NOT copy up to the Job object any Document attributes supplied at the Document Level in Create-Document, Send-Document, or Send-URI to the Job object as observable by the client in any Get-Job-Attributes operation responses.

[10] The Printer MUST NOT copy up to the Job object any Document attributes supplied at the Document Level in Create-Document, Send-Document, or Send-URI to the Job object as observable by the client in any Get-Job-Attributes operation responses.

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4.3 Create-Job ([RFC2911] section 3.2.4)

The Printer creates the Job object with all of the mixture of Job and Document attributes supplied in the Create-Job operation. The Document objects that are subsequently created for the specified Job inherit the Document attributes from the Job object. However, the Printer MUST NOT copy down any Job Level attributes, including "document-overrides" ([override]) to the Document object as observable by a client in any Get-Documents or Get-Document-Attributes operation responses.

4.4 Print-Job ([RFC2911] section 3.2.1)

The Printer creates one Document object as a side effect of the Print-Job operation. All of the attributes supplied by the client MUST remain at the Job Level as part of the Job object. Any Document attributes supplied have affect on the Document object because the Document object inherits them from the Job object. The Printer MUST populate the single Document object's "document-state", "document-state-reasons", and "document-number" Document Description attributes with appropriate values. Thus a Get-Documents or Get-Document-Attributes for a Job created by Print-Job will return no attributes supplied by the client, but will return the populated Document Description attributes.

4.5 Print-URI ([RFC2911] section 3.2.2)

The Printer creates one Document object as a side effect of the Print-URI operation. All of the attributes supplied by the client MUST remain at the Job Level as part of the Job object. Any Document attributes supplied have affect on the Document object because the Document object inherits them from the Job object. The Printer MUST populate the Document object's "document-state", "document-state-reasons", and "document-number" Document Description attributes with appropriate values. Thus a Get-Documents or Get-Document-Attributes for a Job created by Print-Job will return no attributes supplied by the client, but will return the populated Document Description attributes.

4.6 Purge-Jobs ([RFC2911] section 3.2.9)

The Printer removes all Job and all of their contained Document objects.

4.7 Release-Job ([RFC2911] section 3.3.6)

The Printer moves the job to the 'pending' state, if there are no other "job-state-reasons" to hold the job. ISSUE 08: Should a Document's "document-state-reasons" keep a Job from being released with Release-Job? Or should there be no such reasons for the "document-state-reasons" Document Description attribute? For example, what about the 'resources-are-not-ready' value of the "document-state-reasons" Document Description attribute? Or maybe the 'resources-are-not-ready' is only for the "job-state-reasons" Job Description attribute. Then there wouldn't be any "document-state-reasons" that affect job scheduling.

4.8 Reprocess-Job ([adm-ops] section 4.1)

The Printer processes the Job again by processing *all* Documents in the Job, including ones that have been canceled by a previous Cancel-Document operation. Therefore, the Printer removes any 'canceled-by-xxx' values from any of the "document-state-reasons" attributes and the Job's "job-state-reasons" attributes.

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4.9 Restart-Job ([RFC2911] section 3.3.7)

The Printer starts the Job over again by processing *all* Documents in the Job, including ones that have been canceled by a previous Cancel-Document operation. Therefore, the Printer removes any 'canceled-by-xxx' values from any of the "document-state-reasons" attributes and the Job's "job-state-reasons" attributes and

4.10 Send-Document ([RFC2911] section 3.3.1)

The Printer accepts a new Document Attributes group that the client can supply Document Template attribute and creates a Document object (see section 3.3).

4.11 Send-URI ([RFC2911] section 3.3.2)

The Printer accepts a new Document Attributes group that the client can supply Document Template attribute and creates a Document object (see section 3.4).

4.12 Suspend-Current-Job ([adm-ops] section 4.3.1)

The Printer suspends the current job and sets the Job's "job-state" Job Description attribute to 'processing-stopped' and "job-state-reasons" to 'job-suspended-by-xxx', where 'xxx' is 'user' or 'operator'. The Documents' "document-state" and "document-state-reasons" Document Description attributes are unaffected (but the Documents are not processed any further, since the Job is stopped).

5 Attribute Precedence

This section defines the Attribute Precedence rules for Queue Override attributes, Page Override attributes, Document Object attributes, Document Override attributes, Job Object attributes, PDL instructions, PDL Interpreter initialization files, 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.

   - 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.

4) The later that an attribute is introduced into the work flow or the closer the attribute is to the affected object, the higher the precedence is assigned to that attribute, since precedence is intended to reflect the user's wishes.

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The following levels of Attribute Precedence are defined in order of decreasing priority:

1. **queue override** - The value that the Printer enforces for any job submitted to it (see [prod-print2] section 3.1). 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 [prod-print2] section 8). All other levels are available for all Printers independent of the "pdl-override-supported" value.

2. **Document Level - page override programming** - The special “page-overrides” collection Document Template attribute (see [override]) supplied at the Document Level, i.e., in a Create-Document, Send-Document, or Send-URI operation, that contains the attributes that are to have the page override status for the specified ranges of pages in the Input-Document or the Output-Document. Supplied by the client when submitting a Document object, or set by the user or operator after the Document has been accepted either using the Set-Document-Attributes operation, or by the operator using means local to the Printer. Example: "page-overrides" = {"page-number" = '1'; "media" = 'letterhead'}

3. **Document Level - Document object attributes -** The Document attributes supplied at the Document Level, i.e., in a Create-Document, Send-Document, or Send-URI operation to apply to the Input Document. Supplied by the client when submitting a Document object, or set by the user or operator after the Document has been accepted either using the Set-Job-Attributes operation, or by the operator using means local to the Printer. Examples: "media" = 'na-letter' and "copies" = '2'.

4. **Job Level - page override programming** - A special "page-overrides" collection Job Template attribute (see [override]) supplied at the Job Level, i.e., in a Job Creation operation, that contains the attributes that are to have the page override status for the specified ranges of pages in the Input-Document or the Output-Document. Supplied 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, or by the operator using means local to the Printer. Example: "page-overrides" = {"page-number" = '1'; "media" = 'letterhead'}

5. **Job Level - document override programming** - A special "document-overrides" collection Job Template attribute (see [override]) that contains the attributes that are to have the document override status for the specified Input-Documents or Output-Documents. Supplied 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, or by the operator using means local to the Printer. Example: "document-overrides" = {"document-number" = '5; "media" = 'transparency'}

6. **Job Level - Job object attributes** - The Job attributes supplied at the Job Level, i.e., with a Create-Job, Print-Job, or Print-URI operation. Supplied 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, or by the operator using means local to the Printer. Examples: "media" = 'na-letter' and "copies" = '2'.

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

8. **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 [prod-print2] Section 5.8. 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.

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9. **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 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 value 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.

6 Operation Attributes for the Job and Document Creation operations

This section lists *all* the Operation attributes that have been defined in other IPP specifications that are used in Job Creation operations and extends their use to the Document Creation operations defined in the IPP specification. Operation attributes relate to the operation and do not depend on the printing capabilities of the Printer.

6.1 Operation Attributes supplied ~~in Job Creation and Document Creation requests~~at the Job and Document Levels

Table 5 lists the Operation attributes that clients supply at the Job Level and/or the Document Level. ~~in Job Creation operation *requests*: Print-Job, Print-URI, and Create-Job and in Document Creation operation *requests*: Send-Document and Send-URI.~~ The value of the "ipp-attribute-fidelity" operation attribute does *not* affect the Printer's handling of the other operation attributes, only its handling of the Job Template attributes (see section 7).

The "Level Supplied" column indicates whether the Operation attribute can be supplied at the Job Level (Print-Job, Print-URI, and Create-Job) and at the Document Level (Create-Document, Send-Document, and Send-URI) ~~in a Job Creation operation (Job = y) and/or a Document Creation operation (Doc = y)~~. The Conformance column indicates the conformance requirements for what the client supplies in a request and the Printer supports in a request. The Reference and Section columns list the IETF or IEEE-ISTO specification which defines the semantics of the attribute

Table 5 - Operation Attributes supplied ~~in Job and Document Creation operation *requests*~~at the Job and Document Levels

Operation attribute name for Job and Document Creation *requests*	Attribute Syntax	Level Supplied		Conformance		Reference
		Job	Doc	Client supply	Printer support	
attributes-charset *	charset	y	y	MUST	MUST	[RFC2911] §3.1.4
attributes-natural-language *	naturalLanguage	y	y	MUST	MUST	[RFC2911] §3.1.4
compression	type3 keyword	y[11]	y	MAY	MUST	[RFC2911] §3.2.1.1

[11] The "compression", "document-format", "document-name", and "document-natural-language" MAY be supplied in the Create-Job Job Creation operation as an extension to [RFC2911] as specified in [override]. If supplied in any Job Creation operation, the Printer copies them to corresponding Job Description attributes for subsequent Job query.

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Operation attribute name for Job and Document Creation *requests*	Attribute Syntax	Level Supplied		Conformance		Reference
		Job	Doc	Client supply	Printer support	
document-format	mimeMediaType	y[3]	y	MAY	MUST	[RFC2911] §3.2.1.1
document-name	name(MAX)	y[3]	y	MAY	MUST	[RFC2911] §3.2.1.1
document-natural-language	naturalLanguage	y[3]	y	MAY	MAY	[RFC2911] §3.2.1.1
document-overrides	1setOf collection		y[12]	MAY	MAY	[override] §5.1
document-uri	uri	y	y	MAY[13]	MAY	[RFC2911] §3.2.2
input-document-number[14]	integer(1:MAX)	-	y	MAY	MAY	[override] §9.2
ipp-attribute-fidelity	boolean	y	y	MAY	MUST	[RFC2911] §3.2.1.1
job-impressions	integer(0:MAX)	y	y	MAY	MAY	[RFC2911] §3.2.1.1
job-k-octets	integer(0:MAX)	y	y	MAY	MAY	[RFC2911] §3.2.1.1
job-media-sheets	integer(0:MAX)	y	y	MAY	MAY	[RFC2911] §3.2.1.1
job-name	name(MAX)	y	-	MAY	MUST	[RFC2911] §4.3.5
job-password	octetString(255)	y	-	MAY	MAY	[prod-print2] §4.1
job-password-encryption	type3 keyword | name(MAX)	y	-	MAY	MAY	[prod-print2] §4.2
last-document	boolean	-	y	~~MAY~~MUST	MUST	[RFC2911] §3.3.1.1
job-mandatory-attributes	1setOf type2 keyword	y	y	MAY	MAY	[this spec] §6.2.1
operation-id *	integer(1:0x8FFF)	y	y	MUST	MUST	[RFC2911] §3.1.2
original-requesting-user-name	name(MAX)	y	y	MAY	MAY	[adm-ops] §11.7.2.2
page-overrides	1setOf collection	-	y[15]	MAY	MAY	[override] §
printer-uri *	uri	y	y	MUST	MUST	[RFC2911] §3.1.5
request-id *	integer(1:MAX)	y	y	MUST	MUST	[RFC2911] §3.1.2
requesting-user-name *	name(MAX)	y	y	SHOULD	MUST	[RFC2911] §3.2.1.1
version-number *	X.Y	y	y	MUST	MUST	[RFC2911] §3.1.8

1239 * - indicates attributes that are defined for *all* operations, not just Job Creation and Document Creation operations

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These supplied attributes become defaults for the Documents in the job and used if the client does not supply the corresponding operation attribute in the Send-Document or Send-URI Document Creation operation.

[12] The “document-overrides” (collection) attribute MAY be supplied by the client in a Send-Document or Send-URI request as an Operation attribute to apply document overrides to this and/or subsequent documents in the job. See the “page-overrides” Job Template attribute in Table 7 for the listing of the member attributes. However, with the introduction of the Document object, the “document-overrides” (collection) attribute SHOULD NOT be used (either as a Job Template attribute or an Operation attribute). Instead, the client simply supplies the Document Template attributes (see Table 7) for each Document Creation request (in a new Document Template attribute group) without needing a collection.

[13] The “document-uri” operation attribute MUST be supplied in the Job Creation operation and MUST NOT be supplied in other Job Creation operations.

[14] The “input-document-number” operation attribute sets the Document’s “document-number” Document Description attribute (see section 8.1).

[15] The “page-overrides” (collection) attribute MAY be supplied by the client in a Send-Document or Send-URI request as an Operation attribute to apply page overrides to this and/or subsequent documents in the job. See the “page-overrides” Job Template attribute in Table 7 for the listing of the member attributes. However, with the introduction of the Document object, the “page-overrides” (collection) attribute SHOULD be more simply supplied as one of the Document Template attributes for this document only.

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6.2 Operation Attributes defined for use with the Document Object

This section defines new Operation attributes defined for use with the Document object.

6.2.1 job-mandatory-attributes (1setOf type2 keyword)

This operation attribute identifies which Job Template and Document Template attributes the Printer MUST honor, otherwise, the Printer MUST reject the Job Creation for the Job or any subsequent Document Creation operations for this Job. The Printer MUST ignore this attribute if the "ipp-attribute-fidelity" operation attribute is supplied with a 'true' value, since that indicates that the Printer MUST honor all supplied Job and Document Template attributes.

The values of the "job-mandatory-attributes" attribute are the keywords that identify attributes, for example, 'copies' and 'media'. In order to identify a member attribute of a collection attribute, the keyword names of both the collection attribute and the member attribute are given separated by a period (.) character. For example, to make the "media" attribute of the "cover-front" collection attribute, supply the keyword value: 'cover-front.media'.

ISSUE 09: Shouldn't we have both a "job-mandatory-attributes" and a "document-management-attributes" operation attribute, one for use in Job Creation operations and the other for use in Document Creation operations?

6.3 Operation Attributes returned in Job and Document Creation responses

Table 6 lists the Operation attributes that Printers return in Job Creation operation *responses*: Print-Job, Print-URI, and Create-Job and in Document Creation operation *responses*: Send-Document and Send-URI. The column labeled "Conformance" indicates the conformance for what the Printer returns and what the Printer supports. The Reference and Section columns list the IETF or IEEE-ISTO specification which defines the semantics of the attribute.

~~ISSUE 1e: Currently the returns operation attributes are the same for Job Creation and Document Creation responses. Should the "document-number" be added as an additional OPTIONAL response attribute to the Document Creation responses?~~

Table 6 - Operation attributes returned in Job and Document Creation operation *responses*

Operation attribute name	Attribute Syntax Values	Conformance		References
		Printer return	Printer support	
attributes-charset *	charset	MUST	MUST	[RFC2911] §3.1.4
	'utf-8'	MAY	MUST	[RFC2911] §4.1.7
	'us-ascii'	MAY	MAY	[RFC2911] §4.1.7
	'iso-8859-1'	MAY	MAY	[RFC2911] §4.1.7
	'iso-10646-ucs-2'	MAY	MAY	[RFC2911] §4.1.7
attributes-natural-language *	naturalLanguage	MUST	MUST	[RFC2911] §3.1.4
	'en-US'	MAY	MAY	[RFC2911] §4.1.8
detailed-status-message *	text	MAY	MAY	[RFC2911] §3.1.6.3
document-access-error	text	MAY	MAY	[RFC2911] §3.1.6.4
document-id-uri	uri	MUST? ISSUE 10	MUST? ISSUE11	[this spec] §8.8

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Operation attribute name	Attribute Syntax Values	Conformance		References
		Printer return	Printer support	
job-id	integer(1:MAX)	MUST	MUST	[RFC2911] §4.3.2
job-uri	uri	MUST	MUST	[RFC2911] §4.3.1
redirect-uri (uri)[16]	uri	MAY	MAY	[not-srv] §5.2
request-id *	integer(1:32767)	MUST	MUST	[RFC2911] §3.1.2
status-code *	integer(0:32767)	MUST	MUST	[RFC2911] §3.1.6.1
status-message *	text(255)	MAY	MAY	[RFC2911] §3.1.6.2
version-number *	integer(1:255), integer(0:255)	MUST	MUST	[RFC2911] §3.1.8

* - indicates attributes that are defined for *all* operations, not just Job Creation operations

7 Job Template and Document Template attributes

Table 7 lists *all* of the Job Template attributes defined in other IPP specifications and lists their corresponding Document Template attributes defined in this IPP specification. The Job Template attributes can be supplied in the Job Creation operations: Print-Job, Print-URI, and Create-Job operations.

A subset of these Job Template attributes (e.g., "document-format" and "media", but not "job-priority") ~~have corresponding~~ are also ~~Document Template attributes~~ defined to apply to Documents and are called Document Template attributes when supplied at the Document Level. Document Template attribute can be supplied in ~~Document Creation operations:~~the Create-Document, Send-Document, and Send-URI operations.

These Document Template attributes can also be supplied as Document Overrides using the "document-overrides" Job Template attribute (see [overrides]).

A subset of the Document Template attributes that apply to pages (e.g., "media", but not "document-format" or "job-priority") can also be supplied as Page Overrides using the "page-overrides" Job Template collection attribute (see [override]) or as a Document Template attribute.

According to [override], the "document-overrides" (collection) attribute MAY be supplied by the client in a Send-Document or Send-URI request as an Operation attribute to apply document overrides to this and/or subsequent documents in the job. See the "document-overrides" Job Template attribute in Table 7 for the listing of the member attributes. However, with the introduction of the Document object, the "document-overrides" (collection) attribute SHOULD NOT be used (either as a Job Template attribute or an Operation attribute). Instead, the client simply supplies the Document Template attributes (see Table 7) for each Document Creation request (in a new Document Template attribute group) without needing a collection. A Printer MAY support "document-overrides" as specified in [override] for backward compatibility with clients that don't support the Document object.

The "document-overrides" attribute is also useful in combination with the "pages-per-subset" attribute (see [overrides]) which divides up the Input Page stream concatenated across the Input Documents into separate Output Documents. For example, making every 10 Input Pages be a separate Output Document but the client only wants to staple the first Output Document.

~~ISSUE 02: What do we want to do with the "document-overrides" collection attributes when supporting the Document object, which is no longer needed as either a Job Template, Document Template, or operation attribute in~~

[16] The Printer or Notification Server returns the "redirect-~~other-site~~uri" operation attribute ~~as a hint that it will~~ in order to redirect ~~any future~~ the Get-Notification operation ~~requests~~ to a ~~separate~~ Notification Server or back to the original Printer.

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~~Document Creation requests? Not completely true, since the "document-copies" member attribute of the "document-overrides" attribute allows the client to supply different attributes to different copies of a document. Has anyone implemented Document Overrides?~~

Similarly, according to [override], the "page-overrides" (collection) attribute MAY be supplied by the client in a Send-Document or Send-URI request as an Operation attribute to apply page overrides to this and/or subsequent documents in the job. See the "page-overrides" Job Template attribute in Table 7 for the listing of the member attributes. However, with the introduction of the Document object, the "page-overrides" (collection) attribute SHOULD be more simply supplied as one of the Document Template attributes for the document being created only. However, a Printer MAY also support the "page-overrides" attribute as an operation attribute for backward compatibility with clients that do not support the Document object.

~~ISSUE 03: What do we want to do with the "page-overrides" collection attributes when supporting the Document object, which is still needed as a Job Template and Document Template attribute for overriding attributes in specified page ranges, but is not needed as an operation attribute on Document Creation requests?~~

The "Defined for use" column indicates whether the client MAY supply and the Printer support the attribute at the Job, Document, or Page Level with the following semantics:

Supplied	Description
J=y:	Job Level: The attributes MAY be supplied as Job Template attributes at the Job Level in a Job Creation request (Print-Job, Print-URI, Create-Job) in which case each Document inherits the Job Template attribute as a default which is used unless an attribute at the document level is also supplied. Note: The "multiple-document-handling" attribute controls whether extensive attributes, such as "finishing", "copies", affect the entire job as a whole ('single-xxx' values) or affect each document separately ('separate-xxx' values).
D=y:	Document Level: The attribute MAY be supplied at the Document Level as Document Template attributes in a Document Creation operation (Send-Document, Send-URI), in which case the supplied Document Templates override any Job Template attributes supplied at the Job Level and any "document-overrides" supplied at the Job or Document level.
P=y:	Page Level: The attribute MAY be supplied as a member of the (1) "page-ranges" Job Template attribute at the Job Level in a Job Creation operation or (2) "page-ranges" Document Template attribute at the Document Level to affect the specified range of pages.

Job Template and Document Template attributes are OPTIONAL for a Printer to support and for a client to supply in a Job Creation or Document Creation request or a Document Overrides or Page Overrides. If a Printer supports a Job Template or Document Template attribute, then it MUST copy the supplied attribute to the Job or Document object, respectively so that a client MAY query the attributes in subsequent Get-Job-Attributes/Get-Jobs and Get-Document-Attributes/Get-Documents operations, respectively. The effect of Job Template Attributes supplied in Job Creation requests are inherited by the Document objects, unless the Document Creation operation supplies the attribute with a different value. ~~However, the Printer MUST NOT propagate Job Template attributes supplied in Job Creation operations to the Document object. Similarly, the Printer MUST NOT promote Document Template attributes up to the Job object when no corresponding Job Template attribute was supplied in the Job Creation operation. Thus the Printer returns in queries only Job Template and Document Template attributes that were actually supplied by a client.~~

~~ISSUE 04: Is this query behavior of not appearing to copying down supplied Job attributes to the Document object and not bubbling up supplied Document attributes to the Job object OK?~~

~~However, i~~If a Job Template collection attribute is supported (see [coll]), then there are conformance requirements for which member attributes MUST be supported and which member attributes a client MUST supply as indicated in the Conformance column for each collection member attribute in Table 7.

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1324 **Table 7 - Job Template and Document Template attributes**

Job Template / Document Template attribute name	Attribute Syntax	Defined for use			Conformance		Reference
		J	D	P	Client supply	Printer support	
copies	integer(1:MAX)	y[17]	y	n	MAY	MAY	[RFC2911] §4.2.5
cover-back	collection	y	y	n	MAY	MAY	[prod-print] §3.1
cover-type	type2 keyword				MUST	MUST	[prod-print] §3.1.2
media	type3 keyword | name(MAX)				MAY be neither or one of, but NOT both	MUST	[prod-print] §3.1.1
media-col	collection					MAY	[prod-print] §3.1.1
cover-front	collection	y	y	n	MAY	MAY	[prod-print] §3.1
cover-type	type2 keyword				MUST	MUST	[prod-print] §3.1.2
media	type3 keyword | name(MAX)				MAY be neither or one of, but NOT both	MUST	[prod-print] §3.1.1
media-col	collection					MAY	[prod-print] §3.1.1
document-overrides	collection	y	n	n	MAY	MAY	[override] §5.1
input-documents	1setOf rangeOfInteger(MAX)				MUST be one or the other, but NOT both	MUST	[override] §5.1.1
output-documents	1setOf rangeOfInteger(MAX)					MUST	[override] §5.1.2
document-copies	1setOf rangeOfInteger(MAX)				MAY	MAY	[override] §5.1.3
document-format	mimeMediaType				MAY	MUST	[override] §5.1.4
document-name	name (MAX)				MAY	MUST	[override] §5.1.5
compression	type3 keyword				MAY	MUST	[override] §5.1.6
document-natural-language	naturalLanguage				MAY	MAY	[override] §5.1.7
page-ranges	1setOf rangeOfInteger (1:MAX)				MAY	MAY	[override] §5.1.8
any other Job Template attributes that affect documents, such as "media" or "media-col"					MAY	MAY	
feed-orientation	type3 keyword	y	y	n	MAY	MAY	[prod-print2] §5.1
finishings	1setOf type2 enum	y[18]	y	y	MAY be neither or one of, but NOT both	MAY, MUST if "finishing-col" is supported	[RFC2911] §4.2.6 [finish] §2
finishings-col	collection	y[9]	y	y		MAY	[prod-print] §3.2

[17] The IPP "copies" attribute is an *extensive* attribute, so its effect when supplied at the job level is not always inherited by the documents in a multi-document job. Instead, its effect depends on the value of the "multiple-document-handling" Job Template attribute. The 'single-document' and 'single-document-new-sheet' values produce copies of the job as a whole with the multiple input documents concatenated into a single output document for each job copy. The 'separate-document-uncollated-copies' value produce N copies of the first input document followed by N copies of the second input document, etc. The 'separate-document-collated-copies' produce N successive job copies, each job copy consisting of 1 copy of the first document followed by 1 copy of the second document, etc.

[18] The IPP "finishings" and "finishings-col" attributes are *extensive* attributes, so their effect when supplied at the job level is not always inherited by the documents in a multi-document job. Instead, their effect depends on the value of the "multiple-document-handling" Job Template attribute. The 'single-document' and 'single-document-new-sheet' cause the finishing to be applied to each job copy as a whole. The 'separate-documents-collated-copies' and 'separate-document-uncollated-copies' values cause the finishing to be applied to each document.

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Job Template / Document Template attribute name	Attribute Syntax	Defined for use			Conformance		Reference
		J	D	P	Client supply	Printer support	
finishing-template	name(MAX)				MAY	MAY	[prod-print] §3.2.1
stitching	collection				MAY	MAY	[prod-print] §3.2.2
stitching-reference-edge	type2 keyword				MUST	MUST	[prod-print] §3.2.2.1
stitching-offset	integer (0:MAX)				MUST	MUST	[prod-print] §3.2.2.2
stitching-locations	1setOf integer(0:MAX)				MUST	MUST	[prod-print] §3.2.2.3
font-name-requested	name(MAX)	y	y	y	MAY	MAY	[prod-print2] §5.2
font-size-requested	integer (1:MAX)	y	y	y	MAY	MAY	[prod-print2] §5.3
force-front-side	1setOf integer(1:MAX)	y[19]	y	y	MAY	MAY	[prod-print] §3.3
imposition-template	type2 keyword | name(MAX)	y	y	y	MAY	MAY	[prod-print] §3.4
insert-sheet	1setOf collection	y[10]	y	y	MAY	MAY	[prod-print] §3.5
insert-after-page-number	integer(0:MAX)				MUST	MUST	[prod-print] §3.5.1
insert-count	integer(0:MAX)				MAY	MUST	[prod-print] §3.5.2
media	type3 keyword | name(MAX)				MUST be one or the other, but NOT both	MUST	[prod-print] §3.5.3
media-col	collection					MAY	[prod-print] §3.5.3
job-account-id	name(MAX)	y	n	n	MAY	MAY	[prod-print] §3.6
job-accounting-sheets	collection	y	n	n	MAY	MAY	[prod-print] §3.8
job-accounting-sheets-type	type3 keyword | name(MAX)				MUST	MUST	[prod-print] §3.8.1
media	type3 keyword | name(MAX)				MAY be neither or one of, but NOT both	MUST	[prod-print] §3.8.2
media-col	collection					MAY	[prod-print] §3.8.2
job-accounting-output-bin	type3 keyword | name(MAX)				MAY	MAY	[prod-print] §3.8.3
job-accounting-user-id	name(MAX)	y	n	n	MAY	MAY	[prod-print] §3.7
job-copies	integer(1:MAX)	y	n[20]	n	MAY	MAY	[this spec] §7.1.1
job-cover-back	collection	y	n[21]	n	MAY	MAY	[this spec] §7.1.2
***same as* cover-back**	**see cover-back**						
job-cover-front	collection	y	n[22]	n	MAY	MAY	[this spec] §7.1.3
***same as* cover-front**	**see cover-front**						
job-error-sheet	collection	y	n	n	MAY	MAY	[prod-print] §3.9

[19] The effect of the IPP "force-front-side" and "insert-sheet" attributes when supplied at the job level of a multi-document job depends on the value of the "multiple-document-handling" Job Template attribute. For the 'single-document' and 'single-document-new-sheet' values, the pages are numbered as a single set from 1 to n for the job as a whole. For the 'separate-documents-collated-copies' and 'separate-document-uncollated-copies' values, the pages are numbered from 1 to n for each document separately.

[20] The "job-copies" Job Template attribute MUST NOT be supplied at the Document or Page Level. The "job-copies" Job Template attribute was introduced for use in clients or Printers that don't support "multiple-document-handling" = 'single-document' or 'single-document-new-sheet'.

[21] The "job-cover-back" Job Template attribute MUST NOT be supplied at the Document or Page Level. The "job-cover-back" Job Template attribute was introduced for use in clients or Printers that don't support "multiple-document-handling" = 'single-document' or 'single-document-new-sheet'.

[22] The "job-cover-front" Job Template attribute MUST NOT be supplied at the Document or Page Level. The "job-cover-front" Job Template attribute was introduced for use with clients or Printers that don't support "multiple-document-handling" = 'single-document' or 'single-document-new-sheet'.

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Job Template / Document Template attribute name	Attribute Syntax	Defined for use			Conformance		Reference
		J	D	P	Client supply	Printer support	
job-error-sheet-type	type3 keyword | name(MAX)				MUST	MUST	[prod-print] §3.9.1
job-error-sheet-when	type2 keyword				MAY	MAY	[prod-print] §3.9.2
media	type3 keyword | name(MAX)				MAY be neither or one of, but NOT both	MUST	[prod-print] §3.9.3
media-col	collection					MAY	[prod-print] §3.9.3
job-finishings	1setOf type2 enum	y	n[23]	n	MAY	MAY	[this spec] §7.1.4
job-finishings-col	collection	y	n[24]	n	MAY	MAY	[this spec] §7.1.5
***same as* finishings-col**	**see finishings-col**						
job-hold-until	type3 keyword | name(MAX)	y	n	n	MAY	MAY	[RFC2911] §4.2.2
job-hold-until-time	dateTime	y	n	n	MAY	MAY	[prod-print2] §5.4
job-message-to-operator	text(MAX)	y	n	n	MAY	MAY	[prod-print] §3.10
job-phone-number	text(127)	y	n	n	MAY	MAY	[prod-print2] §5.5
job-priority	integer(1:100	y	n	n	MAY	MAY	[RFC2911] §4.2.1
job-recipient-name	name(MAX)	y	n	n	MAY	MAY	[prod-print2] §5.6
job-save-disposition	collection	y	n	n	MAY	MAY	[prod-print2] §5.7
save-disposition	type3 keyword	y	n	n	MAY	MAY	[prod-print2] §5.7.1.1
save-info	1setOf collection	y	n	n	MAY	MAY	[prod-print2] §5.7.1.2
save-location	uri	y	n	n	MAY	MAY	[prod-print2] §5.7.1.2.3.1
save-name	name(MAX)	y	n	n	MAY	MAY	[prod-print2] §5.7.1.2.3.2
save-document-format	mimeMediaType	y	n	n	MAY	MAY	[prod-print2] §5.7.1.2.3.3
job-sheet-message	text(MAX)	y	n	n	MAY	MAY	[prod-print] §3.12
job-sheets	type3 keyword | name(MAX)	y	n	n	MAY be neither or one of, but NOT both	MAY, MUST if "job-sheets-col" supported	[RFC2911] §4.2.3
job-sheets-col	collection	y	n	n		MAY	[prod-print] §3.11
job-sheets	type3 keyword | name(MAX)				MUST	MUST	[prod-print] §3.11.1
media	type3 keyword | name(MAX)				MUST be one or the other, but NOT both	MUST	[prod-print] §3.11.2
media-col	collection					MAY	[prod-print] §3.11.2
media	type3 keyword | name(MAX)	y	y	y	MAY be neither or one of, but NOT both	MAY, MUST if "media-col" supported	[RFC2911] §4.2.11
media-col	collection	y	y	y		MAY	[prod-print] §3.13

[23] The "job-finishing" Job Template attribute MUST NOT be supplied at the Document or Page Level. The "job-finishings" Job Template attribute was introduced for use with clients or Printers that don't support "multiple-document-handling" = 'single-document' or 'single-document-new-sheet'.

[24] The "job-finishing-col" Job Template attribute MUST NOT be supplied at the Document or Page Level. The "job-finishings-col" Job Template attribute was introduced for use with clients or Printers that don't support "multiple-document-handling" = 'single-document' or 'single-document-new-sheet'.

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Job Template / Document Template attribute name	Attribute Syntax	Defined for use			Conformance		Reference
		J	D	P	Client supply	Printer support	
media-back-coating	type3 keyword | name(MAX)				MAY	MAY	[prod-print] §3.13.10
media-color	type3 keyword | name(MAX)				MAY	MAY	[prod-print] §3.13.4
media-front-coating	type3 keyword | name(MAX)				MAY	MAY	[prod-print] §3.13.10
media-grain	type3 keyword | name(MAX)				MAY	MAY	[prod-print2] §8.4.2
media-hole-count	integer(0:MAX)				MAY	MAY	[prod-print] §3.13.6
media-info	text(255)				MAY	MAY	[prod-print] §3.13.3
media-key	type3 keyword | name(MAX)				MAY	MAY	[prod-print] §3.13.1
media-material	type3 keyword | name(MAX)				MAY	MAY	[prod-print2] §8.4.3
media-order-count	integer(1:MAX)				MAY	MAY	[prod-print] §3.13.7
media-preprinted	type3 keyword | name(MAX)				MAY	MAY	[prod-print] §3.13.5
media-recycled	type3 keyword | name(MAX)				MAY	MAY	[prod-print] §3.13.11
media-size	collection				MAY	MUST	[prod-print] §3.13.8
x-dimension	integer(0:MAX)				MUST	MUST	[prod-print] §3.13.8.1
y-dimension	integer(0:MAX)				MUST	MUST	[prod-print] §3.13.8.2
media-tooth	type3 keyword | name(MAX)				MAY	MAY	[prod-print2] §8.4.1
media-thickness	integer(1:MAX				MAY	MAY	[prod-print2] §8.4.4
media-type	type3 keyword | name(MAX)				MAY	MAY	[prod-print] §3.13.2
media-weight-metric	integer(0:MAX)				MAY	MAY	[prod-print] §3.13.9
media-input-tray-check	type3 keyword | name(MAX)	y	y	y	MAY	MAY	[prod-print] §3.14
multiple-document-handling	type2 keyword	y	n	n	MAY	MUST if multiple document jobs supported	[RFC2911] §4.2.4
number-up	integer(1:MAX)	y	y	y	MAY	MAY	[RFC2911] §4.2.9
orientation-requested	type2 enum	y	y	y	MAY	MAY	[RFC2911] §4.2.10
output-bin	type2 keyword | name(MAX)	y	y	n	MAY	MAY	[output-bin] §2.1
page-delivery	type2 keyword	y	y	n	MAY	MAY	[prod-print] §3.15
page-order-received	type2 keyword	y	y	n	MAY	MAY	[prod-print] §3.16
page-overrides	1setOf collection	y[25]	y	n	MAY	MAY	[override] §5.2

[25] The effect of the IPP "page-overrides" ~~and "page-ranges",~~ Job Template attribute~~s~~ when supplied at the job level of a multi-document job depends on the value of the "multiple-document-handling" Job Template attribute. For the 'single-document' and 'single-document-new-sheet' values, the pages are numbered as a single set from 1 to n for the job as a whole. For the 'separate-documents-collated-copies' and 'separate-document-uncollated-copies' values, the pages are numbered from 1 to n for each document separately.

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Job Template / Document Template attribute name	Attribute Syntax	Defined for use			Conformance		Reference
		J	D	P	Client supply	Printer support	
input-documents	1setOf rangeOfInteger(MAX)				MUST be one or the other, but NOT both	MUST	[override] §5.2.1
output-documents	1setOf rangeOfInteger(MAX)					MUST	[override] §5.2.2
document-copies	1setOf rangeOfInteger(MAX)				MAY	MAY	[override] §5.2.3
pages	1setOf rangeOfInteger(MAX)				MUST	MUST	[override] §5.2.4
any other Job Template attributes that affect pages, such as "media" or "media-col"					MAY	MAY	
page-ranges	1setOf rangeOfInteger(1:MAX)	y[26] ~~1~~	y	~~y~~n	MAY	MAY	[RFC2911] §4.2.7
pages-per-subset	1setOf integer(1:MAX)	y[27]	~~y~~	n	MAY	MAY	[prod-print] §5.3
pdl-init-file	1setOf collection	y	y	n	MAY	MAY	[prod-print2] §5.8
pdl-init-file-location	uri				MAY	MAY	[prod-print2] §5.8.1.1
pdl-init-file-name	name(MAX)				MAY	MAY	[prod-print2] §5.8.1.2
pdl-init-file-entry	name(MAX)				MAY	MAY	[prod-print2] §5.8.1.3
presentation-direction-number-up	type2 keyword	y	y	y	MAY	MAY	[prod-print] §3.17
print-quality	type2 enum	y	y	y	MAY	MAY	[RFC2911] §4.2.13
printer-resolution	resolution	y	y	y	MAY	MAY	[RFC2911] §4.2.12
proof-print	collection	y	n	n	MAY	MAY	[prod-print2] §5.9
proof-print-copies	integer (0:MAX)	y	n	n	MAY	MAY	[prod-print2] §5.9.1.1
media	type3 keyword | name(MAX)				MAY be neither or one of, but NOT both	MUST	[prod-print2] §5.8.1.2
media-col	collection					MAY	[prod-print2] §5.8.1.2
separator-sheets	collection	y	y	y	MAY	MAY	[prod-print] §3.18
separator-sheets-type	type3 keyword | name(MAX)				MUST	MUST	[prod-print] §3.18.1
media	type3 keyword | name(MAX)				MAY be neither or one of, but NOT both	MUST	[prod-print] §3.18.2
media-col	collection					MAY	[prod-print] §3.18.2
sheet-collate	type2 keyword	y	y	n	MAY	MAY	[job-prog] §3.1
sides	type2 keyword	y	y	y	MAY	MAY	[RFC2911] §4.2.8
x-image-position	type2 keyword	y	y	y	MAY	MAY	[prod-print] §3.19.2
x-image-shift	integer(MIN:MAX)	y	y	y	MAY	MAY	[prod-print] §3.19.3
x-side1-image-shift	integer(MIN:MAX)	y	y	y	MAY	MAY	[prod-print] §3.19.4
x-side2-image-shift	integer(MIN:MAX)	y	y	y	MAY	MAY	[prod-print] §3.19.5
y-image-position	type2 keyword	y	y	y	MAY	MAY	[prod-print] §3.19.6
y-image-shift	integer(MIN:MAX)	y	y	y	MAY	MAY	[prod-print] §3.19.7

[26] The effect of the IPP "page-ranges" Job Template attribute when supplied at the job level of a multi-document job depends on the value of the "multiple-document-handling" Job Template attribute. For the 'single-document' and 'single-document-new-sheet' values, the pages are numbered as a single set from 1 to n for the job as a whole. For the 'separate-documents-collated-copies' and 'separate-document-uncollated-copies' values, the pages are numbered from 1 to n for each document separately.

[27] The IPP "pages-per-subset" Job Template attribute MUST be supplied at the Job Level and can only be used when the "multiple-document-handling" Job Template attribute is 'separate-documents-collated-copies' or 'separate-documents-uncollated-copes', since the purpose of the "pages-per-subset" attribute is to produce separate output documents for each subset. Otherwise, the Printer MUST ignore the "pages-per-subset" attribute.

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Job Template / Document Template attribute name	Attribute Syntax	Defined for use			Conformance		Reference
		J	D	P	Client supply	Printer support	
y-side1-image-shift	integer(MIN:MAX)	y	y	y	MAY	MAY	[prod-print] §3.19.8
y-side2-image-shift	integer(MIN:MAX)	y	y	y	MAY	MAY	[prod-print] §3.19.9

7.1 Job Template attributes defined for use with the Document object

This section defines additional Job Template attributes for use with the Document object.

7.1.1 job-copies (integer(1:MAX)) Job Template attribute

This attribute specifies the number of job copies, i.e., with all of the Document objects taken together. Its interpretation is independent of the value of the "multiple-document-handling" Job Template attribute. See the "copies" Job Template attribute defined in [RFC2911] section 4.2.5 which switches between job copies and document copies depending on the value of the "multiple-document-handling" Job Template attribute.

7.1.2 job-cover-back (collection) Job Template attribute

This attribute specifies the cover for the back of the job, i.e., with all of the Document objects taken together and is independent of the value of the "multiple-document-handling" Job Template attribute. The member attributes are the same as "cover-back" (see [prod-print] section 3.1). However, the "cover-back" Job Template attribute switches between a job back cover and a document back cover depending on the value of the "multiple-document-handling" Job Template attribute.

7.1.3 job-cover-front (collection) Job Template attribute

This attribute specifies the cover for the front of the job, i.e., with all of the Document objects taken together and is independent of the value of the "multiple-document-handling" Job Template attribute. The member attributes are the same as the "cover-front" Job Template attribute (see [prod-print] section 3.2). However, the "cover-front" Job Template attribute switches between a job front cover and a document front cover depending on the value of the "multiple-document-handling" Job Template attribute.

7.1.4 job-finishings (1setOf type2 enum) Job Template attribute

This attribute specifies the job finishings, i.e., with all of the Document objects taken together. Its interpretation is independent of the value of the "multiple-document-handling" Job Template attribute. See the "finishings" Job Template attribute defined in [RFC2911] section 4.2.6 which switches between job finishings and document finishings depending on the value of the "multiple-document-handling" Job Template attribute.

7.1.5 job-finishings-col (1setOf collection) Job Template attribute

This attribute specifies the job finishings collection, i.e., with all of the Document objects taken together. Its interpretation is independent of the value of the "multiple-document-handling" Job Template attribute. See the "finishings" Job Template attribute defined in [RFC2911] section 4.2.6 which switches between job finishings collection and document finishings collection depending on the value of the "multiple-document-handling" Job Template attribute.

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8 Job Description and Document Description attributes

Table 8 lists all the Job Description defined in other IPP specifications and the corresponding Document Description attributes defined in this IPP specification. Job Description and Document Description attributes are Job object and Document object attributes, respectively, that are filled in by the Printer. Some Job/Document Description attribute values are supplied by the client in the Job/Document Creation operation using corresponding Operation attributes as flagged with "**".

The column labeled "attribute syntax" indicates the attribute syntax (see [RFC2911] section 4.1). The Printer conformance is indicated along with the reference to the specification in which the attribute is defined. The conformance for Document Description attributes (if the Printer supports the Document object) is the same as the corresponding Job Description attributes.

Note: There are no corresponding Page Range (or Page Override) Description attributes. The Page Range is not an object with a state and it cannot be queried.

Legend:

[job-] indicates an attribute that shouldn't have had a "job-" prefix in its name in [RFC2911], so that the same attribute could also apply to the Document object as a Document Description attribute. Note: For the PWG Semantic Model, the "job-" prefix is proposed to be dropped.

~~ISSUE 05: Should we sort the attributes ignoring the [job-]? Currently the "job-" is used in the sort for attributes.~~

~~ISSUE 06: How will we register these attributes with IANA, since they will be registered for IPP use, with the "job-" prefix. Do we add the ones without "job-" as aliases to the IANA registry as is done for charset registrations?~~

"-" indicates that the Job or Document attribute is *not* defined.

~~"*" indicates a fundamental Document Description that when the client supplies the value at the Job level, but not at the Document level, the Printer MUST appear to copy down the value to each Document object as returned in Get-Document-Attributes and Get-Documents operation responses.~~

** indicates a Job and/or Document Description attribute that the client MAY supply the values for in a corresponding Operation attribute.

(r/w) indicates that the Job Description or Document Description attribute is read/write, so that the client can changes its value using the Set-Job-Attributes or Set-Document-Attributes operation (see section 3.7).

ISSUE 12: The "document-name" Document Description attribute is settable by Set-Document-Attributes (like "job-name")? But It's the only Document Description attribute that is marked (r/w)? Do we really need to be able to let a client change the "document-name" with the Set-Document-Attributes operation?

Table 8 - Job and Document Description attributes

IPP Job Description / Document Description attribute name	IPP Attribute Syntax	Job	Doc	Printer conformance	Reference
attributes-charset	charset	y	y	MUST	[RFC2911] §4.3.19
attributes-natural-language	naturalLanguage	y	y	MUST	[RFC2911] §4.3.20
compression**	type3 keyword	y*	y*	MUST	[RFC2911] §3.2.1.1
current-page-order	type2 keyword	y[28]	y	MAY	[prod-print] §4.1

[28] When documents in a multiple document job have the same page order, the Printer populates both the Job and Document "current-page-order" with the same value, so that clients that only know about the Job Description attribute

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IPP Job Description / Document Description attribute name	IPP Attribute Syntax	Job	Doc	Printer conformance	Reference
date-time-at-completed	dateTime	y	y	MAY	[RFC2911] §4.3.14.7
date-time-at-creation	dateTime	y	y	MAY	[RFC2911] §4.3.14.5
date-time-at-processing	dateTime	y	y	MAY	[RFC2911] §4.3.14.6
document-format**	documentFormat	y*	y*	MUST	[RFC2911] §3.2.1.1
document-id-uri	uri	-	y	MUST? ISSUE 13	[this spec] §8.8
document-name (r/w) ****	name(MAX)	y*	y*	MUST	[RFC2911] §3.2.1.1
document-natural-language**	naturalLanguage	y*	y*	MAY	[RFC2911] §3.2.1.1
document-number	integer(0:MAX)	-	y	MUST	[this spec] §8.1
document-state	type1 enum	-	y	MUST	[this spec] §8.3.2
document-state-message	text(MAX)	-	y	MAY	[this spec] §8.7
document-state-reasons	1setOf type2 keyword	-	y	MUST	[this spec] §8.5
document-uri **	uri	-	y	MAY	[this spec] §8.9
impressions-completed-current-copy	integer(0:MAX)	y	y	MAY	[job-prog] §4.4
job-collation-type	type2 enum	y	-	MAY	[job-prog] §4.1
[job-]detailed-status-message	1setOf text (MAX)	y	y	MAY	[RFC2911] §4.3.10
[job-]document-access-errors	1setOf text(MAX)	y	y	MAY	[RFC2911] §4.3.11
job-id	integer(1:MAX)	y	-[29]	MUST	[RFC2911] §4.3.2
[job-]impressions **	integer(0:MAX)	y	y	MAY	[RFC2911] §4.3.17.2
[job-]impressions-completed	integer(0:MAX)	y	y	MAY	[RFC2911] §4.3.18.2
[job-]k-octets **	integer(0:MAX)	y	y	MAY	[RFC2911] §4.3.17.1
[job-]k-octets-processed	integer(0:MAX)	y	y	MAY	[RFC2911] §4.3.18.1
[job-]media-sheets **	integer(0:MAX)	y	y	MAY	[RFC2911] §4.3.17.3
[job-]media-sheets-completed	integer(0:MAX)	y	y	MAY	[RFC2911] §4.3.18.3
job-message-from-operator	text(127)	y	- ISSUE 14	MAY	[RFC2911] §4.3.16
[job-]more-info	uri	y	y	MAY	[RFC2911] §4.3.4
job-name (r/w) ISSUE	name(MAX)	y	-[30]	MUST	[RFC2911] §4.3.5
job-originating-user-name	name (MAX)	y	-	MUST	[RFC2911] §4.3.6
job-printer-make-and-model	text(127)	y	-	CMUST[31]	[RFC2911] §4.3.14.4
[job-]printer-up-time	integer (1:MAX)	y	y	MUST	[RFC2911] §4.3.14.4
job-printer-uri	uri	y	-	MUST	[RFC2911] §4.3.3
job-state	type1 enum	y	-[32]	MUST	[RFC2911] §4.3.7
job-state-message	text(MAX)	y	-[33]	MAY	[RFC2911] §4.3.9

---

will get a value. When the page orders differ, the Printer doesn't populate the "current-page-order" Job Description attribute, but only the Document Description attribute of each Document.

[29] The Document Description attribute that corresponds to the "job-id" Job Description attribute is the (new) "document-number" attribute.

[30] The Document Description attribute that corresponds to the "job-name" Job Description attribute is the (existing) "document-name" attribute defined in [RFC2911].

[31] The "job-printer-make-and-model" Job Description attribute MUST be supported if the "job-save-disposition" Job Template attribute is supported.

[32] The Document Description attribute that corresponds to the "job-state" Job Description attribute is the (new) "document-state" attribute.

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IPP Job Description / Document Description attribute name	IPP Attribute Syntax	Job	Doc	Printer conformance	Reference
job-state-reasons	1setOf type2 keyword	y	-[34]	MUST	[RFC2911] §4.3.8
job-uri	uri	y	-[35]	MUST	[RFC2911] §4.3.1
[job-]warnings-count	integer(0:MAX)	y	y	MAY	[override] §6.1
last-document **	boolean	-	y	MAY	[RFC2911] §4.3.12
number-of-documents	integer(0:MAX)	y	-	MAY	[RFC2911] §4.3.15
number-of-intervening-jobs	integer(0:MAX)	y	-	MAY	[RFC2911] §4.3.13
output-device-assigned	name(127)	y	-	MAY	[RFC2911] §4.3.7.2
sheet-completed-copy-number	integer(0:MAX)	y	y	MAY	[job-prog] §4.2
sheet-completed-document-number	integer(0:MAX)	y	-	MAY	[job-prog] §4.3
time-at-completed	integer (MIN:MAX)	y	y	MUST	[RFC2911] §4.3.14.3
time-at-creation	integer (MIN:MAX)	y	y	MUST	[RFC2911] §4.3.14.1
time-at-processing	integer (MIN:MAX)	y	y	MUST	[RFC2911] §4.3.14.2

"*" and "**" See the description in the Legend before the table.

Most of the existing "job-state" and "job-state-reasons" Job Description attribute values apply equally well to individual documents in a multi-document job (with removal of the 'job-' prefix for those that apply to both Job and Document). Furthermore, the job states are completely service-type neutral, so they can apply to scanning. faxing, formatting processes as well. The job state reasons have a number of reasons that are print service specific, but most can apply to other types of service as well. The reason for separating state from reasons, is so that the states can be the fundamental states that most implementations have, while the state reasons can vary depending on the sophistication of the system. The states are the ones that clients are most likely to base actions upon, and the state reasons are more information, both for programs and people.

The descriptions of the new "document-state" and "document-state-reasons" attributes are merged in with the existing "job-state" and "job-state-reasons". Such merging shows the parallelism in the description to aid understanding and implementation and so that future maintenance will continue this strong parallelism. The "/" character separates the words: Job from Document so that the same description can serve for both Job and Document objects.

8.1 document-number (integer(1:MAX)) <Document> Description attribute

This Document Description attribute is the ordinal number of the document within the job which determines its order of being printed in a multi-document job. The Printer generates the values monotonically increasing from 1 for a job. However, the client MAY supply the value in the "input-document-number" operation attribute.

8.2 job-state (type1 enum) <Job> Description attribute

8.3 document-state (type1 enum) <Document> Description attribute

The REQUIRED "job-state" and the REQUIRED "document-state" attribute identify the current state of the job and document, respectively. Even though IPP defines seven values for job/document states (plus the out-of-band

[33] There is no Document Description attribute that corresponds to the "job-state-message". Printers can use the "job-state-message" to describe any document level conditions.
[34] The Document Description attribute that corresponds to the "job-state-reasons" Job Description attribute is the (new) "document-state-reasons" attribute.
[35] The "job-uri" Job Description attribute does not have a corresponding Document Description attribute. The "job-uri" has proved problematic enough.

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'unknown' value - see [RFC2911] section 4.1), implementations only need to support those states which are appropriate for the particular implementation. In other words, an IPP Printer object implementation supports only those job/document states implemented by the output device and available to the IPP Printer object implementation.

Table 9 lists the “job-state” and “document-state” attribute values.

Table 9 - "job-state" and "document-state" attribute values

Values	“job-state”	“document-state”
3 pending	y	y
4 pending-held	y	n/a
5 processing	y	y
6 processing-stopped	y	n/a
7 canceled	y	y
8 aborted	y	y
9 completed	y	y

The (JD) and (J) notation below indicates whether the keyword is defined for the “job-state” and “document-state” attributes or just the “job-state” attribute as indicated in Table 9. Standard enum values are:

Value	Symbolic Name and Description
'3'	**'pending'** (JD): The job is a candidate to start processing, but is not yet processing. The document has not started to be processed at all.
'4'	**'pending-held'** (J): 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. The job's "job-state-reason" attribute MUST indicate why the job is no longer a candidate for processing. The ‘pending-held’ state does not apply to the Document object’s “document-state” attribute.
'5'	**'processing'** (JD): One or more of: 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 stapling, etc., 3. The Printer object 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, awaiting the output device to print it. When the job is in the 'processing' state, the entire job/document state includes the detailed status represented in the Printer object's "printer-state", "printer-state-reasons", and "printer-state-message" attributes. On the other hand, the ‘processing’ state for the Document indicates that the Document has begun to be processed. Even if the job stops being processed, the Document remains in the ‘processing’ state until it moves to one of the three terminal states. Implementations MAY, though they NEED NOT, include additional values in the job's/document’s "job-state-reasons"/“document-state-reasons” attribute to indicate the

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Value	Symbolic Name and Description
	progress of the job/document, such as adding the 'job-printing'/'printing' value to indicate when the output device is actually making marks on paper and/or the 'processing-to-stop-point' value to indicate that the ~~IPP object~~Printer is in the process of canceling or aborting the job/document. Most implementations won't bother with this nuance.
'6'	**'processing-stopped'** (J): The job 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. The job's "job-state-reason" attribute MAY indicate why the job has stopped processing. For example, if the output device is stopped, the 'printer-stopped' value MAY be included in the job's "job-state-reasons" attribute. Note: When an output device is stopped, the device usually indicates its condition in human readable form locally at the device. A client can obtain more complete device status remotely by querying the Printer object's "printer-state", "printer-state-reasons" and "printer-state-message" attributes. The 'processing-stopped' state does not apply to the Document object's "document-state" attribute.
'7'	**'canceled'** (JD): The job/document has been canceled by a Cancel-Job/Cancel-Document operation and the Printer object has completed canceling the job/document and all job/document status attributes have reached their final values for the job/document. While the Printer object is canceling the job/document, the job/document remains in its current state, but the job's/document's "job-state-reasons"/"document-state-reasons" attribute SHOULD contain the 'processing-to-stop-point' value and one of the 'canceled-by-user', 'canceled-by-operator', or 'canceled-at-device' value. When the job/document moves to the 'canceled' state, the 'processing-to-stop-point' value, if present, MUST be removed, but the 'canceled-by-xxx', if present, MUST remain.
'8'	**'aborted'** (JD): The job/document has been aborted by the system, usually while the job/document was in the 'processing' or 'processing-stopped' state and the Printer has completed aborting the job/document and all job/document status attributes have reached their final values for the job/document. While the Printer object is aborting the job/document, the job/document remains in its current state, but the job's/document's "job-state-reasons"/"document-state-reasons" attribute SHOULD contain the 'processing-to-stop-point' and 'aborted-by-system' values. When the job/document moves to the 'aborted' state, the 'processing-to-stop-point' value, if present, MUST be removed, but the 'aborted-by-system' value, if present, MUST remain.
'9'	**'completed'** (JD): The job/document has completed successfully or with warnings or errors after processing and all of the job/document media sheets have been successfully stacked in the appropriate output bin(s) and all job/document status attributes have reached their final values for the job/document. The job's/document's "job-state-reasons"/"document-state-reasons" attribute SHOULD contain one of: 'completed-successfully', 'completed-with-warnings', or 'completed-with-errors' values.

The final value for this attribute MUST be one of: 'completed', 'canceled', or 'aborted' before the Printer removes the job/document altogether. The length of time that jobs/document remain in the 'canceled', 'aborted', and 'completed' states depends on implementation.

Jobs/documents reach one of the three terminal states: 'completed', 'canceled', or 'aborted', after the jobs/documents have completed all activity, including stacking output media, after the jobs/documents have completed all activity, and all job/document status attributes have reached their final values for the job/document.

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8.3.1 The "job-state" Job Description attribute and the Job Life Cycle

The "job-state" attribute is one of the most important Job Description attributes. Figure 1 shows the values of the "job-state" attribute and the Job object life cycle as affected by actions on the Job, Printer, and job processing.

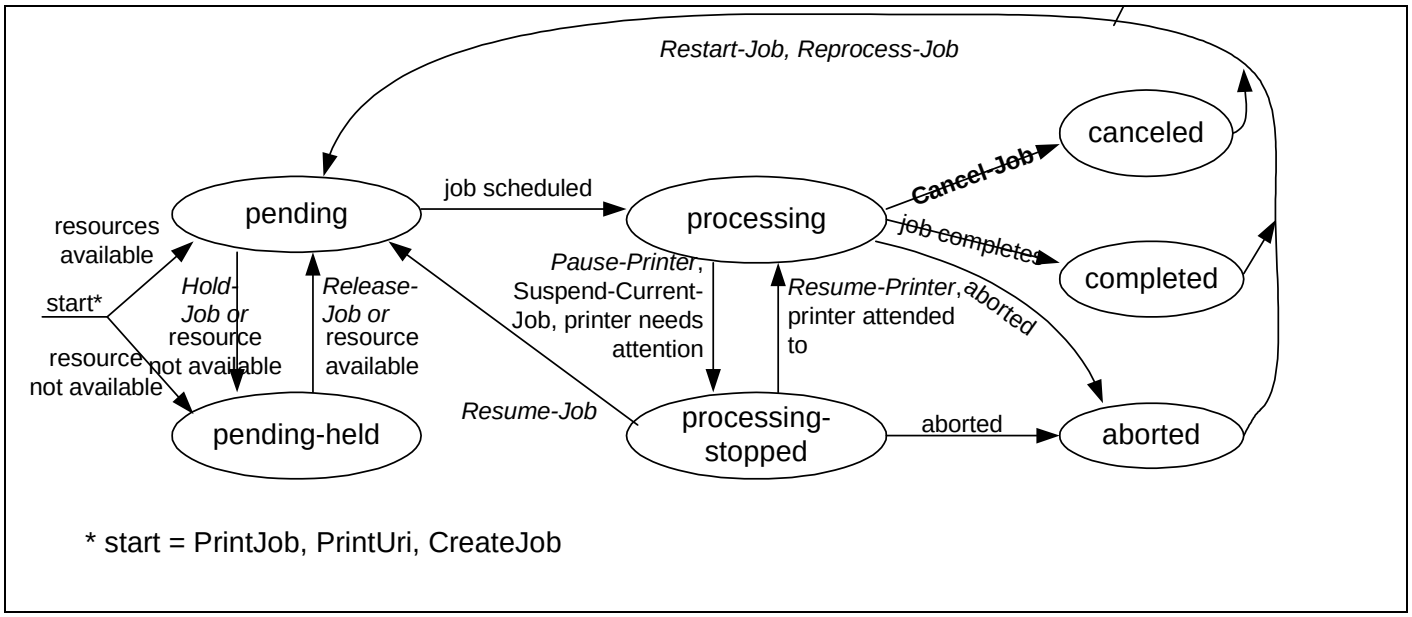

Figure 1 - The "job-state" Job Description attribute and the Job object life cycle

Normally a job progresses from left to right. Other state transitions are unlikely, but are not forbidden. Not shown are the transitions to the 'canceled' state from the 'pending', 'pending-held', and 'processing-stopped' states.

8.3.2 The "document-state" Document Description attribute and the Document object life Cycle

The "document-state" attribute is one of the most important Document Description attributes. Figure 2 shows the values of the "document-state" attribute and the Document object life cycle as affected by actions on the Job, Document, Printer, and job processing. Documents are not active objects and their life cycle is closely tied to the lifecycle of a Job[36]. Documents basically have three states. The first is waiting to be processed by a Job (i.e. pending). The second state is from the time the Job first starts processing the Document (i.e., processing) and until it reaches one of its terminal states. The third state for a Document is one of its terminal states (i.e., completed, canceled, or aborted).

[36] The Document object is not really a sub-job. If the Document object were its own independent active object, i.e., were a sub-job, then the Document state would affect the job state and there would be complex and debatable roll-up rules for how the various "document-state" values of all of the Job's document are rolled up to give a single value for the Job's "job-state" attribute. Instead, the Job state reflects the overall processing of the job and is the same whether or not the Document object is supported.

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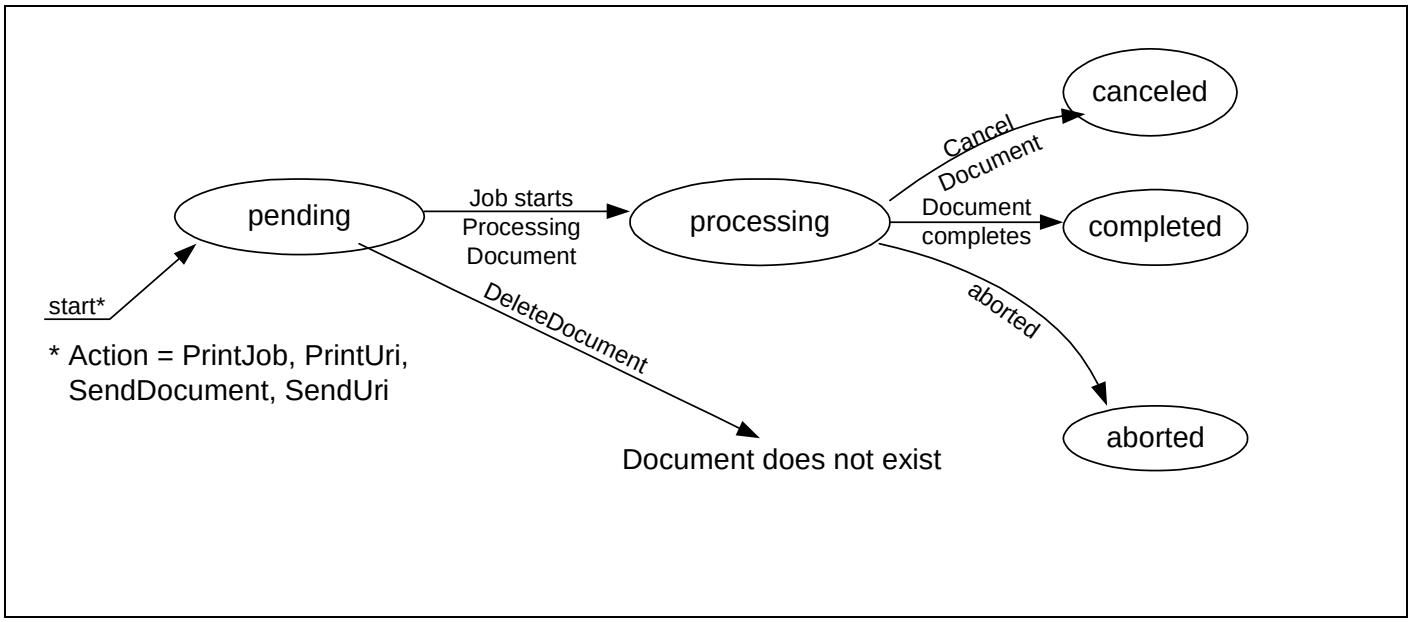

Figure 2 - The "document-state" Document Description attribute and the Document object life Cycle

A Document object has a much simpler life cycle than a Job object. A Document always progresses from left to right in the state diagram. No other state transitions are defined.

8.3.3 Forwarding Servers

As with all other IPP attributes, if the implementation can not determine the correct value for this attribute, it SHOULD respond with the out-of-band value 'unknown' (see [RFC2911] Section 4.1) rather than try to guess at some possibly incorrect value and give the end user the wrong impression about the state of the Job/Document object. For example, if the implementation is just a gateway into some printing system from which it can normally get status, but temporarily is unable, then the implementation should return the 'unknown' value. However, if the implementation is a gateway to a printing system that never provides detailed status about the print job/document, the implementation MAY set the IPP Job/Document object's state to 'completed', provided that it also sets the 'queued-in-device' value in the job's/document's "job-state-reasons"/"document-state-reasons" attribute (see "job-state-reasons"/"document-state-reasons" attribute below).

8.3.4 Partitioning of Job/Document States

This section partitions the job/document states into phases: Job/Document Not Completed, Job/Document Retention, Job/Document History, and Job/Document Removal. This section also explains the 'job-restartable' value of the "job-state-reasons" Job Description attribute for use with the Restart-Job operation.

Job/Document **Not Completed**: When a job is in the 'pending', 'pending-held', 'processing', or 'processing-stopped' states, the job is not completed. When a Document is in the 'pending' or 'processing' state, it is not completed.

Job Retention: When a job enters one of the three terminal job states: 'completed', 'canceled', or 'aborted', the IPP Printer object MAY "retain" the job in a restartable condition for an implementation-defined time period. This time period MAY be zero seconds and MAY depend on the terminal job state. This phase is called Job Retention. While in the Job Retention phase, the job's document data is retained and a client may restart the job using the Restart-Job operation. If the ~~IPP object~~Printer supports the Restart-Job operation, then it SHOULD indicate that the job is

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restartable by adding the 'job-restartable' value to the job's "job-state-reasons" attribute (see Section 8.4) during the Job Retention phase. If the Printer supports the Document object, then the Get-Document-Attributes and Get-Documents operations MUST be supported while the job is in the Job Retention phase.

Job History: After the Job Retention phase expires for a job, the Printer object deletes the document data for the job and the job becomes part of the Job History. The Printer object MAY also delete any number of the job and document attributes. Since the job is no longer restartable, the Printer object MUST remove the 'job-restartable' value from the job's "job-state-reasons" attribute, if present. If the implementation supports the Document object, it SHOULD retain at least the “document-state” and “document-state-reasons” attributes on the Document object during the Job History phase which can be queried using the Get-Document-Attributes and Get-Documents operations.

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 and Document objects from the system.

Using the Get-Jobs/Get-Documents operation and supplying the 'not-completed' value for the "which-jobs" operation attribute, a client is requesting jobs/documents in the Job/Document Not Completed phase. Using the Get-Jobs/Get-Documents operation and supplying the 'completed' value for the "which-jobs" operation attribute, a client is requesting jobs/documents in the Job Retention and Job History phases. Using the Get-Job-Attributes/Get-Document-Attributes operation, a client is requesting a job/documents in any phase except Job Removal. After Job Removal, the Get-Job-Attributes/Get-Document-Attributes and Get-Jobs/Get-Documents operations no longer are capable of returning any information about a job/document.

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

8.4 job-state-reasons (1setOf type2 keyword) <Job> Description attribute

8.5 document-state-reasons (1setOf type2 keyword) <Document> Description attribute

The REQUIRED “job-state-reasons” and the REQUIRED “document-state-reasons” attributes provide additional information about the job's and each document’s current state, i.e., information that augments the value of the job's "job-state" attribute and each Document’s “document-state” attribute, respectively. The Printer SHOULD support the same values for both the “job-state-reasons” and the “document-state-reasons” attribute for those attributes that are defined for both as indicated in the “Job” and “Doc” columns in Table 10.

These values MAY be used with any job or document state or states for which the reason makes sense. Some of these value definitions indicate conformance requirements; the rest are OPTIONAL. Furthermore, when implemented, the Printer MUST return these values when the reason applies and MUST NOT return them when the reason no longer applies whether the value of the Job's "job-state" attribute or the Document’s “document-state” attribute changed or not. When the Job or Document does not have any reasons for being in its current state, the value of the Job's "job-state-reasons" attribute or Document’s “document-state-reasons” attribute MUST be 'none'.

Note: While values cannot be added to the “job-state” or “document-state” attributes without impacting deployed clients that take actions upon receiving "job-state" or “document-state” values, it is the intent that additional "job-state-reasons" and “document-state-reasons’ values can be defined and registered without impacting such deployed clients. In other words, the "job-state-reasons" and the “document-state-reasons” attributes are intended to be extensible.

The following standard keyword values are defined for the “job-state-reasons” and/or “document-state-reasons” attributes as shown in Table 10. In Table 10 the keywords are listed in alphabetic order (~~ignoring~~ observing the “[job-]” prefix), while in their descriptions following, they are listed in the most likely order of occurrence.

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When the Document object is supported, the Printer implementation SHOULD still support the corresponding Job level "job-state-reasons", so that clients that do not support the Document object will receive the same information. Also it is usually more convenient for the client to obtain just the Job level status.

Notation:

[job-] indicates a state reason keyword value that has the 'job-' prefix when it is a value of the "job-state-reasons" attribute, but does not have the 'job-' prefix when it is a value of the "document-state-reasons" attribute[37]. ~~shouldn't have had a "job-" prefix in its name in [RFC2911], so that the same value could also apply at the Document level as a "document-state-reasons" attribute value. Note: For the PWG Semantic Model, the "job-" prefix will be dropped.~~ For purposes of sorting in Table 10, the "[job-]" prefix is ~~ignored~~observed, since ~~the PWG Semantic Model name is proposed without the prefix~~this is an IPP specification.

~~ISSUE 07: Should we sort the attributes values including the [job-]? Currently the "job-" is ignored in the sort for attribute values.~~

~~ISSUE 08: How will we register these attribute values with IANA, since they will be registered for IPP use, with the "job-" prefix. Do we add the ones without "job-" as aliases to the IANA registry for as is done for charset registrations?~~

"-" indicates that the Job or Document value is *not* defined.

Table 10 - "job-state-reasons" and "document-state-reasons" attribute values

IPP Job Description / Document Description attribute name	IPP Attribute Syntax plus Values	Job	Doc	Printer conformance	Reference
job-state-reasons	1setOf type2 keyword	y	-[38]	MUST	[RFC2911] §4.3.8
document-state-reasons	1setOf type2 keyword	-	y	MUST	[this spec] §8.5
	aborted-by-system	y	y	MAY	[RFC2911] §4.3.8
	compression-error	y	y	MAY	[RFC2911] §4.3.8
	document-access-error	y	y	MAY	[RFC2911] §4.3.8
	document-format-error	y	y	MAY	[RFC2911] §4.3.8
	[job-]canceled-at-device	y	y	MAY	[RFC2911] §4.3.8
	[job-]canceled-by-operator	y	y	MAY	[RFC2911] §4.3.8
	[job-]canceled-by-user	y	y	MAY	[RFC2911] §4.3.8
	[job-]completed-successfully	y	y	MAY	[RFC2911] §4.3.8
	[job-]completed-with-errors	y	y	MAY	[RFC2911] §4.3.8
	[job-]completed-with-warnings	y	y	MAY	[RFC2911] §4.3.8
	job-data-insufficient	y	-	MAY	[RFC2911] §4.3.8
	job-hold-until-specified	y	-	MAY	[RFC2911] §4.3.8
	[job-]incoming	y	y	MAY	[RFC2911] §4.3.8
	[job-]interpreting	y	y	MAY	[RFC2911] §4.3.8
	[job-]outgoing	y	y	MAY	[RFC2911] §4.3.8
	job-password-wait	y	-	MAY	[prod-print2] §8.3.1
	[job-]printing	y	y	MAY	[RFC2911] §4.3.8

[37] For the PWG Semantic Model [pwg-sm], the "job-" prefix is being dropped altogether so that the same values can be used for both the JobStateReasons and DocumentStateReasons attributes.

[38] The Document Description attribute that corresponds to the "job-state-reasons" Job Description attribute is the (new) "document-state-reasons" attribute.

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IPP Job Description / Document Description attribute name	IPP Attribute Syntax plus Values	Job	Doc	Printer conformance	Reference
	[job-]queued	y	y-	MAY	[RFC2911] §4.3.8
	[job-]queued-for-marker	y	y	MAY	[RFC2911] §4.3.8
	job-restartable	y	-	MAY	[RFC2911] §4.3.8
	job-resuming	y	-	MAY	[prod-print2] §8.3.1~~[RFC2911] §4.3.8~~
	job-saved-successfully	y	-	MAY	[prod-print2] §8.3.1
	job-save-error	y	-	MAY	[prod-print2] §8.3.1
	job-saving	y	-	MAY	[prod-print2] §8.3.1
	job-scheduling	y	-	MAY	[prod-print2] §8.3.1
	[job-]spooling	y	y	MAY	[prod-print2] §8.3.1
	[job-]streaming	y	y	MAY	[prod-print2] §8.3.1
	job-suspended	y	-	MAY	[adm-ops] §9.1
	job-suspended-by-operator	y	-	MAY	[prod-print2] §8.3.1
	job-suspended-by-system	y	-	MAY	[prod-print2] §8.3.1
	job-suspended-by-user	y	-	MAY	[prod-print2] §8.3.1
	job-suspending	y	-	MAY	[prod-print2] §8.3.1
	[job-]transforming	y	y	MAY	[RFC2911] §4.3.8
	[job-]warnings-detected	y	y	MAY	[override] §7.1
	none	y	y	MUST	[RFC2911] §4.3.8
	printer-stopped	y	-	MAY	[RFC2911] §4.3.8
	printer-stopped-partly	y	-	MAY	[RFC2911] §4.3.8
	processing-to-stop-point	y	-	MAY	[RFC2911] §4.3.8
	proof-print-wait	y	-	MAY	[prod-print2] §8.3.1
	queued-in-device	y	y	MAY	[RFC2911] §4.3.8
	resources-are-not-ready	y	y ISSUE 15	MAY	[RFC2911] §4.3.8
	resources-are-not-supported	y	y	MAY	[prod-print] §6.1
	service-off-line	y	-	MAY	[RFC2911] §4.3.8
	submission-interrupted	y	y	MAY	[RFC2911] §4.3.8
	unsupported-compression	y	y	MUST	[RFC2911] §4.3.8
	unsupported-document-format	y	y	MUST	[RFC2911] §4.3.8

For ease of understanding, the following value descriptions are presented in the order in which the reasons are likely to occur (if implemented), starting with the 'none' value. Note: The order is improved over that in [RFC2911]. The (JD), (J), and (D) notation is identical to the "Job" and "Doc" columns in Table 10 indicating whether the keyword is defined for the "job-state-reasons" and/or "document-state-reasons" attributes:

'none' (JD): There are no reasons for the job's or document's current state. This state reason is semantically equivalent to "job-state-reasons" or "document-state-reasons" attribute without any value and MUST be used when there is no other value, since the 1setOf attribute syntax requires at least one value.

'job-hold-until-specified' (J): The value of the job's "job-hold-until" attribute was specified with a time period that is still in the future. The job MUST NOT be a candidate for processing until this reason is removed and there are no other reasons to hold the job. This value SHOULD be supported if the "job-hold-until" Job Template attribute is supported.

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'job-password-wait' (J): The Job is currently being held until the correct password is entered at the device. If the "job-password" (octetString(255)) Operation attribute (See [prod-print2] section 4.1) is supported, this value MUST be supported.

'proof-print-wait' (J): The job is currently being held until the operator verifies the output of the proof print and performs a Release-Job operation. If the "proof-print" (collection) Job Template attribute (See [prod-print2] section 5.9) is supported, this value MUST be supported.

'resources-are-not-supported' (JD): At least one of the resources needed by the job/document, such as media, fonts, resource objects, etc., is not supported on any of the physical printers for which the job/document is a candidate. This condition MAY be detected when the job/document is accepted, or subsequently while the job/document is pending or processing, depending on implementation. The job/document may (1) remain in its current state, (2) be moved to the 'pending-held' state, depending on implementation and/or job scheduling policy, or (3) scheduled normally, but the Printer is put into the 'stopped' state when the job/document is attempted to be processed on the Printer. This value is intended for use with an implementation that supports the "user-defined-values-supported" Printer attribute (see [prod-print] section 6.1) which allows a job to be accepted with an unsupported 'name' value.

'resources-are-not-ready' (JD): At least one of the resources needed by the job/document, such as media, fonts, resource objects, etc., is not ready on any of the physical printer's for which the job/document is a candidate. This condition MAY be detected when the job/document is accepted, or subsequently while the job/document is pending or processing, depending on implementation. The job/document may remain in its current state or be moved to the 'pending-held' state, depending on implementation and/or job/document scheduling policy.

'[job-]incoming' (JD): Either (1) the Printer has accepted the Create-Job operation and is expecting additional Send-Document and/or Send-URI operations or (2) the Printer is retrieving/accepting document data as a result of a Print-Job, Print-URI, Send-Document or Send-URI operation.

'[job-]spooling' (JD): Same as 'job-incoming' with the specialization that the Printer is spooling the Job/Document data before processing it. This value corresponds to the 'spool' or 'automatic' value of the "job-spooling-supported" Printer Description attribute.

'[job-]streaming' (JD): Same as 'job-incoming' with the specialization that the Printer is processing the Job/Document data as it is being received (that is, the document 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-data-insufficient' (J): The Create-Job operation has been accepted by the Printer, but the Printer is expecting additional document data before it can move the job into the 'processing' state. If a Printer starts processing before it has received all data, the Printer removes the 'job-data-insufficient' reason, but the 'job-incoming' remains. If a Printer starts processing after it has received all data, the Printer removes the 'job-data-insufficient' reason and the 'job-incoming' at the same time.

'unsupported-compression' (JD): The job/document was aborted by the system because the Printer determined while attempting to decompress the document-data's that the compression is actually not among those supported by the Printer. This value MUST be supported, since "compressions is a REQUIRED operation attribute.

'compression-error' (JD): The job/document was aborted by the system because the Printer encountered an error in the document-data while decompressing it. If the Printer posts this reason, the document-data has already passed any tests that would have led to the 'unsupported-compression' job-state-reason/document-state-reason.

'document-access-error' (JD): After accepting a Print-URI or Send-URI request, the Printer could not access one or more documents passed by reference. This reason is intended to cover any file access problem, including file does not exist and access denied because of an access control problem. The Printer MAY also indicate the document access error using the "job-document-access-

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errors" Job Description attribute (see the description of "job-document-access-errors" above). Whether the Printer aborts the job/document and moves the job/document to the 'aborted' job state or prints all documents that are accessible and moves the job/document to the 'completed' job/document state and adds the 'completed-with-errors' value in the job's "job-state-reasons" or document's "document-state-reasons" attribute depends on implementation and/or site policy. This value SHOULD be supported if the Print-URI or Send-URI operations are supported.

'unsupported-document-format' (JD): The job/document was aborted by the system because the document-data's document-format is not among those supported by the Printer. If the client specifies the document-format as 'application/octet-stream', the printer MAY abort the job/document and post this reason even though the format is a member of the "document-format-supported" printer attribute, but not among the auto-sensed document-formats. This value MUST be supported, since "document-format" is a REQUIRED operation attribute.

'document-format-error' (JD): The job/document was aborted by the system because the Printer encountered an error in the document-data while processing it. If the Printer posts this reason, the document-data has already passed any tests that would have led to the 'unsupported-document-format' job-state-reason/document-state-reason.

'submission-interrupted' (JD): The job or document was not completely submitted for some unforeseen reason, such as: (1) the Printer has crashed before the job was closed by the client, (2) the Printer or the document transfer method has crashed in some non-recoverable way before the document data was entirely transferred to the Printer, (3) the client crashed or failed to close the job before the time-out period. See the description of the "multiple-operation-time-out" Printer attribute in [RFC2911] Section 4.4.31.

'[job-]outgoing' (JD): The Printer is transmitting the job/document to the output device.

'job-scheduling' (J): The printer is in the process of scheduling the processing for the Job.

'[job-]queued' (JD): Job is in the 'processing' state, but more specifically, the Printer has queued the ~~d~~Document data.

'[job-]transforming' (JD): Job/document is in the 'processing' state, but more specifically, the Printer is interpreting document data and producing another electronic representation.

'[job-]interpreting' (JD): Job/document is in the 'processing' state, but more specifically, the Printer is interpreting the document data.

'[job-]queued-for-marker' (JD): Job/document is in any of the 'pending-held', 'pending', or 'processing' states, but more specifically, the Printer has completed enough processing of the document to be able to start marking and the job/document is waiting for the marker. Systems that require human intervention to release jobs using the Release-Job operation, put the job into the 'pending-held' job state. Systems that automatically select a job to use the marker put the job into the 'pending' job state or keep the job in the 'processing' job state while waiting for the marker, depending on implementation. All implementations put the job/document into (or back into) the 'processing' state when marking does begin.

'[job-]printing' (JD): The output device is marking media. This value is useful for Printers which spend a great deal of time processing (1) when no marking is happening and then want to show that marking is now happening or (2) when the job/document is in the process of being canceled or aborted while the job/document remains in the 'processing' state, but the marking has not yet stopped so that impression or sheet counts are still increasing for the job/document.

'printer-stopped-partly' (J): The value of the Printer's "printer-state-reasons" attribute contains the value 'stopped-partly'.

'printer-stopped' (J): The value of the Printer's "printer-state" attribute is 'stopped'.

'job-suspending' (J): The printer is in the process of moving the Job from a processing condition to a suspended condition where other jobs can be processed.

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'job-suspended' (J): The job has been suspended while processing using the Suspend-Current-Job operation and other jobs can be processed on the Printer. The Job can be resumed using the Resume-Job operation which removes this value. Note: Documents cannot be suspended and there is no Suspend-Current-Document operation.

'job-suspended-by-operator' (J): The Job has been indefinitely suspended by the printer operator.

'job-suspended-by-user' (J): The Job has been indefinitely suspended by the user.

'job-suspended-by-system' (J): The Job has been indefinitely suspended by the Printer's system software during normal processing of the job.

'job-resuming' (J): The printer is in the process of moving the Job from a suspended condition to become a candidate for processing.

'[job-]canceled-by-user' (JD): The job/document was canceled by the owner of the job using the Cancel-Job/Cancel-Document request, i.e., by a user whose authenticated identity is the same as the value of the originating user that created the Job object, or by some other authorized end-user, such as a member of the job owner's security group. This 'job-canceled' value SHOULD be supported. The 'canceled-by-user' value SHOULD be supported for the "document-state-reasons" attributes if the Cancel-Document operation is supported.

'[job-]canceled-by-operator' (JD): The job/document was canceled by the operator using the Cancel-Job/Cancel-Document request, i.e., by a user who has been authenticated as having operator privileges (whether local or remote). If the security policy is to allow anyone to cancel anyone's job/document, then these values may be used when the job/document is canceled by other than the owner of the job. For such a security policy, in effect, everyone is an operator as far as canceling jobs/documents is concerned. These values SHOULD be supported if the implementation permits canceling by other than the owner of the job.

'[job-]canceled-at-device' (JD): The job/document was canceled by an unidentified local user, i.e., a user at a console at the device. This value SHOULD be supported if the implementation supports canceling jobs/documents at the console.

'aborted-by-system' (JD): The job/document (1) is in the process of being aborted, (2) has been aborted by the system and placed in the 'aborted' state, or (3) has been aborted by the system and placed in the 'pending-held' state, so that a user or operator can manually try the job/document again. This value SHOULD be supported.

'processing-to-stop-point' (J): The requester has issued a Cancel-Job/Cancel-Document operation or the Printer object has aborted the job/document, but is still performing some actions on the job/document until a specified stop point occurs or job/document termination/cleanup is completed.
If the implementation requires some measurable time to cancel the job/document in the 'processing' or 'processing-stopped' job/document states, the ~~IPP object~~Printer MUST use this value to indicate that the Printer object is still performing some actions on the job/document while the job/document remains in the 'processing' or 'processing-stopped' state. After all the job's/document's job/document description attributes have stopped incrementing, the Printer object moves the job/document from the 'processing' state to the 'canceled' or 'aborted' job/document states.

'service-off-line' (J): The Printer is off-line and accepting no jobs. All 'pending' jobs are put into the 'pending-held' state. This situation could be true if the service's or document transform's input is impaired or broken.

'[job-]warnings-detected' (JD): If the Printer supports these values, the Printer MUST add the value to "job-state-reasons" / "document-state-reasons" when it generates the first warning message. That is, a single occurrence of this value is present in the "job-state-reasons" / "document-state-reasons" if the Printer has generated one or more warnings.

'[job-]completed-successfully' (JD): The job/document completed successfully. There were no warnings or errors in printing. This value SHOULD be supported.

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'[job-]completed-with-warnings' (JD): The print part of the job/document completed with warnings (whether or not there were save errors). This value SHOULD be supported if the implementation detects warnings. [RFC2911]

'[job-]completed-with-errors' (JD): The print part of the job/document completed with errors (and possibly warnings too) (whether or not there were save errors). This value SHOULD be supported if the implementation detects errors. [RFC2911]

'job-saving' (J): The Printer is transmitting the Job to the save location. This is similar to the 'job-printing' value.

'job-saved-successfully' (J): The Printer saved the Job successfully.

'job-save-error' (J): The Printer did not save the Job 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.

'job-restartable' (J): This job is retained (see the description of "job-state" above, specifically "Partitioning of Job States") and is currently able to be restarted using the Restart-Job operation (see [RFC2911] Section 3.3.7). If 'job-restartable' is a value of the job's "job-state-reasons" attribute, then the ~~IPP object~~Printer MUST accept a Restart-Job operation for that job. This value SHOULD be supported if the Restart-Job operation is supported.

'queued-in-device' (JD): The job/document has been forwarded to a device or print system that is unable to send back status. The Printer sets the job's/document's "job-state" / "document-state" attribute to 'completed' and adds the 'queued-in-device' value to the job's/document's "job-state-reasons" / "document-state-reasons" attribute to indicate that the Printer has no additional information about the job/document and never will have any better information. See the description of the "job-state" / "document-state" attribute above, specifically the portion on "Forwarding Servers".

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

8.6 job-state-message (text(MAX)) Job Description attribute

8.7 document-state-message (text(MAX)) Document Description attribute

This attribute specifies information about the "job-state"/"document-state" and "job-state-reasons"/"document-state-reasons" attributes in human readable text. If the Printer object supports this attribute, the Printer object MUST be able to generate this message in any of the natural languages identified by the Printer's "generated-natural-language-supported" attribute (see the "attributes-natural-language" operation attribute specified in [RFC2911] Section 3.1.4.1).

The value SHOULD NOT contain additional information not contained in the values of the "job-state" and "job-states-reasons" attributes, such as interpreter error information. Otherwise, application programs might attempt to parse the (localized text). For such additional information such as interpreter errors for application program consumption or specific document access errors, new attributes with keyword values, needs to be developed and registered.

8.8 document-id-uri (uri) Document Description attribute

This Document Description attribute is generated by the Printer as a unique URI to identify a Document object, in the same way that the "job-uri" (uri) Job Description attribute uniquely identifies a Job object.

ISSUE 16: Should the "document-id-uri" Document Description attribute be REQUIRED for the Printer to support in any Document Creation operation, as a way of uniquely identifying a Document object across all Printers?

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ISSUE 17: Should we REQUIRE the Printer to accept a "document-id-uri" as an alternative way for clients to specify the target of Document object operations? I know that implementers have grumbled about the "job-uri" being REQUIRED for the Printer to support and accept as the target.

8.9 document-uri (uri) Document Description attribute

This Document Description attribute is the URI that the client supplied in a Send-URI operation. The Printer MUST support this attribute if the Printer supports the Send-URI operation (see section 3.4).

9 Printer attributes

This section lists *all* of the Printer attributes defined in other IPP documents. Printer attributes are divided into three disjoint groups:

Job Template attributes (JT)	These Printer attributes are related directly to the "xxx" Job Template attributes that a client can supply in a Job Creation request as follows: 1. "xxx-supported" indicate the supported values 2. "xxx-default" indicate the values that will be used if the client and the PDL omit the attribute. 3. "xxx-ready" indicate the supported values that are available without human intervention, for those few attributes that require human intervention, such as "media" and possibly "finishing".
Printer Description attributes (PD)	These Printer attributes describe the Printer, such as "printer-name" and "printer-location". Some of them are "xxx-supported" and "xxx-default" for Operation attributes that the client can supply in a Job Creation request.
neither (-)	These Printer attributes describe supported and defaults for member attributes of collection Job Template attributes.

In a Get-Printer-Attributes request, a client can request all of the Printer attributes in the Job Template (JT) or Printer Description (PD) groups by supplying the 'job-template' or 'printer-description' group name, respectively. The client can also request "all". The column labels are:

"**Attribute Syntax**" - indicates the attribute syntax (see [RFC2911] section 4.1). Many "xxx-default" and "xxx-supported" attributes have the 'collection' syntax which consists of a number of member attributes. These member attributes are not listed in this table when they are the same as the corresponding "xxx" attribute in Table 7. Only those few Printer attribute collection attributes that do not have a corresponding Job Template attributes show the member attributes in this table.

"**Grp**" - indicates to which group the attribute belongs.

"**Printer Conf**." - indicates the IPP/1.1 Printer conformance requirements for supporting the attribute. Those attributes labeled as "MAY" may have conditional requirements that require their support, if the Printer supports a related attribute, operation, or feature. For example, all Job Template attributes are OPTIONAL for a Printer to support. However, if a Printer supports Job Template attribute "xxx", then it MUST also support the corresponding "xxx-default" and "xxx-supported" attributes. Similarly, if Event Notification is supported, then some of the attributes indicated as "MAY" in this table become MUST.

"**Reference**" - lists the IETF or IEEE-ISTO specification which defines the semantics of the attribute.

~~ISSUE 09: What other Printer Description attributes are needed, if any?~~

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1766 **Table 11 - Printer attributes (Job Template and Printer Description)**

Printer attribute name (Job Template & Printer Description)	Attribute Syntax	Grp	Printer Conf.	Reference
charset-configured	charset	PD	MUST	[RFC2911] §4.4.17
charset-supported	1setOf charset	PD	MUST	[RFC2911] §4.4.18
color-supported	boolean	PD	MAY	[RFC2911] §4.4.26
compression-supported	type3 keyword	PD	MUST	[RFC2911] §4.4.32
copies-default	integer(1:MAX)	JT	MAY	[RFC2911] §4.2.5
copies-supported	rangeOfInteger(1:MAX)	JT	MAY	[RFC2911] §4.2.5
cover-back-default	collection	JT	MAY	[prod-print] §3.1.3
cover-back-supported	1setOf type2 keyword	JT	MAY	[prod-print] §3.1.4
cover-front-default	collection	JT	MAY	[prod-print] §3.1.3
cover-front-supported	1setOf type2 keyword	JT	MAY	[prod-print] §3.1.4
cover-type-supported	1setOf type2 keyword	-	MAY	[prod-print] §3.1.2.1
document-creation-attributes-supported	1setOf type2 keyword	PD	MAY	[this-spec] §9.1
document-format-default	mimeMediaType	PD	MUST	[RFC2911] §4.4.21
document-format-supported	1setOf mimeMediaType	PD	MUST	[RFC2911] §4.4.22
document-format-varying-attributes	1setOf type2 keyword	PD	MAY	[set-ops] §6.3
document-overrides-supported	1setOf type2 keyword		MAY	[override] §5.1.14
finishings-col-default	collection	JT	MAY	[prod-print] §3.2.3
finishings-col-ready	1setOf collection	JT	MAY	[prod-print] §3.2.4
finishings-col-supported	1setOf type2 keyword	JT	MAY	[prod-print] §3.2.5
finishings-default	1setOf type2 enum	JT	MAY	[RFC2911] §4.2.6
finishings-ready	1setOf type2 enum	JT	MAY	[RFC2911] §4.2.6
finishings-supported	1setOf type2 enum	JT	MAY	[RFC2911] §4.2.6
finishing-template-supported	1setOf name(MAX)	-	MAY	[prod-print] §3.2.1.1
force-front-side-default	1setOf integer(1:MAX)	JT	MAY	[prod-print] §3.3
force-front-side-supported	rangeOfInteger(1:MAX)	JT	MAY	[prod-print] §3.3
generated-natural-language-supported	1setOf naturalLanguage	PD	MUST	[RFC2911] §4.4.20
imposition-template-default	type3 keyword | name(MAX)	-	MAY	[prod-print] §3.4
imposition-template-supported	1setOf (type3 keyword | name(MAX))	-	MAY	[prod-print] §3.4
insert-after-page-number-supported	rangeOfInteger(0:MAX)	-	MAY	[prod-print] §3.5.1.1
insert-count-supported	rangeOfInteger(0:MAX)	-	MAY	[prod-print] §3.5.2.1
insert-sheet-default	1setOf collection	JT	MAY	[prod-print] §3.5.4
insert-sheet-supported	1setOf type2 keyword	JT	MAY	[prod-print] §3.5.5
ippget-event-life	integer(15:MAX)	PD	MAY	[get-method] §8.1
ipp-versions-supported	1setOf type2 keyword	PD	MUST	[RFC2911] §4.4.20
job-account-id-default	name(MAX)	JT	MAY	[prod-print] §3.6
job-account-id-supported	boolean	JT	MAY	[prod-print] §3.6
job-accounting-output-bin-default	type3 keyword | name(MAX)	-	MAY	[prod-print] §3.8.3.1
job-accounting-output-bin-supported	1setOf (type3 keyword | name(MAX))	-	MAY	[prod-print] §3.8.3.2
job-accounting-sheets-default	collection	JT	MAY	[prod-print] §3.8.4
job-accounting-sheets-supported	1setOf type2 keyword	JT	MAY	[prod-print] §3.8.5
job-accounting-sheets-type-supported	1setOf (type3 keyword | name(MAX))	-	MAY	[prod-print] §3.8.1.1
job-accounting-user-id-default	name(MAX)	JT	MAY	[prod-print] §3.7
job-accounting-user-id-supported	boolean	JT	MAY	[prod-print] §3.7

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Printer attribute name (Job Template & Printer Description)	Attribute Syntax	Grp	Printer Conf.	Reference
job-creation-attributes-supported	1setOf type2 keyword	PD	MAY	[prod-print2] §7.1
job-error-sheet-default	collection	JT	MAY	[prod-print] §3.7
job-error-sheet-supported	1setOf type2 keyword	JT	MAY	[prod-print] §3.9.5
job-error-sheet-type-supported	1setOf (type3 keyword | name(MAX))	-	MAY	[prod-print] §3.9.1.1
job-error-sheet-when-supported	1setOf type2 keyword	-	MAY	[prod-print] §3.9.2.1
job-hold-until-default	type3 keyword | name(MAX)	JT	MAY	[RFC2911] §4.2.2
job-hold-until-supported	1setOf (type3 keyword | name(MAX))	JT	MAY	[RFC2911] §4.2.2
job-impressions-supported	rangeOfInteger(0:MAX)	PD	MAY	[RFC2911] §4.4.34
job-k-octets-supported	rangeOfInteger(0:MAX)	PD	MAY	[RFC2911] §4.4.33
job-media-sheets-supported	rangeOfInteger(0:MAX)	PD	MAY	[RFC2911] §4.4.35
job-message-to-operator-default	text(MAX)	JT	MAY	[prod-print] §3.12
job-message-to-operator-supported	boolean	JT	MAY	[prod-print] §3.12
job-password-supported	integer(0:127)	PD	MAY	[prod-print2] §7.2
job-password-encryption-supported	1setOf (type3 keyword | name(MAX))	PD	MAY	[prod-print2] §7.3
job-priority-default	integer(1:100)	JT	MAY	[RFC2911] §4.2.1
job-priority-supported	1setOf integer(1:100)	JT	MAY	[RFC2911] §4.2.1
job-settable-attributes-supported	1setOf type2 keyword	PD	MAY	[set-ops] §6.2
job-sheet-message-default	text(MAX)		MAY	[prod-print] §3.12
job-sheet-message-supported	boolean		MAY	[prod-print] §3.12
job-sheets-col-default	collection	JT	MAY	[prod-print] §3.11.3
job-sheets-col-supported	1setOf type2 keyword	JT	MAY	[prod-print] §3.11.4
job-sheets-default	type3 keyword | name(MAX)	JT	MAY	[RFC2911] §4.2.3
job-sheets-supported	1setOf (type3 keyword | name(MAX))	JT	MAY	[RFC2911] §4.2.3
job-spooling-supported	type2 keyword	PD	MAY	[prod-print2] §7.4
max-save-info-supported	integer(1:MAX)	PD	MAY	[prod-print2] §7.5
max-stitching-locations-supported	integer(1:MAX)	PD	MAY	[prod-print] §5.2
media-back-coating-supported	1setOf (type3 keyword | name(MAX))	-	MAY	[prod-print] §3.13.10.2
media-col-database	1setOf collection	-[39]	MAY	[prod-print2] §7.6
any "media-col" member attribute				
media-col-default	collection	JT	MAY	[prod-print] §3.13.12
media-color-supported	1setOf type2 keyword	-	MAY	[prod-print] §3.13.4.1
media-col-ready	1setOf collection	JT	MAY	[prod-print] §3.13.13
media-col-supported	1setOf type2 keyword	JT	MAY	[prod-print] §3.13.14
media-default	type3 keyword | name(MAX)	JT	MAY	[RFC2911] §4.2.11
media-front-coating-supported	1setOf (type3 keyword | name(MAX))	-	MAY	[prod-print] §3.13.10.1
media-hole-count-supported	1setOf rangeOfInteger(0:MAX)	-	MAY	[prod-print] §3.13.6.1
media-info-supported	boolean	-	MAY	[prod-print] §3.13.3.1
media-input-tray-check-default	type3 keyword | name(MAX)	JT	MAY	[prod-print] §3.14
media-input-tray-check-supported	1setOf (type3 keyword | name(MAX))	JT	MAY	[prod-print] §3.14

[39] The "media-col-database" attribute is not returned when the client requests 'all' or 'printer-description' attribute group because there MAY be a large number of values. Instead the client MUST query "media-col-database" explicitly in a Get-Printer-Attributes request.

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Printer attribute name (Job Template & Printer Description)	Attribute Syntax	Grp	Printer Conf.	Reference
media-key-supported	1setOf (type3 keyword | name(MAX))	-	MAY	[prod-print] §3.13.1.1
media-order-count-supported	1setOf rangeOfInteger(1:MAX)	-	MAY	[prod-print] §3.13.7.1
media-pre-printed-supported	1setOf (type3 keyword | name(MAX))	-	MAY	[prod-print] §3.13.5.1
media-ready	1setOf (type3 keyword | name(MAX))	JT	MAY	[RFC2911] §4.2.11
media-recycled-supported	1setOf (type3 keyword | name(MAX))	-	MAY	[prod-print] §3.13.11.1
media-size-supported	1setOf collection	-	MAY	[prod-print] §3.13.8.3
media-supported	1setOf (type3 keyword | name(MAX))	JT	MAY	[RFC2911] §4.2.11
media-type-supported	1setOf (type3 keyword | name(MAX))	-	MAY	[prod-print] §3.13.2.1
media-weight-metric-supported	1setOf rangeOfInteger(1:MAX)	-	MAY	[prod-print] §3.13.9.1
multiple-document-handling-default	type2 keyword	JT	MAY	[RFC2911] §4.2.4
multiple-document-handling-supported	1setOf type2 keyword	JT	MAY	[RFC2911] §4.2.4
multiple-document-jobs-supported	boolean	PD	MAY	[RFC2911] §4.4.16
multiple-operation-time-out	integer(1:MAX)	PD	MAY	[RFC2911] §4.4.31
natural-language-configured	naturalLanguage	PD	MUST	[RFC2911] §4.4.19
notify-attributes-supported	1setOf type2 keyword	PD	MAY	[ntfy] §5.3.4
notify-events-default	1setOf type2 keyword	PD	MAY	[ntfy] §5.3.3
notify-events-supported	1setOf type2 keyword	PD	MAY	[ntfy] §5.3.3
notify-lease-duration-default	integer(0:67108863)	PD	MAY	[ntfy] §5.3.8
notify-lease-duration-supported	1setOf (integer(0: 67108863) | rangeOfInteger(0:67108863))	PD	MAY	[ntfy] §5.3.8
notify-lease-expiration-time	integer(0:MAX)	PD	MAY	[ntfy] §5.4.3
notify-max-events-supported	integer(2:MAX)	PD	MAY	[ntfy] §5.3.3
notify-pull-method-supported	1setOf type2 keyword	PD	MAY	[ntfy] §5.3.2
notify-schemes-supported	1setOf uriScheme	PD	MAY	[ntfy] §5.3.1
number-up-default	integer(1:MAX)	JT	MAY	[RFC2911] §4.2.9
number-up-supported	1setOf (integer(1:MAX) | rangeOfInteger(1:MAX))	JT	MAY	[RFC2911] §4.2.9
operations-supported	1setOf type2 enum	PD	MUST	[RFC2911] §4.4.15
orientation-requested-default	type2 enum	JT	MAY	[RFC2911] §4.2.10
orientation-requested-supported	1setOf type2 enum	JT	MAY	[RFC2911] §4.2.10
output-bin-default	type2 keyword | name(MAX)	JT	MAY	[output-bin] §2.1
output-bin-supported	1setOf (type2 keyword | name(MAX))	JT	MAY	[output-bin] §2.1
page-delivery-default	type2 keyword	JT	MAY	[prod-print] §3.15
page-delivery-supported	1setOf type2 keyword	JT	MAY	[prod-print] §3.15
page-order-received-default	type2 keyword	JT	MAY	[prod-print] §3.16
page-order-received-supported	1setOf type2 keyword	JT	MAY	[prod-print] §3.16
page-overrides-supported	1setOf type2 keyword	PD	MAY	[override] §5.2.9
page-ranges-supported	boolean	JT	MAY	[RFC2911] §4.2.7
pages-per-minute	integer(0:MAX)	PD	MAY	[RFC2911] §4.4.36
pages-per-minute-color	integer(0:MAX)	PD	MAY	[RFC2911] §4.4.37
pages-per-subset-supported	boolean	PD	MAY	[override] §5.3.2
parent-printers-supported	1setOf uri	PD	MAY	[adm-ops-~~set2~~] §7.2

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Printer attribute name (Job Template & Printer Description)	Attribute Syntax	Grp	Printer Conf.	Reference
pdl-override-supported	type2 keyword	PD	MUST	[RFC2911] §4.4.28
presentation-direction-number-up-default	type2 keyword	JT	MAY	[prod-print] §3.17
presentation-direction-number-up-supported	1setOf type2 keyword	JT	MAY	[prod-print] §3.17
printer-current-time	dateTime	PD	MAY	[RFC2911] §4.4.30
printer-detailed-status-messages	1setOf text(MAX)	PD	MAY	[prod-print2] §7.7
printer-driver-installer	uri	PD	MAY	[RFC2911] §4.4.8
printer-info	text(127)	PD	MAY	[RFC2911] §4.4.6
printer-is-accepting-jobs	boolean	PD	MUST	[RFC2911] §4.4.23
printer-location	text(127)	PD	MAY	[RFC2911] §4.4.5
printer-make-and-model	text(127)	PD	MAY	[RFC2911] §4.4.9
printer-message-date-time	dateTime	PD	MAY	[set-ops] §6.5
printer-message-from-operator	text(127)	PD	MAY	[RFC2911] §4.4.25
printer-message-time	integer(MIN:MAX)	PD	MAY	[set-ops] §6.4
printer-more-info	uri	PD	MAY	[RFC2911] §4.4.7
printer-more-info-manufacturer	uri	PD	MAY	[RFC2911] §4.4.10
printer-name	name(127)	PD	MUST	[RFC2911] §4.4.4
printer-notify-server-uri	uri	PD	MAY	[not-srv] §4.1
printer-resolution-default	resolution	JT	MAY	[RFC2911] §4.2.12
printer-resolution-supported	1setOf resolution	JT	MAY	[RFC2911] §4.2.12
printer-settable-attributes-supported	1setOf type2 keyword	PD	MAY	[set-ops] §6.1
printer-state	type1 enum	PD	MUST	[RFC2911] §4.4.11
printer-state-change-date-time	dateTime	PD	MAY	[ntfy] §6.2
printer-state-change-time	integer(1:MAX)	PD	MAY	[ntfy] §6.1
printer-state-message	text(MAX)	PD	MAY	[RFC2911] §4.4.13
printer-state-reasons	1setOf type2 keyword	PD	MUST	[RFC2911] §4.4.12
printer-up-time	integer(1:MAX))	PD	MUST	[RFC2911] §4.4.29
printer-uri-supported	1setOf uri	PD	MUST	[RFC2911] §4.4.1
printer-xri-supported	1setOf collection	PD	MAY	[set-ops] §6.6
xri-uri	uri	PD	MUST	[set-ops] §6.6
xri-authentication	1setOf type2 keyword	PD	MUST	[set-ops] §6.6
xri-security	1setOf type2 keyword	PD	MUST	[set-ops] §6.6
print-quality-default	type2 enum	JT	MAY	[RFC2911] §4.2.13
print-quality-supported	1setOf type2 enum	JT	MAY	[RFC2911] §4.2.13
queued-job-count	integer(0:MAX)	PD	MUST	[RFC2911] §4.4.24
reference-uri-schemes-supported	1setOf uriScheme	PD	MAY	[RFC2911] §4.4.27
separator-sheets-default	collection	JT	MAY	[prod-print] §3.18.3
separator-sheets-supported	1setOf type2 keyword	JT	MAY	[prod-print] §3.18.4
separator-sheets-type-supported	1setOf (type3 keyword | name(MAX))	-	MAY	[prod-print] §3.18.1.1
sheet-collate-default	type2 keyword	JT	MAY	[job-prog] §3.1
sheet-collate-supported	1setOf type2 keyword	JT	MAY	[job-prog] §3.1
sides-default	type2 keyword	JT	MAY	[RFC2911] §4.2.8
sides-supported	1setOf type2 keyword	JT	MAY	[RFC2911] §4.2.8
stitching-locations-supported	1setOf (integer(0:MAX) | rangeOfInteger(0:MAX))	-	MAY	[prod-print] §3.2.2.3.1
stitching-offset-supported	1setOf (integer (0:MAX) | rangeOfInteger(0:MAX))	-	MAY	[prod-print] §3.2.2.2.1
stitching-reference-edge-supported	1setOf type2 keyword		MAY	[prod-print] §3.2.2.1.1

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Printer attribute name (Job Template & Printer Description)	Attribute Syntax	Grp	Printer Conf.	Reference
subordinate-printers-supported	1setOf uri	PD	MAY	[adm-ops-~~set2~~] §7.1
uri-authentication-supported	1setOf type2 keyword	PD	MUST	[RFC2911] §4.4.2
uri-security-supported	1setOf type2 keyword	PD	MUST	[RFC2911] §4.4.3
user-defined-values-supported	1setOf type2 keyword	PD	MAY	[prod-print] §5.1
which-jobs-supported	1setOf type2 keyword	PD	MAY	[prod-print2] §7.8
x-image-position-default	type2 keyword	JT	MAY	[prod-print] §3.19.2
x-image-position-supported	1setOf type2 keyword	JT	MAY	[prod-print] §3.19.2
x-image-shift-default	integer(MIN:MAX)	JT	MAY	[prod-print] §3.19.3
x-image-shift-supported	rangeOfInteger(MIN:MAX)	JT	MAY	[prod-print] §3.19.3
xri-authentication-supported	1setOf type2 keyword	PD	MAY	[set-ops] §6.8
xri-security-supported	1setOf type2 keyword	PD	MAY	[set-ops] §6.9
xri-uri-scheme-supported	1setOf uriScheme	PD	MAY	[set-ops] §6.7
x-side1-image-shift-default	integer(MIN:MAX)	JT	MAY	[prod-print] §3.19.4
x-side1-image-shift-supported	rangeOfInteger(MIN:MAX)	JT	MAY	[prod-print] §3.19.4
x-side2-image-shift-default	integer(MIN:MAX)	JT	MAY	[prod-print] §3.19.5
x-side2-image-shift-supported	rangeOfInteger(MIN:MAX)	JT	MAY	[prod-print] §3.19.5
y-image-position-default	type2 keyword	JT	MAY	[prod-print] §3.19.6
y-image-position-supported	1setOf type2 keyword	JT	MAY	[prod-print] §3.19.6
y-image-shift-default	integer(MIN:MAX)	JT	MAY	[prod-print] §3.19.7
y-image-shift-supported	rangeOfInteger(MIN:MAX)	JT	MAY	[prod-print] §3.19.7
y-side1-image-shift-default	integer(MIN:MAX)	JT	MAY	[prod-print] §3.19.8
y-side1-image-shift-supported	rangeOfInteger(MIN:MAX)	JT	MAY	[prod-print] §3.19.8
y-side2-image-shift-default	integer(MIN:MAX)	JT	MAY	[prod-print] §3.19.9
y-side2-image-shift-supported	rangeOfInteger(MIN:MAX)	JT	MAY	[prod-print] §3.19.9

9.1 document-creation-attributes-supported (1setOf type2 keyword)

This Printer Description attribute lists the keyword names of the Document Template and Operation attributes that the Printer will accept in the Create-Document, Send-Document, and Send-URI Document Creation operations.

9.2 printer-state-reasons (1setOf type2 keyword)

IPP Printer Description attribute name	IPP Attribute Syntax plus Values	Printer conformance	Reference
printer-state-reasons	1setOf type2 keyword	MUST	[RFC2911] §4.4.12
	other	MAY	[RFC2911] §4.4.12
	none	MUST	[RFC2911] §4.4.12
	connecting-to-device	MAY	[RFC2911] §4.4.12
	cover-open	MAY	[RFC2911] §4.4.12
	deactivated	MAY	[adm-ops] §8.2
	developer-empty	MAY	[RFC2911] §4.4.12
	developer-low	MAY	[RFC2911] §4.4.12
	door-open	MAY	[RFC2911] §4.4.12
	fuser-over-temp	MAY	[RFC2911] §4.4.12
	fuser-under-temp	MAY	[RFC2911] §4.4.12
	hold-new-jobs	MAY	[adm-ops] §8.1
	input-tray-missing	MAY	[RFC2911] §4.4.12

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IPP Printer Description attribute name	IPP Attribute Syntax plus Values	Printer conformance	Reference
	interlock-open	MAY	[RFC2911] §4.4.12
	interpreter-resource-unavailable	MAY	[RFC2911] §4.4.12
	marker-supply-empty	MAY	[RFC2911] §4.4.12
	marker-supply-low	MAY	[RFC2911] §4.4.12
	marker-waste-almost-full	MAY	[RFC2911] §4.4.12
	marker-waste-full	MAY	[RFC2911] §4.4.12
	media-empty	MAY	[RFC2911] §4.4.12
	media-jam	MAY	[RFC2911] §4.4.12
	media-low	MAY	[RFC2911] §4.4.12
	media-needed	MAY	[RFC2911] §4.4.12
	moving-to-paused	CMUST[40]	[RFC2911] §4.4.12
	opc-life-over	MAY	[RFC2911] §4.4.12
	opc-near-eol	MAY	[RFC2911] §4.4.12
	output-area-almost-full	MAY	[RFC2911] §4.4.12
	output-area-full	MAY	[RFC2911] §4.4.12
	output-tray-missing	MAY	[RFC2911] §4.4.12
	paused	CMUST[41]	[RFC2911] §4.4.12
	shutdown	MAY	[RFC2911] §4.4.12
	spool-area-full	SHOULD	[RFC2911] §4.4.12
	stopped-partly	MAY	[RFC2911] §4.4.12
	stopping	MAY	[RFC2911] §4.4.12
	timed-out	MAY	[RFC2911] §4.4.12
	toner-empty	MAY	[RFC2911] §4.4.12
	toner-low	MAY	[RFC2911] §4.4.12

This description is taken from [RFC2911] with additions from other IPP extension documents:

This REQUIRED Printer attribute supplies additional detail about the device's state. Some of the these value definitions indicate conformance requirements; the rest are OPTIONAL.

Each keyword value MAY have a suffix to indicate its level of severity. The three levels are: report (least severe), warning, and error (most severe).

'-report': This suffix indicates that the reason is a "report". An implementation may choose to omit some or all reports. Some reports specify finer granularity about the printer state; others serve as a precursor to a warning. A report MUST contain nothing that could affect the printed output.

'-warning': This suffix indicates that the reason is a "warning". An implementation may choose to omit some or all warnings. Warnings serve as a precursor to an error. A warning MUST contain nothing that prevents a job from completing, though in some cases the output may be of lower quality.

'-error': This suffix indicates that the reason is an "error". An implementation MUST include all errors. If this attribute contains one or more errors, printer MUST be in the stopped state.

[40] The 'moving-to-paused' value MUST be supported if the Pause-Printer operation is supported and it takes significant time to move to paused.
[41] The 'paused' value MUST be supported if the Pause-Printer operation is supported.

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If the implementation does not add any one of the three suffixes, all parties MUST assume that the reason is an "error".

If a Printer object controls more than one output device, each value of this attribute MAY apply to one or more of the output devices. An error on one output device that does not stop the Printer object as a whole MAY appear as a warning in the Printer's "printer-state-reasons attribute". If the "printer-state" for such a Printer has a value of 'stopped', then there MUST be an error reason among the values in the "printer-state-reasons" attribute.

The following standard keyword values are defined (in alphabetical order):

'other': The device has detected an error other than one listed in this document.

'none': There are not reasons. This state reason is semantically equivalent to "printer-state-reasons" without any value and MUST be used, since the 1setOf attribute syntax requires at least one value.

'connecting-to-device': The Printer object has scheduled a job on the output device and is in the process of connecting to a shared network output device (and might not be able to actually start printing the job for an arbitrarily long time depending on the usage of the output device by other servers on the network).

'cover-open': One or more covers on the device are open.

'deactivated': A client has issued a Deactivate-Printer operation for the Printer object (see [adm-ops] section 3.4.1) and the Printer is in the process of becoming deactivated or has become deactivated. The Printer MUST reject all requests except Activate-Printer, queries (Get-Printer-Attributes, Get-Job-Attributes, Get-Jobs, etc.), Send-Document, and Send-URI (so that partial job submission can be completed - see [adm-ops] section 3.1.1) and return the 'server-error-service-unavailable' status code.

'developer-empty': The device is out of developer.

'developer-low': The device is low on developer.

'door-open': One or more doors on the device are open.

'fuser-over-temp': The fuser temperature is above normal.

'fuser-under-temp': The fuser temperature is below normal.

'hold-new-jobs': The operator has issued the Hold-New-Jobs operation (see [adm-ops] section 3.3.1) or other means, but the output-device(s) are taking an appreciable time to stop. Later, when all output has stopped, the "printer-state" becomes 'stopped', and the 'paused' value replaces the 'moving-to-paused' value in the "printer-state-reasons" attribute. This value MUST be supported, if the Hold-New-Jobs operation is supported and the implementation takes significant time to pause a device in certain circumstances.

'input-tray-missing': One or more input trays are not in the device.

'interlock-open': One or more interlock devices on the printer are unlocked.

'interpreter-resource-unavailable': An interpreter resource is unavailable (i.e. font, form)

'marker-supply-empty': The device is out of at least one marker supply. (e.g. toner, ink, ribbon)

'marker-supply-low': The device is low on at least one marker supply. (e.g. toner, ink, ribbon)

'marker-waste-almost-full': The device marker supply waste receptacle is almost full.

'marker-waste-full': The device marker supply waste receptacle is full.

'media-empty': At least one input tray is empty.

'media-jam': The device has a media jam.

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'media-low': At least one input tray is low on media.

'media-needed': A tray has run out of media.

'moving-to-paused': Someone has paused the Printer object using the Pause-Printer operation (see [RFC2911] section 3.2.7) or other means, but the device(s) are taking an appreciable time to stop. Later, when all output has stopped, the "printer-state" becomes 'stopped', and the 'paused' value replaces the 'moving-to-paused' value in the "printer-state-reasons" attribute. This value MUST be supported, if the Pause-Printer operation is supported and the implementation takes significant time to pause a device in certain circumstances.

'opc-life-over': The optical photo conductor is no longer functioning.

'opc-near-eol': The optical photo conductor is near end of life.

'output-area-almost-full': One or more output area is almost full (e.g. tray, stacker, collator).

'output-area-full': One or more output area is full. (e.g. tray, stacker, collator)

'output-tray-missing': One or more output trays are not in the device

'paused': Someone has paused the Printer object using the Pause-Printer operation (see [RFC2911] section 3.2.7) or other means and the Printer object's "printer-state" is 'stopped'. In this state, a Printer MUST NOT produce printed output, but it MUST perform other operations requested by a client. If a Printer had been printing a job when the Printer was paused, the Printer MUST resume printing that job when the Printer is no longer paused and leave no evidence in the printed output of such a pause. This value MUST be supported, if the Pause-Printer operation is supported.

'shutdown': Someone has removed a Printer object from service, and the device may be powered down or physically removed. In this state, a Printer object MUST NOT produce printed output, and unless the Printer object is realized by a print server that is still active, the Printer object MUST perform no other operations requested by a client, including returning this value. If a Printer object had been printing a job when it was shutdown, the Printer NEED NOT resume printing that job when the Printer is no longer shutdown. If the Printer resumes printing such a job, it may leave evidence in the printed output of such a shutdown, e.g. the part printed before the shutdown may be printed a second time after the shutdown.

'spool-area-full': The limit of persistent storage allocated for spooling has been reached. The Printer is temporarily unable to accept more jobs. The Printer will remove this value when it is able to accept more jobs. This value SHOULD be used by a non-spooling Printer that only accepts one or a small number jobs at a time or a spooling Printer that has filled the spool space.

'stopped-partly': When a Printer object controls more than one output device, this reason indicates that one or more output devices are stopped. If the reason is a report, fewer than half of the output devices are stopped. If the reason is a warning, fewer than all of the output devices are stopped.

'stopping': The Printer object is in the process of stopping the device and will be stopped in a while. When the device is stopped, the Printer object will change the Printer object's state to 'stopped'. The 'stopping-warning' reason is never an error, even for a Printer with a single output device. When an output-device ceases accepting jobs, the Printer will have this reason while the output device completes printing.

'timed-out': The server was able to connect to the output device (or is always connected), but was unable to get a response from the output device.

'toner-empty': The device is out of toner.

'toner-low': The device is low on toner.

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10 New Values for Existing Printer Description Attributes

This section contains those attributes for which additional values are added.

10.1 operations-supported (1setOf type2 enum)

The following “operation-id” values are added in order to support the new operations defined in this document:

Table 12 – Operation-id assignments

Value	Operation Name	Reference
0x0032	Cancel-Current-Document	[this-doc] §3.9
0x0033	Cancel-Document	[this-doc] §3.8
0x0034	Get-Document-Attributes	[this-doc] §3.5
0x0035	Get-Documents	[this-doc] §3.6
0x0036	Delete-Document	[this-doc] §3.10
0x0037	Set-Document-Attributes	[this-doc] §3.7
0x0038	Validate-Document	[this-doc] §3.11
0x0039	Create-Document	[this-doc] §3.1
0x003A	Send-Data	[this-doc] §3.2

11 Conformance Requirements

This section specifies the conformance requirements for Printers and clients.

11.1 Printer conformance requirements

In order to conform to this specification, a Printer:

1. MUST meet the conformance requirements for Printers specified in [RFC2911].
2. MUST support the Document operations that section 3 REQUIRES a Printer to support.
3. MUST support the operation attributes in the Send-Document operation and, if supported, the Send-URI operation that section 6 REQUIRES a Printer to support.
4. MAY support any of the Document Template attributes in Document Creation operations as indicated in section 7 and MUST NOT support them for contexts for where they are not defined as indicated in the Table 8 with an “n”.
5. MUST support the Document Description attributes that section 8 REQUIRES a Printer to support.
6. MUST support the Printer attributes that section 9 REQUIRES a Printer to support.
7. MUST support the values of Printer Descriptions attribute that section 10 REQUIRES a Printer to support.

11.2 Client conformance requirements

In order to conform to this specification, a client:

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1. MUST meet the conformance requirements for clients specified in [RFC2911]

2. MAY support any of the Document operations defined in section 3. ISSUE 18: Or should the client be REQUIRED to support some of the Document operations?

3. MUST supply the operation attributes that section 6 REQUIRES a client to supply in operation requests.

4. MUST supply any Document Template attributes in the format that section 7 REQUIRES a client to supply in Document Creation operations and MUST NOT support them for contexts for where they are not defined as indicated in the Table 8 with an "n".

5. SHOULD support any of the Document Description attributes that section 8 REQUIRES a Printer to support.

6. MAY support any of the Printer attributes listed in section 9.

7. MAY support any of the values of the Printer Descriptions attributes in section 10.

12 Normative References

Note: The references in the body of this IEEE-ISTO document use the more reader-friendly mnemonic symbols below, rather than the RFC number (except for [RFC2910] and [RFC2911]). IETF RFCs and IANA registrations require using the RFC numbers in the body of the document for references.

[adm-ops]
Kugler, C, Hastings, T., Lewis, H., "Internet Printing Protocol (IPP): Job and Printer Administrative Operations", <draft-ietf-ipp-ops-set2-03.txt>, July 17, 2001.

[coll]
deBry, R., Hastings, T., Herriot, R., Ocke, K., and P. Zehler, "Internet Printing Protocol (IPP): The 'collection' attribute syntax", <draft-ietf-ipp-collection-05.txt>, work in progress, July 17, 2001.

[finish]
Hastings, T., Fullman, D., "Internet Printing Protocol (IPP): "finishings" attribute values extension", IEEE-ISTO 5100.1-2001, February 5, 2001, ftp://ftp.pwg.org/pub/pwg/standards/pwg5100.1.pdf

[get-method]
Herriot, R., and T. Hastings, "Internet Printing Protocol (IPP): The 'ippget' Delivery Method for Event Notifications", <draft-ietf-ipp-notify-get-08.txt>, September 5, 2002.

[job-prog]
Hastings, T., Lewis, H., and R. Bergman, "Internet Printing Protocol (IPP): Job Progress Attributes", RFC3381, September 2002~~<draft-ietf-ipp-job-prog-03.txt> work in progress, July 17, 2001~~.

[not-srv]
Hastings, T., Lewis, H, and Ira McDonald, "Distributed Notification Server", September 26, 2002, work in progress to become IEEE-ISTO 5100.6-2002, ftp://ftp.pwg/org/pub/pwg/ipp/new_NOT/ipp-dist-not-service-020926.doc

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~~[not-srv]~~
~~Hastings, T., Lewis, H, and Ira McDonald, "Distributed Notification Server", PWG IEEE-ISTO standard to be started.~~

[ntfy]
Herriot, R., Hastings, T., Shepherd, M., deBry, R., Isaacson, S., Martin, J., and R. Bergman, "Internet Printing Protocol/1.1: Event Notifications and Subscriptions", <draft-ietf-ipp-not-spec-08.txt>, November 19, 2001.

[output-bin]
Hastings, T., and R. Bergman, "Internet Printing Protocol (IPP): output-bin attribute extension", IEEE-ISTO 5100.2-2001, February 7, 2001, ftp://ftp.pwg.org/pub/pwg/standards/pwg5100.2.pdf.

[override]
Herriot, R., Ocke, K., "Internet Printing Protocol (IPP): Override Attributes for Documents and Pages", IEEE-ISTO 5100.4-2001, February 7, 2001, ftp://ftp.pwg.org/pub/pwg/standards/pwg5100.4.pdf.

[prod-print]
Ocke, K., Hastings, T., "Internet Printing Protocol (IPP): Production Printing Attributes - Set1", IEEE-ISTO 5100.3-2001, February 12, 2001, ftp://ftp.pwg.org/pub/pwg/standards/pwg5100.3.pdf.

[prod-print2] Hastings, T., and D. Fullman, "Internet Printing Protocol (IPP): Production Printing Attributes - Set 2", to become a PWG IEEE-ISTO standard, work in progress, August 21, 2002, ftp://ftp.pwg.org/pub/pwg/ipp/new_PPE/pwg-ipp-prod-print-set2-draft-v0_1-020821.pdf.

[RFC2911]
R. deBry, T. Hastings, R. Herriot, S. Isaacson, P. Powell, "Internet Printing Protocol/1.1: Model and Semantics", RFC 2911, September 2000.

[set-ops]
Hastings, T., Herriot, R., Kugler, C., and H. Lewis, "Internet Printing Protocol (IPP): Job and Printer Set Operations", RFC 3380, September 2002.

13 Informative References

[fsg-jt]
Free Software Group, Open Printing Job Ticket API, Visit: http://www.freestandards.org/openprinting/

[pwg-psi]
"Print Service Interface (PSI)", work in progress to become a PWG IEEE-ISTO standard. Visit http://www.pwg.org/.

[pwg-sm]
Zehler, P., and S. Albright, "PWG Semantic Model", work in progress to become a PWG IEEE-ISTO standard, version 0.11, September 27, 2002. ftp://ftp.pwg.org/pub/pwg/Semantic-Model/PWG-Semantic-Model.pdf

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[RFC2565]
Herriot, R., Butler, S., Moore, P., and R. Turner, "Internet Printing Protocol/1.0: Encoding and Transport", RFC 2565, April 1999.

[RFC2566]
R. deBry, T. Hastings, R. Herriot, S. Isaacson, and P. Powell, "Internet Printing Protocol/1.0: Model and Semantics", RFC 2566, April 1999.

[RFC2567]
Wright, D., "Design Goals for an Internet Printing Protocol", RFC 2567, April 1999.

[RFC2568]
Zilles, S., "Rationale for the Structure and Model and Protocol for the Internet Printing Protocol", RFC 2568, April 1999.

[RFC2569]
Herriot, R., Hastings, T., Jacobs, N., Martin, J., "Mapping between LPD and IPP Protocols", RFC 2569, April 1999.

[RFC2616]
R. Fielding, J. Gettys, J. Mogul, H. Frystyk, L. Masinter, P. Leach, T. Berners-Lee, “Hypertext Transfer Protocol - HTTP/1.1”, RFC 2616, June 1999.

[RFC3196]
Hastings, T., Manros, C., Zehler, P., Kugler, C., and H. Holst, “Internet Printing Protocol/1.1: Implementer’s Guide”, RFC 3196, November 2001.

[RFC3239]
Kugler, C., Lewis, H. and T. Hastings, “Internet Printing Protocol (IPP): Requirements for Job, Printer, and Device Administrative Operations”, RFC 3239, February 2002.

14 IANA Considerations

This section contains the registration information for IANA to add to the various IPP Registries according to the procedures defined in RFC 2911 [RFC2911] section 6 to cover the definitions in this document.

Note Replace the References below with the RFC number for the appropriate document, so that it accurately reflects the content of the information for the IANA Registry.

14.1 Attribute Registrations

The following table lists all the attributes defined in this document. These are to be registered according to the procedures in RFC 2911 [RFC2911] section 6.2.

Document Description attributes:		
Document Description attributes:	Reference:	Section
attributes-charset (charset)	[RFC2911]	4.3.19
attributes-natural-language (naturalLanguage)	[RFC2911]	4.3.20

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compression (type3 keyword)	[RFC2911]	3.2.1.1
current-page-order (type2 keyword)	[prod-print]	4.1
date-time-at-completed (dateTime)	[RFC2911]	4.3.14.7
date-time-at-creation (dateTime)	[RFC2911]	4.3.14.5
date-time-at-processing (dateTime)	[RFC2911]	4.3.14.6
detailed-status-message (1setOf text (MAX))	[RFC2911]	4.3.10
document-access-errors (1setOf text(MAX))	[RFC2911]	4.3.11
document-format (documentFormat)	[RFC2911]	3.2.1.1
document-name (name(MAX))	[RFC2911]	3.2.1.1
document-natural-language (naturalLanguage)	[RFC2911]	3.2.1.1
document-number (integer(0:MAX))	[this spec]	8.1
document-state (type1 enum)	[this spec]	8.3
document-state-reasons (1setOf type2 keyword)	[this spec]	8.5!
impressions (integer(0:MAX))	[RFC2911]	4.3.17.2
impressions-completed (integer(0:MAX))	[RFC2911]	4.3.18.2
impressions-completed-current-copy (integer(0:MAX))	[job-prog]	4.4
k-octets (integer(0:MAX))	[RFC2911]	4.3.17.1
k-octets-processed (integer(0:MAX))	[RFC2911]	4.3.18.1
last-document (boolean)	[RFC2911]	4.3.12
media-sheets (integer(0:MAX))	[RFC2911]	4.3.17.3
media-sheets-completed (integer(0:MAX))	[RFC2911]	4.3.18.3
more-info (uri)	[RFC2911]	4.3.4
printer-up-time (integer (1:MAX))	[RFC2911]	4.3.14.4
sheet-completed-copy-number (integer(0:MAX))	[job-prog]	4.2
time-at-completed (integer (MIN:MAX))	[RFC2911]	4.3.14.3
time-at-creation (integer (MIN:MAX))	[RFC2911]	4.3.14.1
time-at-processing (integer (MIN:MAX))	[RFC2911]	4.3.14.2
warnings-count (integer(0:MAX))	[override]	6.1

Document Templates attributes:	Reference:	Section:
copies (integer(1:MAX))	[RFC2911]	4.2.5
cover-back (collection)	[prod-print]	3.1
media (type3 keyword | name(MAX))	[prod-print]	3.1.1
media-col (collection)	[prod-print]	3.1.1
cover-front (collection)	[prod-print]	3.1
cover-type (type2 keyword)	[prod-print]	3.1.2
media (type3 keyword | name(MAX))	[prod-print]	3.1.1
media-col (collection)	[prod-print]	3.1.1
cover-type (type2 keyword)	[prod-print]	3.1.2
finishings (1setOf type2 enum)	[RFC2911]	4.2.6
	[finish]	2
finishings-col (collection)	[prod-print]	3.2
finishing-template (name(MAX))	[prod-print]	3.2.1
stitching (collection)	[prod-print]	3.2.2

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```
    stitching-locations (1setOf integer(0:MAX))  [prod-print] 3.2.2.3
    stitching-offset (integer (0:MAX))           [prod-print] 3.2.2.2
    stitching-reference-edge (type2 keyword)     [prod-print] 3.2.2.1
force-front-side (1setOf integer(1:MAX))         [prod-print] 3.3
imposition-template (type2 keyword | name(MAX))  [prod-print] 3.4
insert-sheet (1setOf collection)                 [prod-print] 3.5
  insert-after-page-number (integer(0:MAX))      [prod-print] 3.5.1
  insert-count (integer(0:MAX))                  [prod-print] 3.5.2
  media (type3 keyword | name(MAX))              [prod-print] 3.5.3
  media-col (collection)                         [prod-print] 3.5.3
media (type3 keyword | name(MAX))                [RFC2911]    4.2.11
media-col (collection)                           [prod-print] 3.13
  media-back-coating (type3 keyword |            [prod-print] 3.13.10
      name(MAX))
  media-color (type3 keyword | name(MAX))        [prod-print] 3.13.4
  media-front-coating (type3 keyword |           [prod-print] 3.13.10
      name(MAX))
  media-hole-count (integer(0:MAX))              [prod-print] 3.13.6
  media-info (text(255))                         [prod-print] 3.13.3
  media-key (type3 keyword | name(MAX))          [prod-print] 3.13.1
  media-order-count (integer(1:MAX))             [prod-print] 3.13.7
  media-preprinted (type3 keyword | name(MAX))   [prod-print] 3.13.5
  media-recycled (type3 keyword | name(MAX))     [prod-print] 3.13.11
  media-size (collection)                        [prod-print] 3.13.8
    x-dimension (integer(0:MAX))                 [prod-print] 3.13.8.1
    y-dimension (integer(0:MAX))                 [prod-print] 3.13.8.2
  media-type (type3 keyword | name(MAX)          [prod-print] 3.13.2
  media-weight-metric (integer(0:MAX))           [prod-print] 3.13.9
media-input-tray-check (type3 keyword |          [prod-print] 3.14
      name(MAX))
number-up (integer(1:MAX))                       [RFC2911]    4.2.9
orientation-requested (type2 enum)               [RFC2911]    4.2.10
output-bin (type2 keyword | name(MAX))           [output-bin] 2.1
page-delivery (type2 keyword)                    [prod-print] 3.15
page-order-received (type2 keyword)              [prod-print] 3.16
page-overrides (1setOf collection)               [override]   5.2
  document-copies (1setOf rangeOfInteger(MAX))   [override]   5.2.3
  input-documents (1setOf rangeOfInteger(MAX))   [override]   5.2.1
  output-documents (1setOf rangeOfInteger(MAX))  [override]   5.2.2
  pages (1setOf rangeOfInteger(MAX))             [override]   5.2.4
  <any other Job Template attributes that
affect pages, such as media or media-col (
page-ranges (1setOf rangeOfInteger(1:MAX))       [RFC2911]    4.2.7
pages-per-subset (1setOf integer(1:MAX))         [prod-print] 5.3
presentation-direction-number-up (type2          [prod-print] 3.17
keyword)
```

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```
print-quality (type2 enum)                          [RFC2911]    4.2.13
printer-resolution (resolution)                     [RFC2911]    4.2.12
separator-sheets (collection)                       [prod-print] 3.18
  media (type3 keyword | name(MAX))                 [prod-print] 3.18.2
  media-col (collection)                            [prod-print] 3.18.2
  separator-sheets-type (type3 keyword |            [prod-print] 3.18.1
      name(MAX))
sheet-collate (type2 keyword)                       [job-prog]   3.1
sides (type2 keyword)                               [RFC2911]    4.2.8
x-image-position (type2 keyword)                    [prod-print] 3.19.2
x-image-shift (integer(MIN:MAX))                    [prod-print] 3.19.3
x-side1-image-shift (integer(MIN:MAX))              [prod-print] 3.19.4
x-side2-image-shift (integer(MIN:MAX))              [prod-print] 3.19.5
y-image-position (type2 keyword)                    [prod-print] 3.19.6
y-image-shift (integer(MIN:MAX))                    [prod-print] 3.19.7
y-side1-image-shift (integer(MIN:MAX))              [prod-print] 3.19.8
y-side2-image-shift (integer(MIN:MAX))              [prod-print] 3.19.9


Operation attributes:
document-number                                       [this spec]   3
```

14.2 Additional Enum Attribute Value Registrations for the “operations-supported” Printer Attribute

The following table lists all the new enum attribute values defined in this document as additional type2 enum values for use with the “operations-supported” Printer Description attribute. These are to be registered according to the procedures in RFC 2911 [RFC2911] section 6.1.

Value	Name	Reference	Section:
operations-supported (type2 enum):			
0x0032	Cancel-Current-Document	[this-spec]	§3.9
0x0033	Cancel-Document	[this-spec]	§3.8
0x0034	Get-Document-Attributes	[this-spec]	§3.5
0x0035	Get-Documents	[this-spec]	§3.6
0x0036	Delete-Document	[this-spec]	§3.10
0x0037	Set-Document-Attributes	[this-spec]	§3.7
0x0038	Validate-Document	[this-spec]	§3.11
0x0039	Create-Document	[this-spec]	§3.1
0x003A	Send-Data	[this-spec]	§3.1

The resulting enum attribute value registrations will be published in the http://www.iana.org/assignments/ipp-registrations registry~~file~~.

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14.3 Operation Registrations

The following table lists all of the operations defined in this document. These are to be registered according to the procedures in RFC 2911 [RFC2911] section 6.4.

Operations:	Reference:	Section:
Cancel-Current-Document	[this-spec]	§3
Cancel-Document	[this-spec]	§3
Get-Document-Attributes	[this-spec]	§3
Get-Documents	[this-spec]	§3
Delete-Document	[this-spec]	§3
Set-Document-Attributes	[this-spec]	§3
Validate-Document	[this-spec]	§3
Create-Document	[this-spec]	§
Send-Data	[this-spec]	§

15 Internationalization Considerations

The internationalization considerations for this extension for handling the Document object are the same as for handling the Job object in [RFC2911].

16 Security Considerations

The Document object should provide no more increased security considerations than the Job object. The Printer MUST provide the same access control for Document objects as for Job objects.

17 Contributors

18 Acknowledgments

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20 Appendix A: Document operations compared to Job operations

This appendix compares the Document operations with the existing Job operations to show the parallelism.

Table 13 compares the Job and Document operations. The two Conf. columns indicate the conformance requirements (REQUIRED = REQ, OPTIONAL = OPT) for the Job and Document operations respectively. A "REQ" in the Document Conformance column means if the Document object is supported. Whether a Document operation is a method on the Job object or the Document object depends on the modeling regime and is not an essential part of the semantics described here, since these semantics are intended to apply to both to object-oriented and object-based protocols, APIs, and implementations.

Table 13 - Document operations compared to Job operations

Job operations	Job Conf.	Document operations	Doc Conf
Cancel-Current-Job	OPT	**Cancel-Current-Document**	OPT
Cancel-Job	REQ	**Cancel-Document**	OPT
Create-Job	OPT	**Create-Document**	REQ
Get-Job-Attributes	REQ	**Get-Document-Attributes**	REQ
Get-Jobs	REQ	**Get-Documents**	REQ
Hold-Job		*N/A, can only hold an entire job.*	
Print-Job	REQ	**Send-Document** (existing operation - see [RFC2911] with an additional Document attributes group defined in section 3.3)	REQ[42]
Print-URI	OPT	**Send-URI** (existing operation - see [RFC2911] with an additional Document attributes group defined in section 3.4)	OPT
N/A		**Send-Data**	REQ
Promote-Job	OPT	*N/A, can only promote an entire job*	
Purge-Jobs	OPT	**Delete-Document**	OPT
Release-Held-New-Jobs	OPT	*N/A, can only release entire jobs*	
Release-Job	OPT	*N/A, can only release an entire job*	
Reprocess-Job	OPT	*N/A, can only reprocess an entire job*	
Restart-Job	OPT	*N/A, can only restart an entire job*	
Resume-Job	OPT	*N/A, can only resume an entire job*	

[42] The Send-Document operation is OPTIONAL for a Printer to conform to [RFC2911], but is REQUIRED for a Printer to conform to this Document object specification.

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Job operations	Job Conf.	Document operations	Doc Conf
Schedule-Job-After	OPT	*N/A, can only schedule an entire job*	
Set-Job-Attributes	OPT	**Set-Document-Attributes**	OPT
Suspend-Current-Job	OPT	*N/A, can only suspend an entire job in order to run another one*	
Validate-Job	REQ	**Validate-Document**	REQ

21 Annex B: Change Log (informative)

Version 0.4, 14 September 2002:

1. Added the operation specifications.
2. Added the Create-Document and Send-Data to be more parallel with Jobs and support PWG PSI.
3. Resolved the 15 issues in version 0.3 as discussed on the mailing list.
4. Added the Attribute Precedence section 5.
5. Added [prod-print2] attributes.
6. Added job-mandatory-attributes, job-cover-back, job-cover-front, job-copies, job-finishings, job-finishings-col. document-id-uri, and redirect-uri.

Version 0.3, 9 September 2002:

1. Reformatted as an IEEE-ISTO standard and added the usual sections for a standard.
2. Added “original-requesting-user-name” Operation attribute to Table 5.
3. Added “y” to “output-bin” in Table 7 so it MAY be a Document Template attribute.
4. Clarified the * and ** in Table 8 - Job and Document Description attributes.
5. Added section 9 all of the Printer attributes defined In any IPP standard.
6. Allocated operation-id enums in section 10 to the 7 Document operations.
7. Added the conformance section 11
8. Completed the IANA Considerations section 14.

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