

INTERNET-DRAFT

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Carl Kugler
IBM Corporation
T. Hastings
Xerox Corporation
R. Herriot
Xerox Corporation
H. Lewis
IBM Corporation
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Internet Printing Protocol (IPP): Job and Printer Set Operations

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Abstract

This document specifies 3 additional OPTIONAL operations for use with the Internet Printing Protocol/1.0 (IPP) [RFC2565, [RFC2566](#)], IPP/1.1 [[ipp-mod](#), [ipp-pro](#)], and future versions. The first is the Set-Printer-Attributes operation that operators/administrators may perform on a Printer object to change Printer attribute values. The second is the Set-Job-Attributes operation that end-users may perform on their jobs and operators/administrators may perform on any job, depending on circumstances. The operation changes the Job attribute values. The third is the Get-Printer-Supported-Values operation that operators/administrators may perform on a Printer object in order to determine acceptable values for setting "xxx-supported" attributes using the Set-Printer-Attributes operation.

A Printer implementation can make the value of some attributes dependent on the document-format, e.g. "resolution-supported".

Two operation attributes: "printer-message-from-operator" (text) and

"job-message-from-operator" (text) are defined to set the corresponding IPP/1.1 Printer and Job Description attributes with the same names. A new out-of-band value 'any-value' is added which may be used with any

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attribute syntax if an attribute definition allows. The 'any-value' value used with the 'name' attribute syntax can be (one of) the values of "xxx-supported" attributes whose attribute syntaxes include both 'keyword' and 'name'. The 'any-value' value with the 'name' attribute syntax matches any name supplied by the client during validation.

New Printer Description attributes are defined:

- printer-settable-attributes-supported (1setOf type2 keyword)
- job-settable-attributes-supported (1setOf type2 keyword)
- document-format-varying-attributes (1setOf type2 keyword)
- printer-message-time (integer(MIN:MAX))
- printer-message-date-time (dateTime)

A new status code is defined: 'client-error-attributes-not-settable'.

A 'delete-attribute' out-of-band attribute value is defined for use by the client in the Set-Job-Attributes request to indicate explicitly that the Printer is to remove the specified attribute from the Job object.

Finally, the 'not-settable' out-of-band attribute value is defined for returning in the Set-Printer-Attributes and Set-Job-Attributes operation responses.

The scope of IPP is characterized in [RFC2526](#) "Design Goals for an Internet Printing Protocol". It is not the intent of this document to revise or clarify this scope or conjecture as to the degree of industry adoption or trends related to IPP within printing systems. It is the intent of this document to extend the original set of operations - in a similar fashion to the Set1 extensions which referred to IPP/1.0 and were later incorporated into IPP/1.1.

Kugler, Hastings, Herriot, Lewis

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The full set of IPP documents includes:

- Design Goals for an Internet Printing Protocol [[RFC2567](#)]
- Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [[RFC2568](#)]
- Internet Printing Protocol/1.1: Model and Semantics (this document)
- Internet Printing Protocol/1.1: Encoding and Transport [IPP-PRO]
- Internet Printing Protocol/1.1: Implementer's Guide [IPP-IIG]
- Mapping between LPD and IPP Protocols [[RFC2569](#)]

The "Design Goals for an Internet Printing Protocol" document takes a broad look at distributed printing functionality, and it enumerates real-life scenarios that help to clarify the features that need to be included in a printing protocol for the Internet. It identifies requirements for three types of users: end users, operators, and administrators. It calls out a subset of end user requirements that are satisfied in IPP/1.0. A few OPTIONAL operator operations have been added to IPP/1.1.

The "Rationale for the Structure and Model and Protocol for the Internet Printing Protocol" document describes IPP from a high level view, defines a roadmap for the various documents that form the suite of IPP specification documents, and gives background and rationale for the IETF working group's major decisions.

The "Internet Printing Protocol/1.1: Encoding and Transport" document is a formal mapping of the abstract operations and attributes defined in the model document onto HTTP/1.1 [[RFC2616](#)]. It defines the encoding rules for a new Internet MIME media type called "application/ipp". This document also defines the rules for transporting over HTTP a message body whose Content-Type is "application/ipp". This document defines a new scheme named 'ipp' for identifying IPP printers and jobs.

The "Internet Printing Protocol/1.1: Implementer's Guide" document gives insight and advice to implementers of IPP clients and IPP objects. It is intended to help them understand IPP/1.1 and some of the considerations that may assist them in the design of their client and/or IPP object implementations. For example, a typical order of processing requests is given, including error checking. Motivation for some of the specification decisions is also included.

The "Mapping between LPD and IPP Protocols" document gives some advice to implementers of gateways between IPP and LPD (Line Printer Daemon) implementations.

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1 Introduction

The Internet Printing Protocol (IPP) is an application level protocol that can be used for distributed printing using Internet tools and technologies. IPP version 1.1 [[ipp-mod](#), [ipp-pro](#)] focuses on end user functionality with a few administrative operations included. This document defines additional OPTIONAL end user, operator, and administrator Set-Job-Attributes and Set-Printer-Attributes operations used to modify IPP Job objects and Printer objects. It also defines a third Get-Printer-Supported-Values operation that returns values that the IPP Printer will accept for setting its "xxx-supported" attributes. The Get-Printer-Supported-Values operation MUST be supported, if the Set-Printer-Attributes operation is supported.

This document is an extension to IPP/1.0 [RFC2565, [RFC2566](#)] and IPP/1.1 [[ipp-mod](#), [ipp-pro](#)], and future versions.

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. These terms are defined in [[ipp-mod](#)] [section 12.1](#) on conformance terminology, most of which is taken from [RFC 2119](#) [[RFC2119](#)].

The following specialization of these terms apply to this document:

REQUIRED: if an implementation supports the extensions described in this document, it MUST support a REQUIRED feature.

OPTIONAL: if an implementation supports the extensions described in this document, it MAY support an OPTIONAL feature.

2.2 Other terminology

This document uses terms such as Job object (or Job), IPP Printer object (or Printer), "operation", "request", "response", "attributes", "keywords", and "support". These terms have special meaning and are

defined in the model terminology [[ipp-mod](#)] [section 12.2](#). The following additional terms are introduced in this document:

READ-ONLY: used in an attribute definition to indicate that the attribute MUST NOT be settable using an IPP protocol Set operation. In other words, the attribute is not settable by definition.

not-settable: an implementation does not support setting an attribute (whether or not the attribute's definition is READ-ONLY).

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3 Requirements and Use Cases

The following requirements and usage are intended to be met by the specification in this document.

1. The end-user and the operator need a way to modify a Job that is in the 'pending' or 'pending-held' state.

Usage: The end-user discovers that he/she forgot to include a print instruction, such as "finishings" = 'staple' after submitting a job. Rather than canceling the job and resubmitting it to the same IPP Printer, the end-user is able to modify the job on the IPP Printer.

The operator needs to modify a job because it is requesting a particular kind of media for which there is no more, but the policy is to print the job on a comparable medium.

2. The system administrator needs a way to re-configure or change the policy of the IPP Printer remotely.

Usage: The system administrator is adding additional media to the supported media list.

The system administrator is reducing the capability of the IPP Printer by removing one of the operations from the supported operations list, such as Cancel-Job, because the policy is to run the IPP Printer like a public facsimile machine.

The system administrator is remotely configuring the IPP Printer after installing it, and so is replacing the Printer Description attributes that have the out-of-band 'no-value' value (see [[ipp-mod](#) section 4.1]) with the proper values.

The operator is changing the media loaded in the input tray and so is replacing the "media-ready" Job Template Printer attribute value with the proper values

4 Definition of the Set operations

The Set-Printer-Attributes operation (as are all Printer operations) are directed at Printer objects. A client MUST always supply the "printer-

uri" operation attribute in order to identify the correct target of the operation. These descriptions assume all of the common semantics of IPP/1.1 Model and Semantics document [[ipp-mod](#)] [section 3.1](#).

The Set-Job-Attributes operation (as are all Job operations) are directed at Job objects. A client MUST always supply some means of identifying the Job object in order to identify the correct target of the operation. That job identification MAY either be a single Job URI or a combination of a Printer URI with a Job ID as defined in [[ipp-mod](#)]. The IPP object implementation MUST support both forms of identification

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for every job. If possible, a client SHOULD use the Printer URI with a Job ID rather than a Job URI, since the 32-bit "job-id" is more readily translated to and from other print protocols that MAY be serving as gateways into or out of the IPP implementation.

The Set Printer operations are summarized in Table 1:

Table 1 - Operation-Id assignments

Operation Name	Operation -Id	Brief description
Set-Printer-Attributes	0x0013	Sets attribute values of the target Printer object
Set-Job-Attributes	0x0014	Sets attribute values of the target Job object
Get-Printer-Supported-Values	0x0015	Gets values that are valid for setting "xxx-supported" attributes using the Set-Printer-Attributes operation

4.1 Set-Printer-Attributes Operation

This OPTIONAL operation allows a client to set the values of the attributes of a Printer object. In the request, the client supplies the set of Printer attribute name keywords and values that are to be set. In the response, the Printer object returns success or rejects the entire request with indications of which attribute or attributes could not be set.

The Printer object validates the client-supplied attributes in the Set-Printer-Attributes request. For an attribute to validate it MUST meet all of the following rules:

1. The number of attributes supplied by the client MUST NOT exceed the maximum number that the Printer supports in a Set-Printer-Attributes request. A Printer MUST accept at least one attribute, but SHOULD accept a reasonable number in a single Set-Printer-Attributes request. If a Printer supports setting the three "parallel" Printer Description attributes ("printer-uri-supported", "uri-authentication-supported", and "uri-security-supported" (see [[ipp-mod](#)] sections [4.4.1](#) through [4.4.3](#)), then the Printer MUST accept at least three attributes in a Set-Printer-Attributes request.

Note: There is no way for the client to determine the maximum number of attributes that the Printer supports in a Set-Printer-Attributes request, except to try a reasonable number.

2. The Printer MUST support the attribute.
3. The attribute MUST NOT be READ-ONLY, i.e., the definition of the attribute MUST NOT indicate that the attribute is READ-ONLY (see [Appendix A](#) for an indication of which IPP/1.1 attributes are READ-ONLY).

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4. The attribute MUST be settable in this implementation.
5. The Printer MUST support the value according to the rules defined in [Appendix A](#).
6. The attribute's values MUST NOT conflict with other Printer attribute, including ones being set in this same operation.

If any of the supplied attributes does not validate, the 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-Printer-Attributes an atomic operation.

The Printer MUST accept this operation when its READ-ONLY "printer-state" attribute (see ipp-mod] [section 4.4.11](#)) is 'idle' or 'stopped', and SHOULD accept it when the value is 'processing'. The Printer MUST accept this operation for any of the values of the Printer object's READ-ONLY "printer-state-reasons" and "printer-is-accepting-jobs" attributes, unless explicitly defined otherwise in the definition of these attributes' values.

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. For example, this document explicitly specifies that when this operation sets "printer-message-from-operator", the Printer also MUST set the READ-ONLY "printer-message-time" and READ-ONLY "printer-message-date-time" attributes to the time of the operation as a side effect. In particular, if this operation changes an "xxx-default" attribute, the new value MUST be in the "xxx-supported" attribute or the request MUST contain a new value for "xxx-supported" which contains the new value for the "xxx-default". Otherwise, the Printer MUST reject the operation. In general, Printer 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.

4.1.1 Settable and READ-ONLY Printer Description attributes

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

all Job Template Default ("xxx-default") attributes

all Job Template Supported ("xxx-supported") attributes
all Job Template Ready ("xxx-ready") attributes

that the implementation supports (see [[ipp-mod](#)] [section 4.2](#) and extensions).

Some Printer Description attributes (see [[ipp-mod](#)] [section 4.4](#)) MUST NOT be settable, i.e., they are defined to be READ-ONLY. An attribute marked as "READ-ONLY" in the Printer Description attribute table in Appendix A is such an attribute. The Printer attributes that are not

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marked as "READ-ONLY" MAY be settable using the Set-Printer-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.

If "xxx-supported" Printer Description attribute are settable, then they MUST affect the behavior of the implementation. If they are READ-ONLY then they reflect the implementation and cannot be changed explicitly using the Set-Printer-Attributes operation. Consider the following example:

For example, if the "operations-supported" Printer Description attribute (see [[ipp-mod](#)] [section 4.4.15](#)) is settable in a particular implementation, then changing its value with a Set-Printer-Attributes operation MUST affect the operations that the implementation accepts or rejects. Such an implementation will need to be able to reject values for operations that it contains no code support for (see [section 5](#)). If the "operations-supported" Printer Description attribute is not settable in a particular implementation, then that implementation MUST reject an attempt to set it with a Set-Printer-Attributes operation, return the 'client-error-attributes-not-settable' status code (see [section 7.1](#)), and return the "operations-supported" attribute with the out-of-band 'not-settable' value in the Unsupported Attributes Group.

Access Rights: The authenticated user (see [[ipp-mod](#)] [section 8.3](#)) performing this operation must be an operator or administrator of the Printer object (see [[ipp-mod](#)] [Sections 1](#) and [8.5](#)). Most Printer attributes will require administrator privileges to set, such as "xxx-supported", while some will require operator privileges only, such as "media-ready" and "printer-message-from-operator". Which attributes require which privileges depends on implementation and MAY depend on site policy.

4.1.2Set-Printer-Attributes Request

The following sets of attributes are part of the Set-Printer-Attributes Request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes-charset" and "attributes-natural-language" attributes as described in [[ipp-mod](#)] [section 3.1.4.1](#).

Target:

The "printer-uri" (uri) operation attribute which is the target for this operation as described in [[ipp-mod](#)] [section 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 [[ipp-mod](#)] [section 8.3](#).

"document-format" (mimeMediaType):

The client OPTIONALLY supplies this attribute. The Printer object MUST support this attribute. This attribute is useful for a client to select the document-format to which the attribute modification should be applied. A Printer implementation MAY allow some attributes to have different values for each document format that it supports. See [[ipp-mod](#)] [section 3.2.5.1](#) "Get-Printer-Attributes Request".

If the client includes this attribute, the Printer MUST change the supplied attributes for the document format specified by this attribute. If a supplied attribute is a member of the "document-format-varying-attributes" (i.e., the attribute varies by document format, see [section 6.3](#)), the Printer MUST change the supplied attribute for the document format specified by this attribute, but not for other document formats. If a supplied attribute isn't a member of the "document-format-varying-attributes" (i.e. it doesn't vary by document format), the Printer MUST change the supplied attribute for all document formats.

If the client omits this attribute, the Printer MUST change the supplied attributes for all document formats whether or not they vary by document-format.

If the client supplies a value for the "document-format" Operation attribute that is either 'application/octet-stream' or not supported by the Printer, i.e., is not among the values of the Printer object's "document-format-supported" attribute, the Printer object MUST reject the operation and return the 'client-error-document-format-not-supported' status code. Note: the document-format 'application/octet-stream' is the union of several document-formats (see [[ipp-mod](#)] [section 3.2.5.1](#), Get-Printer-Attributes) and is not a true document-format.

Group 2: Printer Attributes

The client MUST supply a set of Printer attributes with one or more values (including explicitly allowed out-of-band values) as defined in [[ipp-mod](#)] [section 4.2](#) Job Template Attributes ("xxx-default",

"xxx-supported", and "xxx-ready" attributes), [section 4.4](#) Printer Description Attributes, and any attribute extensions supported by the Printer. The value(s) of each Printer attribute supplied in Group 2 replaces the value(s) of the corresponding Printer attribute on the target Printer object. For attributes that can have multiple values (1setOf), all values supplied by the client replace all values of the corresponding Printer object attribute. If a Printer object attribute had not been configured yet and so had the 'no-value' out-of-band value (see [[ipp-mod](#)] [section 4.1](#)), the supplied value(s) replace the 'no-value' value.

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4.1.3Set-Printer-Attributes Response

The Printer object returns the following sets of attributes as part of the Get-Printer-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 [[ipp-mod](#)] sections [13](#) and [3.1.6](#).

Natural Language and Character Set:

The "attributes-charset" and "attributes-natural-language" attributes as described in [[ipp-mod](#)] [section 3.1.4.2](#).

Group 2: Unsupported Attributes

See [[ipp-mod](#)] [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 Printer 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 [[ipp-mod](#)] [section 13.1.4.9](#)).
2. The Printer doesn't support the attribute: return the attribute with the "out-of-band" value 'unsupported' (see [[ipp-mod](#)] [section 3.1.7](#) and [[ipp-pro](#)]) and the 'client-error-attributes-or-values-not-supported' (see [[ipp-mod](#)] [section 13.1.4.12](#)).
3. The attribute is either READ-ONLY (in its definition) or is not-settable in this implementation: return the attribute

with the "out-of-band" value 'not-settable' (see [section 8.1](#)) and the 'client-error-attributes-not-settable' status code (see [section 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 [[ipp-mod](#)] [section 13.1.4.12](#)).

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5. The values of some of the supplied attributes conflict with one another and/or other Printer 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 [[ipp-mod](#)] [section 13.1.4.15](#)).

[4.2](#) Set-Job-Attributes Operation

This OPTIONAL operation allows a client to set the values of the attributes of a Job object. In the request, the client supplies the set of Job attribute name keywords 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-Attributes operation (see [section 4.1](#)). The only differences are that the Set-Job-Attributes operation is directed at a Job object rather than a Printer object, there is no "document-format" operation attribute used when setting a Job object, the operation can add an attribute to the (Job) object, the 'delete-attributes' out-of-band value is permitted to remove an attribute, and the validation is the same as the Job Creation operations (Print-Job, Print-URI, and Create-Job), i.e., depends on the "xxx-supported" Printer Description attributes (see [[ipp-mod](#)] [section 3.1](#)).

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

If the client supplies a job attribute with the "out-of-band" value 'delete-attribute' (see [section 8.2](#)), then the Printer MUST remove the attribute and all of its values from the Job object, if present. The semantic effect of the client supplying the 'delete-attribute' value in a Set-Job-Attributes operation MUST be the same as if the attribute had not been supplied with the Job object in the Job Creation operation, i.e., the Printer applies its default attribute or behavior with lower precedence than the PDL (see the beginning of [[ipp-mod](#)] [section 4.2](#) and [[ipp-mod](#)] 3.2.1.1). Any subsequent query of the Job object using Get-

Job-Attributes or Get-Jobs 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 attribute with any supported value(s) using a subsequent Set-Job-Attributes operation.

If the client supplies an attribute in a Set-Job-Attributes request with the 'delete-attribute' value and that attribute is not present on the Job 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.

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The validation of the Set-Job-Attributes request is performed by the Printer as if the job 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 attributes and values MUST be supported in combination with the Job attributes not modified. If such a Job Creation operation would have been accepted, then the Set-Job-Attributes MUST be accepted. If such a Job Creation operation would have been rejected, then the Set-Job-Attributes MUST be rejected and the Job MUST be unchanged. In addition, if any of the supplied attributes are not supported, are not settable, or the values are not supported, the 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-Attributes an atomic operation.

The IPP object MUST accept or reject this operations when the Job's READ-ONLY "job-state" attribute has the values shown in Table 2. The job's current state MUST affect whether the IPP object accepts or rejects the request. For example, in the case where the operation creates a request for unavailable resources, the Job transitions to a new state. Table 2 shows the allowed behaviors in each job state and the transitions.

Table 2 - Job State Transition Table for the Set-Job-Attributes operation

Current "job-state"	New "job-state"	IPP object's response status code and action:
'pending'	'pending'	'successful-ok'
'pending'	'pending-held'	'successful-ok' - needed resources are not ready
'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 has started marking media, etc.
'processing-	'processing-	'successful-ok' or 'client-

stopped'	stopped'	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'

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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 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.

4.2.1 Settable and READ-ONLY Job Description attributes

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

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

all Job Template job ("xxx") attributes

that the implementation supports (see [[ipp-mod](#)] [section 4.2](#) and extensions).

Some Job Description attributes (see [[ipp-mod](#)] [section 4.3](#)) MUST NOT be settable, i.e., they are defined to be READ-ONLY. 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 [[ipp-mod](#)] [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 [[ipp-mod](#)] [Sections 1](#) and [8.5](#)).

4.2.2 Set-Job-Attributes Request

The following sets of attributes are part of the Set-Job-Attributes

Request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes-charset" and "attributes-natural-language" attributes as described in [[ipp-mod](#)] [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 for this operation as described in [[ipp-mod](#)] [section 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 [[ipp-mod](#)] [section 8.3](#).

Group 2: Job Attributes

The client MUST supply a set of Job attributes with one or more values (including explicitly allowed out-of-band values) as defined in [[ipp-mod](#)] [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 attribute supplied in Group 2 replaces the value(s) of the corresponding Job attribute on the target Job object. For attributes that can have multiple values (1setOf), all values supplied by the client replace all values of the corresponding Job object attribute.

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

4.2.3Set-Job-Attributes Response

The IPP object returns the following sets of attributes as part of the Set-Job-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 [[ipp-mod](#)] [sections 13](#) and [3.1.6](#).

Natural Language and Character Set:

The "attributes-charset" and "attributes-natural-language" attributes as described in [[ipp-mod](#)] [section 3.1.4.2](#).

Group 2: Unsupported Attributes

See [[ipp-mod](#)] [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 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-

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Attributes request: return the 'client-error-request-entity-too-large' (see [[ipp-mod](#)] [section 13.1.4.9](#)).

2. The Printer doesn't support the attribute: return the attribute with the "out-of-band" value 'unsupported' (see [[ipp-mod](#)] [section 3.1.7](#) and [[ipp-pro](#)]) and the 'client-error-attributes-or-values-not-supported' (see [[ipp-mod](#)] [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 "out-of-band" value 'not-settable' (see [section 8.1](#)) and the 'client-error-attributes-not-settable' status code (see [section 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 [[ipp-mod](#)] [section 13.1.4.12](#)).
5. The values of some of the supplied attributes conflict with one another and/or other Job 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 [[ipp-mod](#)] [section 13.1.4.15](#)).

[4.3](#) Get-Printer-Supported-Values Operation

This OPTIONAL operation allows a client to request the values that the Printer allows in the Set-Printer-Attributes operation for "xxx-supported" attributes. If the Printer supports the Set-Printer-Attributes operation AND some of its "xxx-supported" Printer attributes are settable, then the Printer MUST also support this operation. This operation has identical request/response attributes to the Get-Printer-Attributes operation in IPP/1.1 [[ipp-mod](#)]. The operation also behaves identically to the Get-Printer-Attributes operation in IPP/1.1 [[ipp-mod](#)] with the following exceptions:

1. The Get-Printer-Supported-Values operation supports only "xxx-supported" attributes.
2. The Get-Printer-Attributes operation returns the current value of specified attributes while the Get-Printer-Supported-Values operation returns values that permit a client to determine what values of "xxx-supported" attributes the Printer supports in the Set-Printer-Attributes operation.

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3. The Get-Printer-Supported-Values operation does not return any 'name' attribute syntax values for any "xxx-supported" attributes. Instead, if the Set-Printer-Attributes operation will accept (any) name value for an "xxx-supported" attribute, then the Get-Printer-Supported-Values operation MUST return the 'any-value' out-of-band attribute value with the 'name' attribute syntax (see [section 8.3](#)) as one of the values of the "xxx-supported" attribute. In other words, the 'any-value' out-of-band attribute value used in combination with the 'name' attribute syntax indicates that the Printer implementation supports clients setting 'name' attribute syntax values for "xxx-supported" attributes that are defined with the 'name' attribute syntax.

For example, if the Get-Printer-Supported-Values operation returns several keywords as the value of the "media-supported" attribute, then the Set-Printer-Attributes operation MUST accept any of these keywords as values for the "media-supported" attribute. If the Get-Printer-Supported-Values operation returns an 'any-value' out-of-band attribute value with the 'name' attribute syntax as one of the values of the "media-supported" attribute, then the Set-Printer-Attributes operation MUST accept any value whose attribute syntax is 'name' as values for the "media-supported" attribute.

The Get-Printer-Supported-Values MAY return the 'any-value' out-of-band attribute value in combination with the 'name' attribute syntax for any of the following IPP/1.1 attributes in which case the Printer MUST accept any 'name' value in a Set-Printer-Attributes operation that is setting that attribute:

- media-supported
- job-hold-until-supported
- job-sheets-supported

If the 'any-value' out-of-band attribute value in combination with the 'name' attribute syntax is not one of the values of an "xxx-supported" attribute returned in a Get-Printer-Supported-Values response, then the Printer MUST NOT allow the Set-Printer-Attributes operation for that attribute to contain a value whose attribute syntax is 'name'.

See [Appendix B](#) for a full list of values returned by this operation.

5 New Operation attributes

This section defines new operation attributes for use with the IPP/1.1 operations indicated. As new operations are defined they will also indicate explicitly whether these operation attributes are defined for use with them.

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5.1 "printer-message-from-operator" (text(127))

The Printer SHOULD support this Operation attribute in following operations if it supports the corresponding "printer-message-from-operator" Printer Description attribute.

Pause-Printer
Resume-Printer
Purge-Jobs

The client OPTIONALLY supplies this attribute in the above operations. The value of this attribute is a message from the operator about the Printer object on which the operator is performing the operation. If this operation attribute is supported, the Printer copies the value to its "printer-message-from-operator" Printer Description attribute (see [[ipp-mod](#)] [section 4.4.25](#)) even if this Operation attribute is a zero-length text value or consists solely of white space.

If the Printer supports this operation attribute, it MUST support both a zero-length text value and the 'no-value' out-of-band value (see [[ipp-mod](#)] [section 4.1](#)) to indicate that the operator has sent no message. In this case, the Printer sets the value of the "printer-message-from-operator" to the zero-length value or 'no-value' out-of-band value, respectively. If the client queries the "printer-message-from-operator" Printer attribute, the Printer returns the attribute with the zero-length value or the 'no-value' value, respectively.

In addition, the Printer automatically copies:

1. the value of its "printer-up-time" attribute (see [[ipp-mod](#)] [section 4.4.29](#)) to its "printer-message-time" attribute,
2. the value of its "printer-current-time" (dateTime) attribute (see [[ipp-mod](#)] [section 4.4.30](#)) to its "printer-message-date-time" attribute, if supported.

If the client omits this operation attribute, the Printer does not change the value of its "printer-message-from-operator", "printer-message-time" and "printer-message-date-time" Printer Description attributes.

The "printer-message-from-operator" operation attribute MUST NOT be supported as an operation attribute for the Set-Printer-Attributes

operation. If the operator wants to set the Printer's "printer-message-from-operator" Printer Description attribute when issuing the Set-Printer-Attributes operation, the client supplies the "printer-message-from-operator" explicitly with its new value as one of the Printer Description attributes in Group 2 in the request. The Printer also updates its "printer-message-time" and "printer-message-date-time" Printer Description attributes. If the client does not explicitly supply the "printer-message-from-operator" with its new value in the Set-Printer-Attributes request, the Printer leaves the value of the

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Printer's "printer-message-from-operator" Printer Description attribute unchanged.

[5.2](#) "job-message-from-operator" (text(127))

The Printer SHOULD support this Operation attribute in following operations if it supports the corresponding "job-message-from-operator" Job Description attribute.

- Cancel-Job
- Hold-Job
- Release-Job
- Restart-Job

The client OPTIONALLY supplies this attribute in the above operations. The value of this attribute is a message from the operator about the Job object on which the operator has just performed an operation. If supported, the Printer copies the value to the Job's "job-message-from-operator" Job Description attribute (see [[ipp-mod](#)] [section 4.3.16](#)) (even if this Operation attribute is a zero-length text value or consists solely of white space).

If the Printer supports this operation attribute, it MUST support both a zero-length text value and the 'no-value' out-of-band value (see [[ipp-mod](#)] [section 4.1](#)) to indicate that the operator has sent no message. In this case, the Printer sets the value of the "job-message-from-operator" to the zero-length value or 'no-value' out-of-band value, respectively. If the client queries the "job-message-from-operator" Job attribute, the IPP object returns the attribute with the zero-length value or the 'no-value' value, respectively.

If the client omits this attribute, the Printer does not change the value of its "job-message-from-operator" Job Description attribute.

Note: There are no corresponding 'job-message-time' and "job-message-date-time" Job Description attributes, since the usual lifetime of a job is limited.

The "job-message-from-operator" operation attribute MUST NOT be supported as an operation attribute for the Set-Job-Attributes operation. If the operator wants to set the Job's "job-message-from-operator" Job Description attribute when issuing the Set-Job-Attributes

operation, the client MUST supply the "job-message-from-operator" with its new value as one of the Job Description attributes in Group 2 in the request. Otherwise, the Printer leaves the value of the Job's "job-message-from-operator" Job Description attribute unchanged by not explicitly setting the attribute. If the client does not explicitly supply the "job-message-from-operator" with its new value in the Set-Job-Attributes request, the Printer leaves the value of the Job's "job-message-from-operator" Job Description attribute unchanged.

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6 New Printer Description Attributes

The following new Printer Description attributes are needed to support the new operations defined in this document.

6.1 printer-settable-attributes-supported (1setOf type2 keyword)

This REQUIRED READ-ONLY Printer attribute identifies the Printer object attributes that are settable in this implementation, i.e., that are settable using the Set-Printer-Attributes operations (see [section 4.1](#)). This attribute MUST be supported if the Set-Printer-Attributes operations is supported. The Printer MUST reject attempts to set any Printer attributes that are not one of the values of this attribute, returning the 'client-error-attributes-not-settable' status code (see [section 7.1](#)). The value of this attribute MAY depend on the value of the "document-format" operation attribute supplied in the Get-Printer-Attributes operation (see [[ipp-mod](#)] [section 3.2.5.1](#)).

Standard keyword values are:

'none': There are no settable Printer attributes.
'xxx': Where 'xxx' is any of the keyword attribute names allowed by [section 4.1.1](#)

6.2 job-settable-attributes-supported (1setOf type2 keyword)

This REQUIRED READ-ONLY Printer attribute identifies the Job object attributes that are settable in this implementation, i.e., that are settable using the Set-Job-Attributes operation (see [section 4.2](#)). This attribute MUST be supported if the Set-Job-Attributes operations is supported. The Printer MUST reject attempts to set any Job attributes that are not one of the values of this attribute, returning the 'client-error-attributes-not-settable' status code (see [section 7.1](#)).

Standard keyword values are:

'none': There are no settable Job attributes.
'xxx': Where 'xxx' is any of the keyword attribute names allowed by [section 4.2.1](#).

6.3 document-format-varying-attributes (1setOf type2 keyword)

This OPTIONAL READ-ONLY Printer Description attribute contains a set of attribute name keywords. This attribute SHOULD be supported by a Printer object, if the Printer object has Printer attributes whose value vary depending on document format (see [[ipp-mod](#)] Get-Printer-Attributes operation). This attribute specifies which attribute values can vary by document-format. If an attribute's name "xxx" is a member of this attribute and the value of attribute "xxx" is changed with the Set-Printer-Attributes operation that included the "document-format" operation attribute, then the Printer MUST change the value for the specified document format and no other document formats (see section

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4.1.2). If an attribute's name "xxx" is not a member of this attribute and the value of attribute "xxx" is changed with the Set-Printer-Attributes operation, then the attribute is changed for all document formats (whether or not the client supplied the "document-format" operation attribute).

[6.4 printer-message-time \(integer\(MIN:MAX\)\)](#)

This OPTIONAL READ-ONLY Printer Description attribute contains the time that the Printer's "printer-message-from-operator" was changed by the operator using any operation where the client supplied the "printer-message-from-operator" operation attribute (see [section 5.1](#)) or was explicitly set using the Set-Printer-Attributes operation (see [section 4.1](#)). This attribute allows the users to know when the "printer-message-from-operator" attribute was last set.

The Printer sets the value of this attribute by copying the value of the Printer's "printer-up-time" attribute (see [[ipp-mod](#)] [section 4.3.14](#)). If the Printer resets its "printer-up-time" attribute to 1 on power-up, then it MUST change the value of the "printer-message-time" to 0 or a negative number as specified in [[ipp-mod](#)] [section 4.3.14](#).

Note: This attribute helps users better understand the context for the "printer-message-from-operator" message.

[6.5 printer-message-date-time \(dateTime\)](#)

This READ-ONLY Printer Description attribute contains the date and time that the Printer's "printer-message-from-operator" was changed by the operator using any operation where the client supplied the "printer-message-from-operator" operation attribute (see [section 5.1](#)) or was explicitly set using the Set-Printer-Attributes operation (see [section 4.1](#)). This attribute allows the users to know when the "printer-message-from-operator" attribute was last set.

This attribute MUST be supported if the Printer supports both the "printer-message-time" and the "printer-current-time" (dateTime) attributes (see [[ipp-mod](#)] [section 4.4.30](#)).

Note: This attribute helps users better understand the context for the

"printer-message-from-operator" message.

[7](#) Additional status codes

This section defines new status codes used by the operations defined in this document.

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7.1 'client-error-attributes-not-settable' (0x0413)

The Set-Printer-Attributes or Set-Job-Attributes operation failed because one or more of the specified attributes cannot be set either because the attribute is defined to be READ-ONLY or the attribute is not settable in this implementation (see sections [4.1.3](#) and [4.2.3](#)), the Printer MUST return this error code and the attribute keyword name(s) and the 'not-settable' out-of-band value (see [section 8.1](#)) in the Unsupported Attributes Group (see [[ipp-mod](#)] [section 3.1.7](#)) for all of the attributes that could not be set. When the Printer returns this status, it MUST NOT change any of the attributes supplied in the operation.

8 Additional out-of-band values

This section defines additional out-of-band values. As with all out-of-band values, a client or a Printer MUST NOT use an out-of-band value unless the definition of the attribute in an operation request and/or response explicitly allows such usage. See the beginning of [[ipp-mod](#)] [section 4.1](#).

8.1 'not-settable' out-of-band value

The 'not-settable' out-of-band value is used by the IPP Printer in the Unsupported Attributes group of a Set-Job-Attributes or Set-Printer-Attributes response to indicate that an attribute (supplied by the client) is READ-ONLY by definition or is not settable in this implementation (see sections [4.1.3](#) and [4.2.3](#)).

See sections [4.1.3](#) and [4.2.3](#) in this document for an example definition of the usage of the 'not-settable' out-of-band value in the Set-Printer-Attributes and Set-Job-Attributes responses.

8.1.1 Encoding of the 'not-settable' out-of-band attribute value

The encoding of the 'not-settable' out-of-band value is 0x15 (see [[ipp-pro](#)]).

8.2 'delete-attribute' out-of-band value

The 'delete-attribute' out-of-band value is supplied by the client in the Set-Job-Attributes request to indicate that the Printer is to remove the supplied attribute and all of its values from the Job object, if present (see [section 4.2](#)).

The 'delete-attribute' out-of-band value is defined for use with the Set-Job-Attributes only. Clients MUST NOT supply and IPP objects MUST NOT support the 'delete-attribute' out-of-band value in other operations, such as the Set-Printer-Attributes operation, where the absence of an attribute from an IPP object indicates that the attribute

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is not supported. If a Printer receives this out-of-band value in other operations, the Printer MUST reject the entire request and return the 'client-error-bad-request' status code and not process any of the other supplied attributes.

See [section 4.2](#) in this document for an example definition of the usage of the 'delete-attribute' out-of-band value in the Set-Job-Attributes request.

8.2.1 Encoding of the 'delete-attribute' out-of-band value

The encoding of the 'delete-attribute' out-of-band value is 0x16 (see [\[ipp-pro\]](#)).

[8.3](#) 'any-value' out-of-band attribute value

The 'any-value' out-of-band attribute value MAY be used in combination with an attribute syntax to represent "any" attribute value of that attribute syntax.

See [section 4.3](#) in this document for an example definition of the usage of the 'any-value' out-of-band attribute value with the 'name' attribute syntax in any "xxx-supported" attribute returned in a Get-Printer-Supported-Values response.

8.3.1 Encoding of the 'any-value' out-of-band attribute value

The encoding of the 'any-value' out-of-band attribute value is 0x17 (see [\[ipp-pro\]](#)). This out-of-band value REQUIRES a non-zero length and an attribute value which identifies an attribute syntax type. The attribute value is either (1) a one-octet attribute syntax tag as defined in [\[ipp-pro\]](#) (value length = 1) or (2) a 0x7F code followed by a 4-octets of an extended attribute syntax type code as allocated in [\[ipp-pro\]](#) (value length = 5).

ISSUE 01 - Ok to define the 'any-value' out-of-band value to have an actual value, consisting of the attribute syntax code?

9 Conformance Requirements

This section specifies the conformance requirements for clients and IPP objects.

Both the Set-Job-Attributes and the Set-Printer-Attributes operations defined in the document are OPTIONAL for an IPP object to support. Either one MAY be supported without the other or both MAY be supported. However, if the Set-Printer-Attributes operation is supported, then the Get-Printer-Supported-Values operation MUST be supported if any "xxx-

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supported" attributes are settable. Otherwise, the Get-Printer-Supported-Values operation is OPTIONAL for an IPP Printer to support.

If the Set-Printer-Attributes operation is supported, then the Printer MUST support the following additional items:

- 1.the Get-Printer-Supported-Values operation (see [section 5](#)), if any "xxx-supported" attributes are settable.
- 2.the "printer-settable-attributes-supported" Printer Description attribute (see [section 6.1](#))
- 3.the 'not-settable' out-of-band value in responses (see [section 8.1](#))
- 4.the 'client-error-not-settable' status code (see [section 7.1](#))
- 5.If "printer-message-from-operator" Printer Description attribute is supported (see [[ipp-mod](#)] [section 4.4.25](#)), then it MUST be settable.
- 6.the Get-Printer-Supported-Values operation (see [section 4.3](#)), if any "xxx-supported" attributes are settable.
- 7.If a client can set a value with the 'name' attribute syntax for one or more "xxx-supported" attributes, then the 'any-value' out-of-band attribute value (see [section 8.3](#)) MUST be supported in the Get-Printer-Supported-Values response with the 'name' attribute syntax for each such settable attribute (see [section 4.3](#))

If the Set-Job-Attributes operation is supported, then the Printer MUST support the following additional items:

- 1.the "job-settable-attributes-supported " Printer Description attribute (see [section 6.2](#))
- 2.the 'not-settable' out-of-band value in responses (see [section 8.1](#))
- 3.the 'delete-attribute' out-of-band value in requests (see [section 8.2](#))
- 4.the 'client-error-not-settable' status code (see [section 7.1](#))

5.If the "job-message-from-operator" Printer Description attribute is supported (see [[ipp-mod](#)] 4.3.16), then it MUST be settable.

It is OPTIONAL for the Printer object to support the "printer-message-time" (integer) and "printer-message-date-time" (dateTime) Printer Description attributes. If both the "printer-message-time" (integer) and the "printer-current-time" (dateTime) (see [[ipp-mod](#)] [section 4.4.30](#)) attributes are supported, then the "printer-message-date-time" (dateTime) Printer Description attribute MUST be supported.

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As with all out-of-band values, a client or a Printer MUST NOT use an out-of-band value unless the definition of the attribute in an operation request and/or response explicitly allows such usage.

10 IANA Considerations

Since this document is intended to be a standards track document, there is no need to also register the operations, attributes, status codes, and out-of-band values defined here-in with IANA according to the procedures in [RFC 2566 \[rfc2566\] section 6](#). However, other registration proposals may site the out-of-band attribute values or the status codes defined in this document.

11 Internationalization Considerations

This document has the same localization considerations as the [\[ipp-mod\]](#).

12 Security Considerations

The IPP Model and Semantics document [[ipp-mod section 8](#)] discusses high level security requirements (Client Authentication, Server Authentication and Operation Privacy). Client Authentication is the mechanism by which the client proves its identity to the server in a secure manner. Server Authentication is the mechanism by which the server proves its identity to the client in a secure manner. Operation Privacy is defined as a mechanism for protecting operations from eavesdropping.

In addition, the introduction of the Set-Printer-Attributes and Set-Job-Attributes operations creates another security threat, since the client is able to modify the Printer and Job attributes stored in the Printer. Such modifications could lead to denial of service.

A malicious user could alter the policy established by the system administrator and stored in the Printer attributes. Such alteration could either grant access to more resources or deny access to resources that the system administrator has established. For example, the malicious user could remove all of the document-format values from the "document-format-supported" Printer attribute so that the Printer would

refuse to accept all jobs.

The general remedy for such malicious user actions against Printer attributes is to have strong Client Authentication coupled with Printer access control to limit the users who have System Administrator or Operator privileges.

A malicious user could modify the Job Template attributes of another user's Job, such as the "copies" attribute. For example, setting the number of copies to a large number.

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13 The general remedy for such malicious user actions against another user's job is to have strong Client Authentication coupled with
Printer access control to limit the users who have System Administrator or Operator privileges who can modify any job and, in addition, store the Client Authentication with each Job so that only the job owner End User can modify his/her own job. Author's Addresses

Carl Kugler
IBM
P.O. Box 1900
Boulder, CO 80301-9191

Phone: (303) 924-5060
FAX:
e-mail: kugler@us.ibm.com

Tom Hastings
Xerox Corporation
737 Hawaii St. ESAE 231
El Segundo, CA 90245

Phone: 310-333-6413
Fax: 310-333-5514
e-mail: hastings@cp10.es.xerox.com

Robert Herriot
Xerox Corp.
3400 Hill View Ave, Building 1
Palo Alto, CA 94304

Phone: 650-813-7696
Fax: 650-813-6860
e-mail: robert.herriot@pahv.xerox.com

Harry Lewis
IBM
P.O. Box 1900
Boulder, CO 80301-9191

Phone: (303) 924-5337
FAX:
e-mail: harryl@us.ibm.com

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[15](#) Change History

This section summarizes the changes. Each sub-section is in reverse chronological order. Adding or removing ISSUES that don't change the document are not listed here.

15.1 Changes to the January 30, 2000 version to make the March 1, 2000 version

The following changes to the January 30, 2000 version to make the March 1, 2000 version as a result of the IPP WG telecons and mailing list discussion:

1. Clarified that this extension may be used with any IPP version, including 1.0, 1.1, and future versions.
2. Added "READ-ONLY" and "not-settable" terms to the terminology section. READ-ONLY is by definition, and "not-settable" is by implementation.
3. Assigned the "operation-id" values 0x0013, 0x0014, and 0x0015,

respectively, for the Set-Printer-Attributes, Set-Job-Attributes, and Get-Printer-Supported-Values operations.

4. Clarified that the Set-Printer-Attributes operation while a Printer SHOULD accept a reasonable number of attribute, the Printer need only support setting one attribute in a request, unless it supports setting the three "parallel" attributes, ("printer-uri-supported", "uri-authentication-supported", and "uri-security-supported" (see [ipp-mod] sections [4.4.1](#) through [4.4.3](#)), in which case it MUST support setting at least three attributes in a single request.

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5. Clarified that for the Set-Printer-Attributes operation the Printer MUST validate all of the supplied attributes in combination with each other, as well as with all of the existing attribute of the Printer object Set-Printer-Attributes.
6. Changed the requirements for accepting the Set-Printer-Attributes operation when the Printer is in the 'stopped' state from MUST to SHOULD, since some implementations may not be able to accept requests when stopped.
7. Clarified that setting certain Printer attributes with Set-Printer-Attributes MAY require more access rights than other attributes, i.e., System Administrator rights to set policy and only Operator rights to set the configuration attributes to reflect the current hardware setup.
8. Clarified the order of error checking and what is returned in each case in the Set-Printer-Attributes response.
9. Changed the 'default' out-of-band value to 'delete-attribute' out-of-band value so that the effect is to actually remove the Job attribute entirely in the Set-Job-Attribute operation.
- 10. Clarified that removing a Job attribute that is not present is not an error.**
- 11. Clarified the validation of the Set-Job-Attributes request and what is returned for each error.**
- 12. Changed the 'any-name' out-of-band attribute value to a more general 'any-value' out-of-band attribute value which in combination with an attribute syntax represents any value of that attribute syntax. The 'any-value' value can be used with the 'name' attribute syntax in a Get-Printer-Supported-Values response to indicate whether or not a Set-Printer-Attributes will accept any name to be set for particular "xxx-supported" (1setOf name | ...) Printer attributes.**
- 13. Clarified that "printer-message-from-operator" and "job-message-from-operator" both REQUIRE that the Printer accept zero-length messages and the 'no-value' out-of-band value is synonymous with removing any value from these Printer attributes.**
- 14. Clarified that the Get-Printer-Supported-Values is REQUIRED only if the Set-Printer-Attributes operation will accept setting some "xxx-**

supported" Printer attributes.

15. Changed the IANA Considerations to indicate that the operations, attributes, status codes, and out-of-band-values won't be registered and published by IANA, since this document is intended to be standards track.

16. Added security considerations for denial of service and sabotage because of the Set operations.

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15.2 Changes to the January 20, 2000 version to make the January 30, 2000 version

The following changes to the January 20, 2000 version to make the January 30, 2000 version as a result of the IPP WG telecons and mailing list discussion:

1. Deleted the "document-format-varying-scope" operation attribute from the Set-Printer-Attributes operation and made whether or not the "document-format" operation was present determine whether one or all document formats are affected, respectively.
2. Renamed the Get-Reset-Printer-Attributes operation to Get-Printer-Supported-Values, so that it only returns "xxx-supported" values. Relegate obtaining reset values to another operation to be paired with the Reset-Printer operation in the Set2 [[ipp-set2](#)] document.
3. Added "-supported" to the names of the "printer-settable-attributes" and "job-settable-attributes" Printer Description attributes, so that they could be returned in Get-Printer-Supported-Values and could be set by Set-Printer-Attributes.
4. Deleted "authentication-methods-supported" (1setOf type2 keyword) and "security-methods-supported" (1setOf type2 keyword) and clarified that "uri-authentication-supported" (1setOf type2 keyword) and "uri-security-supported" (1setOf type2 keyword) can return multiple keywords of the same value in a Get-Printer-Supported-Values operation.

15.3 Changes to the January 4, 2000 version to make the January 20, 2000 version

The following changes to the January 4, 2000 version to make the January 4, 2000 version as a result of the IPP WG telecons and mailing list discussion:

1. Replaced the "factory-settings" operation attribute proposed to be added to the Get-Printer-Attributes operation with the Get-Reset-Printer-Attributes operation which returns the reset values and the possible "xxx-supported" values.

2. Added the out-of-band 'any-name' value to be used with "xxx-supported" attributes with attribute syntax 'type3 keyword | name' to indicate that any name will be accepted in a Job Creation operation for configurations that support such a concept.
3. Added authentication-methods-supported (1setOf type2 keyword) and security-methods-supported (1setOf type2 keyword) Printer Description attributes so that clients can discover the possible values for use in Set-Printer-Attributes to set "uri-authentication-supported" and "uri-security-supported" attributes, since the Reset-Printer operation doesn't change them.

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4. Added validation rules that the Printer MUST use to validate a Set-Printer-Attributes request.
5. Clarified that the Set-Printer-Attributes operation MUST NOT have any side effects on other attributes, unless explicitly specified in this document.
6. Moved the specification of the attributes that MUST be READ-ONLY to [Appendix A](#).
7. Added the "document-format-varying-attributes" (1setOf type2 keyword)
8. Added the REQUIRED "document-format-varying-scope" operation attribute to Set-Printer-Attributes in order to control whether one or all document formats are affected for those attributes that vary by document format.
9. Clarified that the Printer returns the 'client-error-attributes-not-settable' status code in a Set-Printer-Attributes response whether the attribute is READ-ONLY, the attribute is not supported, or the value is not supported.
- 10. Added the out-of-band 'default' value for use with Set-Job-Attributes and Job Creation operations.**
- 11. Deleted the "printer-message-operation" Printer Description attribute.**
- 12. Made the "Get-Reset-Printer-Attributes" operation, along with the "authentication-methods-supported" and the "security-methods-supported" Printer Description attributes REQUIRED, if the Set-Printer-Attributes operation is supported.**
- 13. Made the 'not-settable' out-of-band value and the 'client-error-not-settable' status code REQUIRED, if the Set-Printer-Attributes operation is supported.**
- 14. Made the 'default' out-of-band value REQUIRED, if the Set-Job-Attributes operation is supported.**
- 15. Removed the requirement that "xxx-supported" Printer Description attributes that contain only one value be read-only.**

15.4 Changes to the December 8, 1999 version to make the January 4, 2000 version

The following changes to the December 8, 1999 version to make the January 4, 2000 version as a result of the IPP WG telecons and mailing list discussion:

1. Removed the Set operations and related items from the Set2 specification [[ipp-set2](#)] to create this Set specification.

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2. Added that an attribute that can only be set to one fixed value SHOULD NOT be included in the "printer-settable-attributes" or "job-settable-attributes" attributes.
3. Indicated that the encoding of the 'not-settable' out-of-band value is TBD.
4. Added that Set-Job-Attributes operation adds an attribute to the Job object if it wasn't already there
5. Added the conformance section to make it easy to understand the conformance requirements.

16 Appendix A: Allowed Values for Set-Printer-Attributes

This appendix is a normative part of this document and contains a table of all IPP/1.1 attributes. Each row contains

An attribute and

The values allowed in the Set-Printer-Attributes operation for the attribute. The entry in each cell is the name (first few words) of each item below 1, 2, 3, 4a-g, and 5.

The allowed values include the following cases:

1. READ-ONLY: the Set-Printer-Attributes operation MUST NOT change this attribute
2. Any of "xxx-supported": the Set-Printer-Attributes operation accepts values that are allowed according to the IPP/1.1 rules for the "xxx-supported" attribute (see [section 3.1.2.3](#) of the "Internet Printing Protocol/1.1: Implementer's Guide" [ipp-iig]). The 'xxx-supported' attribute value is obtained from a 'Get-Printer-Attributes' response.
3. From Get-Printer-Supported-Values: the Set-Printer-Attributes operation accepts values that are allowed according to the IPP/1.1 rules for the "xxx-supported" attribute (see [section 3.1.2.3](#) of the "Internet Printing Protocol/1.1: Implementer's Guide" [ipp-iig]). The "xxx-supported" attribute value is obtained from a Get-Printer-

Supported-Values response (see [Appendix B](#): Attributes returned from Get-Printer-Supported-Values below).

4. Any value of the proper attribute syntax: the Set-Printer-Attributes accepts any value of the specified attribute syntax. The attribute syntaxes supported are enumerated below.

- a.Any text(127)
- b.Any name(127)
- c.Any uri
- d.Any boolean
- e.Any positive integer
- f.Any dateTime
- g.1setOf any uri

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5. Combination of 'Any of "xxx-supported"' or 'Any name'.

If a Printer implementation doesn't want to allow setting values indicated in this Appendix as "any xxx", it can make the value be read-only. For example, for a monochrome printer the attribute "color-supported" is "false" and MUST be read-only. Otherwise an administrator could set it to "true" because the value can have "any boolean" according to the rules in Table 6 below.

Table 3 - Values allowed for Job Template Attributes in the Set-Job-Attributes Operation

Job Template Attributes	Values allowed for Set
job-priority (integer(1:100))	Any of "xxx-supported"
job-hold-until (type3 keyword name (MAX))	Any of "xxx-supported"
job-sheets (type3 keyword name(MAX))	Any of "xxx-supported"
multiple-document-handling (type2 keyword)	Any of "xxx-supported"
copies (integer(1:MAX))	Any of "xxx-supported"
finishings (1setOf type2 enum)	Any of "xxx-supported"
page-ranges (1setOf rangeOfInteger (1:MAX))	Any of "xxx-supported"
sides (type2 keyword)	Any of "xxx-supported"
number-up (integer(1:MAX))	Any of "xxx-supported"
orientation-requested (type2 enum)	Any of "xxx-supported"
media (type3 keyword name(MAX))	Any of "xxx-supported"
printer-resolution (resolution)	Any of "xxx-supported"
print-quality (type2 enum)	Any of "xxx-supported"

Table 4 - Values allowed for Job Description Attributes in the Set-Job-Attributes Operation

Job Description Attributes	Values allowed for Set
job-uri (uri)	READ-ONLY
job-id (integer(1:MAX))	READ-ONLY
job-printer-uri (uri)	READ-ONLY
job-more-info (uri)	READ-ONLY
job-name (name(MAX))	Any name(MAX)
job-originating-user-name (name(MAX))	READ-ONLY
job-state (type1 enum)	READ-ONLY
job-state-reasons (1setOf type2 keyword)	READ-ONLY
job-state-message (text(MAX))	READ-ONLY
job-detailed-status-messages (1setOf	READ-ONLY

text(MAX))	
job-document-access-errors (1setOf	READ-ONLY
text(MAX))	
number-of-documents (integer(0:MAX))	READ-ONLY
output-device-assigned (name(127))	READ-ONLY
time-at-creation (integer(MIN:MAX))	READ-ONLY
time-at-processing (integer(MIN:MAX))	READ-ONLY
time-at-completed (integer(MIN:MAX))	READ-ONLY
job-printer-up-time (integer(1:MAX))	READ-ONLY
date-time-at-creation (dateTime)	READ-ONLY
date-time-at-processing (dateTime)	READ-ONLY
date-time-at-completed (dateTime)	READ-ONLY

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Job Description Attributes	Values allowed for Set
number-of-intervening-jobs (integer(0:MAX))	READ-ONLY
job-message-from-operator (text(127))	Any text(127)
job-k-octets (integer(0:MAX))	READ-ONLY
job-impressions (integer(0:MAX))	READ-ONLY
job-media-sheets (integer(0:MAX))	READ-ONLY
job-k-octets-processed (integer(0:MAX))	READ-ONLY
job-impressions-completed (integer(0:MAX))	READ-ONLY
job-media-sheets-completed (integer(0:MAX))	READ-ONLY
attributes-charset (charset)	READ-ONLY
attributes-natural-language (naturalLanguage)	READ-ONLY

Table 5 - Values allowed for Printer Job Template Attributes in the Set-Printer-Attributes Operation

Printer Job Template Attributes	Values allowed for Set
job-priority-default (integer(1:100))	Any of "xxx-supported"
job-hold-until-default (type3 keyword name (MAX))	Any of "xxx-supported"
job-sheets-default (type3 keyword name(MAX))	Any of "xxx-supported"
multiple-document-handling-default (type2 keyword)	Any of "xxx-supported"
copies-default (integer(1:MAX))	Any of "xxx-supported"
finishings-default (1setOf type2 enum)	Any of "xxx-supported"
sides-default (type2 keyword)	Any of "xxx-supported"
number-up-default (integer(1:MAX))	Any of "xxx-supported"
orientation-requested-default (type2 enum)	Any of "xxx-supported"
media-default (type3 keyword name(MAX))	Any of "xxx-supported"
printer-resolution-default (resolution)	Any of "xxx-supported"
print-quality-default (type2 enum)	Any of "xxx-supported"
job-priority-supported (integer(1:100))	From Get-Printer-Supported-Values
job-hold-until-supported (1setOf(type3 keyword name (MAX)))	From Get-Printer-Supported-Values
job-sheets-supported (1setOf(type3 keyword name(MAX)))	From Get-Printer-Supported-Values
multiple-document-handling-supported (1setOf type2 keyword)	From Get-Printer-Supported-Values
copies-supported (rangeOfInteger(1:MAX))	From Get-Printer-

finishings-supported (1setOf type2 enum)	Supported-Values From Get-Printer-Supported-Values
page-ranges-supported (boolean)	Supported-Values From Get-Printer-Supported-Values
sides-supported (1setOf type2 keyword)	Supported-Values From Get-Printer-Supported-Values
number-up-supported (1setOf (integer(1:MAX) rangeOfInteger(1:MAX)))	Supported-Values From Get-Printer-Supported-Values
orientation-requested-supported (1setOf type2 enum)	Supported-Values From Get-Printer-Supported-Values

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Printer Job Template Attributes	Values allowed for Set
media-supported (1setOf (type3 keyword name(MAX)))	From Get-Printer-Supported-Values
printer-resolution-supported (1setOf resolution)	From Get-Printer-Supported-Values
print-quality-supported (1setOf type2 enum)	From Get-Printer-Supported-Values
media-ready (type3 keyword name(MAX))	From Get-Printer-Supported-Values

Table 6 - Values allowed for Printer Description Attributes in the Set-Printer-Attributes Operation

Printer Description Attributes	Values allowed for Set
printer-uri-supported (1setOf uri)	From Get-Printer-Supported-Values
uri-authentication-supported (1setOf type2 keyword)	From Get-Printer-Supported-Values
uri-security-supported (1setOf type2 keyword)	From Get-Printer-Supported-Values
printer-name (name(127))	Any name(127)
printer-location (text(127))	Any text(127)
printer-info (text(127))	Any text(127)
printer-more-info (uri)	Any uri
printer-driver-installer (uri)	Any uri
printer-make-and-model (text(127))	Any text(127)
printer-more-info-manufacturer (uri)	Any uri
printer-state (type1 enum)	READ-ONLY
printer-state-reasons (1setOf type2 keyword)	READ-ONLY
printer-state-message (text(MAX))	READ-ONLY
ipp-versions-supported (1setOf type2 keyword)	From Get-Printer-Supported-Values
operations-supported (1setOf type2 enum)	From Get-Printer-Supported-Values
multiple-document-jobs-supported (boolean)	From Get-Printer-Supported-Values
charset-configured (charset)	Any of "xxx-supported"
charset-supported (1setOf charset)	From Get-Printer-Supported-Values
natural-language-configured	Any of "xxx-supported",

(naturalLanguage)	use generated-natural-language-supported
generated-natural-language-supported (1setOf naturalLanguage)	From Get-Printer-Supported-Values
document-format-default (mimeType)	Any of "xxx-supported"
document-format-supported (1setOf mimeType)	From Get-Printer-Supported-Values
printer-is-accepting-jobs (boolean)	READ-ONLY
queued-job-count (integer(0:MAX))	READ-ONLY
printer-message-from-operator (text(127))	Any text(127)
color-supported (boolean)	From Get-Printer-

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Printer Description Attributes	Values allowed for Set
reference-uri-schemes-supported (1setOf uriScheme)	Supported-Values From Get-Printer-Supported-Values
pdl-override-supported (type2 keyword)	From Get-Printer-Supported-Values
printer-up-time (integer(1:MAX))	READ-ONLY
printer-current-time (dateTime)	Any dateTime
multiple-operation-time-out (integer(1:MAX))	any positive integer
compression-supported (1setOf type3 keyword)	From Get-Printer-Supported-Values
job-k-octets-supported (rangeOfInteger(0:MAX))	From Get-Printer-Supported-Values
job-impressions-supported (rangeOfInteger(0:MAX))	From Get-Printer-Supported-Values
job-media-sheets-supported (rangeOfInteger(0:MAX))	From Get-Printer-Supported-Values
pages-per-minute (integer(0:MAX))	READ-ONLY
pages-per-minute-color (integer(0:MAX))	READ-ONLY
printer-settable-attributes-supported (1setOf type2 keyword)	From Get-Printer-Supported-Values
job-settable-attributes-supported (1setOf type2 keyword)	From Get-Printer-Supported-Values
document-format-varying-attributes (1setOf type2 keyword)	READ-ONLY
printer-message-time (integer(MIN:MAX))	READ-ONLY
printer-message-date-time(dateTime)	READ-ONLY

[17 Appendix B](#): Attributes returned from Get-Printer-Supported-Values

For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be a single integer value in the range specified by the value returned by the Get-Printer-Supported-Values operation.

Table 7 - Printer Job Template Attributes returned from Get-Printer-Supported-Values

Printer Job Template Attributes	Values Returned
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job-priority-supported (integer(1:100)) rangeOfInteger(1:100)

For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be a single rangeOfInteger value whose bounds do not exceed those of the range specified by the value returned by the Get-Printer-Supported-Values operation.

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Table 8 - Printer Job Template Attributes returned from Get-Printer-Supported-Values

Printer Job Template Attributes	Values Returned
copies-supported (rangeOfInteger(1:MAX))	rangeOfInteger(1:MAX)

The following table has the same criteria as the last, but is for Printer Description attributes.

Table 9 - Printer Description Attributes returned from Get-Printer-Supported-Values

Printer Description Attributes	Values allowed for Set
job-k-octets-supported (rangeOfInteger(0:MAX))	rangeOfInteger(0:MAX)
job-impressions-supported (rangeOfInteger(0:MAX))	rangeOfInteger(0:MAX)
job-media-sheets-supported (rangeOfInteger(0:MAX))	rangeOfInteger(0:MAX)

For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be one or more integers and rangeOfInteger values, such that the integer values described by these integers and rangeOfInteger is the same as or a subset of the integers described by the integers and rangeOf Integer of value returned by the Get-Printer-Supported-Values operation.

Table 10 - Printer Job Template Attributes returned from Get-Printer-Supported-Values

Printer Job Template Attributes	Values Returned
number-up-supported (1setOf (integer(1:MAX) rangeOfInteger(1:MAX)))	1setOf (integer(1:MAX) rangeOfInteger(1:MAX))

For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be one or more values, where each such value matches a value returned by the Get-Printer-Supported-Values operation. A keyword, enum, boolean, charset, naturalLanguage, uriScheme,

mimeMediaType or resolution value matches if it is equal. A name matches the 'any-name' out-of-band value.

Table 11 - Printer Job Template Attributes returned from Get-Printer-Supported-Values

Printer Job Template Attributes	Values Returned
job-hold-until-supported (1setOf(type3 keyword name (MAX)))	1setOf(type3 keyword any name)
job-sheets-supported (1setOf(type3 keyword name(MAX)))	1setOf(type3 keyword any name)

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Printer Job Template Attributes	Values Returned
multiple-document-handling-supported (1setOf type2 keyword)	1setOf type2 keyword
finishings-supported (1setOf type2 enum)	1setOf type2 enum
page-ranges-supported (boolean)	1setOf(boolean)
sides-supported (1setOf type2 keyword)	1setOf type2 keyword
orientation-requested-supported (1setOf type2 enum)	1setOf type2 enum
media-supported (1setOf (type3 keyword name(MAX)))	1setOf(type3 keyword any name)
printer-resolution-supported (1setOf resolution)	1setOf resolution
print-quality-supported (1setOf type2 enum)	1setOf type2 enum

The following table has the same criteria as the last, but is for Printer Description attributes. Note that the first two attributes in the table below follow the rules for allowed values in the Set-Printer-Attributes, but unlike other attributes, there can be more than one occurrence of each value because the i-th value of these attributes specifies the authentication or security for the i-th printer in "printer-uri-supported".

Table 12 - Printer Description Attributes returned from Get-Printer-Supported-Values

Printer Description Attributes	Values allowed for Set
uri-authentication-supported (1setOf type2 keyword)	1setOf type2 keyword
uri-security-supported (1setOf type2 keyword)	1setOf type2 keyword
ipp-versions-supported (1setOf type2 keyword)	1setOf type2 keyword
operations-supported (1setOf type2 enum)	1setOf type2 keyword
multiple-document-jobs-supported (boolean)	1setOf boolean
charset-supported (1setOf charset)	1setOf charset
generated-natural-language-supported (1setOf naturalLanguage)	1setOf naturalLanguage
document-format-supported (1setOf mimeType)	1setOf mimeType
color-supported (boolean)	1setOf boolean

reference-uri-schemes-supported (1setOf uriScheme)	1setOf uriScheme
compression-supported (1setOf type3 keyword)	1setOf type3 keyword
printer-settable-attributes-supported (1setOf type2 keyword)	1setOf type2 keyword
job-settable-attributes-supported (1setOf type2 keyword)	1setOf type2 keyword

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For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be a single value that matches one of the values returned by the Get-Printer-Supported-Values operation. A keyword, enum, boolean, charset, naturalLanguage, uriScheme, mimeType or resolution value matches if it is equal. A name matches the 'any-name' out-of-band value.

Table 13 - Printer Description Attributes returned from Get-Printer-Supported-Values

Printer Description Attributes	Values allowed for Set
pdl-override-supported (type2 keyword)	1 setOf type2 keyword

For the following attributes, the Set-Printer-Attributes operation MUST NOT return a value. The IPP Model document [[ipp-mod](#)] document specifies the allowed values.

Table 14 - Printer Description Attributes returned from Get-Printer-Supported-Values

Printer Description Attributes	Values allowed for Set
printer-uri-supported (1setOf uri)	any uri

[18 Appendix C: Full Copyright Statement](#)

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