

PWG-DRAFT - 20 ISSUES are numbered and highlighted ~~like this~~
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JulySeptember 19, 1999

Internet Printing Protocol/1.0 & 1.1: ~~Set2 Additional Administrative~~ Operations

Status of this Memo

This document is a PWG-Draft. It is intended for registration following the registration procedures of IPP/1.0 [RFC2566] and IPP/1.1 [ipp-mod]. This version includes the comments discussed at the IPP telecon, on 6/23/1999, 6/30/1999, at the IETF IPP WG meeting, 7/7/99-7/8/99, in Copenhagen, ~~and~~ the IPP telecon, 7/17/1999, the August, 1999 IPP meeting in Alaska and subsequent phone conferences and discussions. Specifically, the 9/16 update refers to this set of extensions simply as "Set2" rather than using the term "Administrative" which was misleading, controversial and incorrect as an overall description. Also, two new attributes have been proposed to clarify the intent of each operation in terms of it's target, the Printer vs. the Print Job. Unresolved ISSUES are highlighted ~~like this~~ in the ~~.swd~~ and .pdf files.

Abstract

This document specifies ~~145~~ additional OPTIONAL ~~administrative~~ operations for use with the Internet Printing Protocol/1.0 (IPP) [RFC2565, RFC2566] and IPP/1.1 [ipp-mod, ipp-pro]. These operations are ~~76~~ Printer object operations that ~~operators/administrators~~ may be performed on a Printer object:

- Set-Printer-Attributes
- Enable-Printer
- Disable-Printer
- Reset-Printer
- Restart-Printer
- Non-Process-Run-Out
- Shutdown-Printer

and 7 Job object operations that end users may perform on their jobs and operators/administrators may perform on any job, depending on the circumstances:

- Set-Job-Attributes
- Reprocess-Job
- Cancel-Current-Job (though the target is the Printer object)
- Pause-Current-Job (though the target is the Printer object)
- Resume-Job
- Promote-Job
- Space-Current-Job (though the target is the Printer object)

In addition, two operation attributes are defined: "printer-message-from-operator" and "job-message-from-operator" are included to set the corresponding Printer and Job Description attributes with the same names. And the "when" operation attribute is added to the IPP/1.1 Pause-Printer operation.

Finally, new status codes: 'client-error-attributes-not-settable' and 'server-error-printer-is-in-standby-mode' are added.

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 IPPv1.0 and were later incorporated into IPPv1.1.

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/1.1) focuses only on end user functionality with a few administrative operations included. This document defines additional OPTIONAL end user, operator and administrative operations used to control Jobs and Printers. This document is a registration proposal for an extension to IPP/1.0 and IPP/1.1 following the registration procedures in those documents.

2. New Operation attributes

This section defines the new "printer-message-from-operation" and "job-message-from-operator" operation attributes that set the corresponding Printer and Job Description attributes.

2.1 New operation attribute: "printer-message-from-operator" (text(127))

Type of registration: attribute

Proposed keyword name of this attribute: "printer-message-from-operator"

Types of attribute (Operation, Job Template, Job Description, Printer Description): Operation

Operations to be used with if the attribute is an operation attribute: See below

Object (Job, Printer, etc. if bound to an object): Printer (already in IPP/1.0 and IPP/1.1)

Attribute syntax(es) (include 1setOf and range as in Section 4.2): text(127)

Specification of this attribute (follow the style of IPP Model Section 4.2):

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

The client OPTIONALLY supplies this attribute. The Printer object SHOULD support this operation attribute if it supports the corresponding Printer Description attribute. The value of this attribute is a message from the operator about the Printer object on which the operator is performing the operation. If supported, the Printer copies the value to the Printer's "printer-message-from-operator" Printer Description attribute (see [ipp-mod] section 4.4.25), automatically sets the value of the Printer's "printer-message-time" with the current value of the Printer's "printer-up-time" attribute, the value of the "printer-message-date-time" with the current value of the Printer's "printer-current-date-time" attribute, and the value of the Printer's "printer-message-operation" with the operation-id value of this operation (see [ipp-mod] section 4.4.15).

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

If the client supplies this attribute with a zero-length text value or with a value consisting solely of white space, the Printer copies that value as any other value to the Printer's "printer-message-from-operator" and sets the "printer-message-time", "printer-message-date-time", and "printer-message-operation" attributes. Supplying such a value is the way that the operator indicates that there is no longer a printer message from the operator (rather than using the "out-of-band" 'no-value' value).

This operation attribute is defined for use with the following operator operations on the Printer object:

- Pause-Printer - see [ipp-mod] section 3.2.7
- Resume-Printer - see [ipp-mod] section 3.2.8
- Purge-Jobs - see [ipp-mod] section 3.2.9
- Disable-Printer - see section
- Enable-Printer - see section
- Reset-Printer - see section
- Restart-Printer - see section
- Non-Process-Run-Out - see section
- Shutdown-Printer - see section

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

2.2New operation attribute: "job-message-from-operator" (text(127))

Type of registration: attribute

Proposed keyword name of this attribute: "job-message-from-operator"

Types of attribute (Operation, Job Template, Job Description, Printer Description): Operation

Operations to be used with if the attribute is an operation attribute: See below

Object (Job, Printer, etc. if bound to an object): Job (already in IPP/1.0 and IPP/1.1)

Attribute syntax(es) (include 1setOf and range as in Section 4.2): text(127)

Specification of this attribute (follow the style of IPP Model Section 4.2):

"job-message-from-operator" (text(127))

The client OPTIONALLY supplies this attribute. The Printer object SHOULD supports this operation attribute if it supports the corresponding Job Description attribute. 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).

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

If the client supplies this attribute with a zero-length text value or with a value consisting solely of

white space, the Printer copies that value as any other value to the job's "job-message-from-operator". Supplying such a value is the way that the operator indicates that there is no longer a job message from the operator (rather than using the "out-of-band" 'no-value' value).

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

This operation attribute is defined for use with the following operator operations on the Job object:

- Cancel-Job - see [ipp-mod] section 3.2.4
- Hold-Job - see [ipp-mod] section 3.3.5
- Release-Job - see [ipp-mod] section 3.3.6
- Restart-Job - see [ipp-mod] section 3.3.7
- Reprocess-Job - see section
- Cancel-Current-Job - see section
- Pause-Current-Job - see section
- Resume-Job - see section
- Promote-Job - see section
- Space-Current-Job - see section

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 supplies 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.

2.3New operation attribute for Get-Printer-Attributes: "factory-settings" (boolean)

Type of registration: attribute

Proposed keyword name of this attribute: "factory-settings"

Types of attribute (Operation, Job Template, Job Description, Printer Description): Operation

Operations to be used with if the attribute is an operation attribute: Get-Printer-Attributes

Object (Job, Printer, etc. if bound to an object): N/A

Attribute syntax(es) (include 1setOf and range as in Section 4.2): boolean

Specification of this attribute (follow the style of IPP Model Section 4.2):

"factory-settings" (boolean)

The client **OPTIONALLY** supplies this attribute. The Printer object **OPTIONALLY** supports this attribute, if it supports the Set-Printer-Attributes operation. If the client omits this attribute or supplies the 'false' value, the Printer returns the current values of the requested attributes that are settable, i.e., the values that have been set by previous Set-Printer-Attributes. If the client supplies the 'true' value, the Printer returns the factory settings, i.e., the inherent values supported by the implementation as shipped from the manufacturer or established at install time. This operation

attribute allows an operator to determine which values are supported in an implementation after having modified a settable attribute. Attributes that are not settable are not affected by this operation attribute, so that the Printer returns the same values for non-settable attribute when either the 'true' or 'false' value has been supplied. If this operation attribute is supported, both values MUST be supported.

2.4 New operation attribute for Pause-Printer: "when" (type2 keyword)

Type of registration: attribute

Proposed keyword name of this attribute: "when"

Types of attribute (Operation, Job Template, Job Description, Printer Description): Operation

Operations to be used with if the attribute is an operation attribute: Pause-Printer, Reset-Printer, ~~Non-Process-Run-Out~~, Shutdown-Printer, and Pause-Current-Job

Object (Job, Printer, etc. if bound to an object): N/A

Attribute syntax(es) (include 1setOf and range as in Section 4.2): type2 keyword

Specification of this attribute (follow the style of IPP Model Section 4.2):

"when" (type2 keyword)

The client OPTIONALLY supplies this attribute. The Printer object OPTIONALLY supports this attribute, if it supports this operation. The value of this attribute indicates when to pause, reset, or shutdown the printer. If the client omits this attribute, the Printer assumes the 'after-current-job' value. The 'after-current-job' value is REQUIRED to be supported if the "when" attribute is supported; the remaining values are OPTIONAL.

ISSUE 1: Can a client determine the values of "when" that are supported for operations (Pause-Printer, Reset-Printer, Shutdown-Printer, and Pause-Current-Job)?

~~We did not resolve this issue, since there could be different values of "when" for the four different operations. Adding four "when-xxx" Printer Description attributes is a possibility, but does seem overkill.~~

~~TH> Just add a "when-values-supported" that applies to all of the four operations supported, with the exception of Pause-Current-Job. For Pause-Current-Job, only the 'now' and 'after-current-copy' have any meaning, so the other two values ('after-current-job' and 'after-all') don't apply.~~

~~HRL> Or, "just say NO". The client can't determine the values of "when" supported. The client may specify a value of when and the implementation will do it's best to deliver as close to the desired behavior as possible within the constraints of the device or environment. The client may determine the actual result based on final status and/or notification feedback.~~

Standard keyword values are:

'now' - cancel the currently printing job(s) and shutdown the Printer. Jobs in the 'held' and 'pending' state remain in those states.

'after-current-copy' - shutdown the Printer after the current job finishes printing its current copy. Jobs in the 'held' and 'pending' state remain in those states.

'after-current-job' - shutdown the Printer after the current job finishes printing (all its copies). Jobs in the 'held' and 'pending' state remain in those states.

'after-all' - shutdown the Printer after all 'pending' jobs finish printing. Jobs in the 'held' state remain in the 'held' state.

2.5 Summary of the operation attributes for the Printer operations

The following table shows the operation attributes for the Printer operations that a client MAY supply in a request. Operation parameters and attributes that a client MUST supply are not shown. Also "requesting-user-name" is not shown, though it is RECOMMENDED that a client supply it in every request.

Legend:

R - REQUIRED for a Printer to support

O - OPTIONAL for a Printer to support; the Printer ignores the attribute if not supported

Operation Attribute	Pause-Printer	Resume-Printer	Purge-Jobs	Get-Printer-Attributes	Set-Printer-Attributes	Enable-Print	Disable-Printer	Reset-Printer	Restart-Printer	Non-Process-Run-Out	Shut down-Printer
document-format				R	R						
factory-settings				O							
printer-message-from-operator	O	O	O			O	O	O	O		O
job-type						O	O				
when	O							O			O
reset-function								R			
non-process-run-out									⊖		⊖
synchronize											O
shutdown-function											R

2.6 Summary of the operation attributes for the Job operations

The following table shows the operation attributes for the Job operations that a client MAY supply in a request. Operation attributes that specify the Printer or Job object as the target are shown in the first two rows, respectively. Other operation attributes and parameters that a client MUST supply are not shown. Also "requesting-user-name" is not shown, though it is RECOMMENDED that a client supply it in every request.

Legend:

R - REQUIRED for a Printer to support

O - OPTIONAL for a Printer to support; the Printer ignores the attribute if not supported

Operation Attribute	Cancel-Job	Cancel-Current-Job	Hold-Job	Release-Job	Space-Current-Job	Pause-Current-Job	Resume-Job	Get-Job-Attributes	Set-Job-Attributes	Restart-Job	Reprocess-Job	Promote-Job
printer-uri		R			R	R						
printer-uri/job-id or job-uri	R		R	R			R	R	R	R	R	R
job-id		R			R	R						

requested-attributes								R				
back-space					O							
forward-space					O							
non-process-run-out			⊖		⊖	⊖						
synchronize					O	O						
when						O					O	
job-message-from-operator	O	O	O	O		O	O			O	O	O
message [to-operator]	O		O	O		O	O			O	O	O
job-hold-until			O*	O*							O**	

* The Printer MUST support the "job-hold-until" operation attribute if it supports the "job-hold-until" Job Template attribute.

** The Printer MUST support the "job-hold-until" operation attribute if it supports the Set-Job-Attributes operation, so that the client can hold the job with the Reprocess-Job operation and the modify the job before releasing it to be processed.

3. New Printer Description Attributes

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

3.1 ~~settable-attributes (1setOf type2 keyword)~~

~~Type of registration: attribute~~

~~Proposed keyword name of this attribute: settable-attributes~~

~~Types of attribute (Operation, Job Template, Job Description, Printer Description): Printer Description~~

~~Operations to be used with if the attribute is an operation attribute: N/A~~

~~Object (Job, Printer, etc. if bound to an object): Printer~~

~~Attribute syntax(es) (include 1setOf and range as in Section 4.2): 1setOf type2 keyword~~

~~If attribute syntax is 'keyword' or 'enum', is it type2 or type3: type2~~

~~If this is a Printer attribute, MAY the value returned depend on "document format" (See Section 6.2): Yes~~

~~If this is a Job Template attribute, how does its specification depend on the value of the "multiple-document-handling" attribute: N/A~~

~~Specification of this attribute (follow the style of IPP Model Section 4.2):~~

4.2.2 ~~settable-attributes (1setOf type2 keyword)~~

~~This READ-ONLY Printer attribute identifies the Printer and Job object attributes that are settable in this implementation, i.e., that are settable using the Set Printer Attributes and Set Job Attributes operations, respectively. This attribute MUST be supported if the Set Printer Attributes or Set Job Attributes operations are supported. The Printer MUST reject attempts to set any Printer or Job attributes that are not in this list, returning the 'client-error-attributes-not-settable' status code (see section). 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).~~

ISSUE 2: Can we add just one Printer Description attribute: "settable-attributes" or do we need a "printer-settable-attributes" and a "job-settable-attributes" Printer Description attributes? What if the Interpreter and/or the Document object become real objects, would we need to add "interpreter-settable-attributes" and "document-settable-attributes" Printer Description attributes?

TH> Replace the "settable-attributes" Printer Description attribute, with three Printer Description attributes: "printer-settable-attributes", "job-settable-attributes", and "interpreter-settable-attributes". The latter for those implementations that have different values for Printer attributes in the Get-Printer-Attributes and Set-Printer-Attributes operations, depending on the value of the "document-format" operation attribute supplied by the client. If and when we get a Document object, then we can add a "document-settable-attributes" Printer Description attribute.

3.2 printer-settable-attributes (1setOf type2 keyword)

Type of registration: attribute

Proposed keyword name of this attribute: printer-settable-attributes

Types of attribute (Operation, Job Template, Job Description, Printer Description): Printer Description

Operations to be used with if the attribute is an operation attribute: N/A

Object (Job, Printer, etc. if bound to an object): Printer

Attribute syntax(es) (include 1setOf and range as in Section 4.2): 1setOf type2 keyword

If attribute syntax is 'keyword' or 'enum', is it type2 or type3: type2

If this is a Printer attribute, MAY the value returned depend on "document-format" (See Section 6.2): Yes

If this is a Job Template attribute, how does its specification depend on the value of the "multiple-document-handling" attribute: N/A

Specification of this attribute (follow the style of IPP Model Section 4.2):

4.2.? printer-settable-attributes (1setOf type2 keyword)

This 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. This attribute MUST be supported if the Set-Printer-Attributes operation is supported. The Printer MUST reject attempts to set any Printer attributes that are not in this list, returning the 'client-error-attributes-not-settable' status code (see section). 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).

3.3 job-settable-attributes (1setOf type2 keyword)

Type of registration: attribute

Proposed keyword name of this attribute: job-settable-attributes

Types of attribute (Operation, Job Template, Job Description, Printer Description): Printer Description

Operations to be used with if the attribute is an operation attribute: N/A

Object (Job, Printer, etc. if bound to an object): Job

Attribute syntax(es) (include 1setOf and range as in Section 4.2): 1setOf type2 keyword

If attribute syntax is 'keyword' or 'enum', is it type2 or type3: type2

If this is a Printer attribute, MAY the value returned depend on "document-format" (See Section 6.2): Yes

If this is a Job Template attribute, how does its specification depend on the value of the "multiple-document-handling" attribute: N/A

Specification of this attribute (follow the style of IPP Model Section 4.2):

4.2.? job-settable-attributes (1setOf type2 keyword)

This 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. This attribute MUST be supported if the Set-Job-Attributes operation is supported. The Printer MUST reject attempts to set any Job attributes that are not in this list, returning the 'client-error-attributes-not-settable' status code (see section). 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).

3.4interpreter-settable-attributes (1setOf type2 keyword)

Type of registration: attribute

Proposed keyword name of this attribute: interpreter-settable-attributes

Types of attribute (Operation, Job Template, Job Description, Printer Description): Printer Description

Operations to be used with if the attribute is an operation attribute: N/A

Object (Job, Printer, etc. if bound to an object): Job

Attribute syntax(es) (include 1setOf and range as in Section 4.2): 1setOf type2 keyword

If attribute syntax is 'keyword' or 'enum', is it type2 or type3: type2

If this is a Printer attribute, MAY the value returned depend on "document-format" (See Section 6.2): Yes

If this is a Job Template attribute, how does its specification depend on the value of the "multiple-document-handling" attribute: N/A

Specification of this attribute (follow the style of IPP Model Section 4.2):

4.2.? interpreter-settable-attributes (1setOf type2 keyword)

This 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. This attribute MUST be supported if the Set-Job-Attributes operations are supported. The Printer MUST reject attempts to set any Job attributes that are not in this list, returning the 'client-error-attributes-not-settable' status code (see section). 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).

3.5printer-controls-other-protocols (boolean)

Type of registration: attribute

Proposed keyword name of this attribute: printer-controls-other-protocols

Types of attribute (Operation, Job Template, Job Description, Printer Description): Printer Description

Operations to be used with if the attribute is an operation attribute: N/A

Object (Job, Printer, etc. if bound to an object): Printer

Attribute syntax(es) (include 1setOf and range as in Section 4.2): boolean

If attribute syntax is 'keyword' or 'enum', is it type2 or type3: N/A

If this is a Printer attribute, MAY the value returned depend on "document-format" (See Section 6.2): No

If this is a Job Template attribute, how does its specification depend on the value of the "multiple-document-handling" attribute: N/A

Specification of this attribute (follow the style of IPP Model Section 4.2):

4.2.? printer-controls-other-protocols (boolean)

This Printer attribute indicates whether ~~administrative~~ operations, such as Disable-Printer, Pause-Printer, etc., affect non-IPP protocols that may be supported. It is RECOMMENDED that IPP control other non-IPP protocols. However, this attribute permits an implementation to indicate explicitly whether it does affect other protocols or not.

A 'false' value indicates that IPP operations only affect jobs submitted by the IPP Protocol. For example, a 'true' value indicates that a Disable-Printer operation prevents all protocols from submitting jobs, not just the IPP protocol. An another example, a 'true' value indicates that the Pause-Printer operation would pause the current job, no matter what job submission protocol had submitted it.

ISSUE 3: Ok that the "printer-controls-other-protocols" Printer Description attribute is just a boolean, or do we need a list of operations that affect non-IPP protocols?

TH> It would be more flexible to allow per-operation control, so change from "printer-controls-other-protocols" Printer Description attribute to "operations-affecting-other-protocols (1setOf type2 enum). The values are defined by the "operations-supported (1setOf type2 enum)" operation.

HRL> The situation is already complex in that SNMP or IPP (possibly others?) may "compete" or "conflict" is managing the printer. Per-operation control does nothing to alleviate this and may make the situation even more complex. Suggest leave as is.

As with any Printer Description attribute that this specification does not list as READ-ONLY, an implementation MAY allow ~~an administrator to change~~ the value of this attribute to change using Set-Printer-Attributes, thereby changing the way that the IPP operations affect other non-IPP protocols. An implementation MAY also support other means to change the value of this attribute, such as via the console or at installation time.

ISSUE 4: Is IPP intended for printer management. The issue is still undetermined?

TH> I think it is natural and so far there is not much overlap with any MIB. If and when we do get overlap, we need to make sure that the semantics are the same.

HRL> I think it is clear that IPP is moving in this direction. I leave this issue open for further discussion, however, because I believe we need to be as clear as possible about the possible conflicts of two management protocols originating form one organization (SNMP and IPP) and provide some guidelines.

3.6printer-message-time (integer(MIN:MAX))

Type of registration: attribute

Proposed keyword name of this attribute: printer-message-time

Types of attribute (Operation, Job Template, Job Description, Printer Description): Printer Description

Operations to be used with if the attribute is an operation attribute: N/A

Object (Job, Printer, etc. if bound to an object): Printer

Attribute syntax(es) (include 1setOf and range as in Section 4.2): integer(MIN:MAX)

If attribute syntax is 'keyword' or 'enum', is it type2 or type3: N/A

If this is a Printer attribute, MAY the value returned depend on "document-format" (See Section 6.2): No

If this is a Job Template attribute, how does its specification depend on the value of the "multiple-document-handling" attribute: N/A

Specification of this attribute (follow the style of IPP Model Section 4.2):

4.2.? printer-message-time (integer(MIN:MAX))

This 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) or was explicitly set using the Set-Printer-Attributes operation (see section). 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.

3.7printer-message-date-time (dateTime)

Type of registration: attribute

Proposed keyword name of this attribute: printer-message-date-time

Types of attribute (Operation, Job Template, Job Description, Printer Description): Printer Description

Operations to be used with if the attribute is an operation attribute: N/A

Object (Job, Printer, etc. if bound to an object): Printer

Attribute syntax(es) (include 1setOf and range as in Section 4.2): dateTime

If attribute syntax is 'keyword' or 'enum', is it type2 or type3: N/A

If this is a Printer attribute, MAY the value returned depend on "document-format" (See Section 6.2): No

If this is a Job Template attribute, how does its specification depend on the value of the "multiple-document-handling" attribute: N/A

Specification of this attribute (follow the style of IPP Model Section 4.2):

4.2.? 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) or was explicitly set using the Set-Printer-Attributes operation (see section). 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-from-operator" and the "printer-current-date-time" attributes.

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

3.8printer-message-operation (type2 keyword)

Type of registration: attribute

Proposed keyword name of this attribute: printer-message-operation

Types of attribute (Operation, Job Template, Job Description, Printer Description): Printer Description

Operations to be used with if the attribute is an operation attribute: N/A

Object (Job, Printer, etc. if bound to an object): Printer

Attribute syntax(es) (include 1setOf and range as in Section 4.2): type2 enum

If attribute syntax is 'keyword' or 'enum', is it type2 or type3: type2

If this is a Printer attribute, MAY the value returned depend on "document-format" (See Section 6.2): No

If this is a Job Template attribute, how does its specification depend on the value of the "multiple-document-handling" attribute: N/A

Specification of this attribute (follow the style of IPP Model Section 4.2):

4.2.? printer-message-operation (type2 enum)

This READ-ONLY Printer Description attribute contains the operation that was used to changed the Printer's "printer-message-from-operator" by the operator using any operation where the client supplied the "printer-message-from-operator" operation attribute (see section) or explicitly set using the Set-Printer-Attributes operation (see section). This attribute allows the users to know which operation was used to change the "printer-message-from-operator" attribute when it was last set.

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

4. Additional values for "printer-state-reasons" and "job-state-reasons" attributes

The following values are added to the "printer-state-reasons" and "job-state-reasons" for use with the operations defined in this document.

4.1Value for "printer-state-reasons": 'standby'

Type of registration: type2 keyword attribute value

Name of attribute to which this keyword specification is to be added: printer-state-reasons

Proposed keyword name of this keyword value: standby

Specification of this keyword value (follow the style of IPP Model Section 4.1.2.3):

'standby': The Printer has been shutdown in standby mode. Only Restart-Printer and Get-Printer-Attributes operations are accepted in this state; all other operations are rejected with the 'server-error-printer-is-in-standby-mode'.

4.2 Value for "job-state-reasons": 'job-paused'

Type of registration: type2 keyword attribute value

Name of attribute to which this keyword specification is to be added: job-state-reasons

Proposed keyword name of this keyword value: job-paused

Specification of this keyword value (follow the style of IPP Model Section 4.1.2.3):

'job-paused': The job has been paused while processing using the Pause-Current-Job operations and other jobs can be processed on the Printer. The Job can be resumed using the Resume-Job operation which removes this value.

5. New status codes

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

5.1 New status code: 'client-error-attributes-not-settable'

Type of registration: status code

Keyword symbolic name of this status code value: 'client-error-attributes-not-settable'

Numeric value (to be assigned by the IPP Designated Expert in consultation with IANA):

Operations that this status code may be used with: Set-Printer-Attributes, Set-Job-Attributes

Specification of this status code (follow the style of IPP Model Section 13 APPENDIX B: Status Codes and Suggested Status Code Messages):

5.1.0.113.1.4.20 client-error-attributes-not-settable (0x0413)

In a Set-Printer-Attributes or Set-Job-Attributes request, if the Printer object does not support one or more attributes as settable, the Printer object MUST return this status code. The Printer object MUST also return in the Unsupported Attributes Group all the attributes and/or values supplied by the client that are not settable. See [ipp-mod] section 3.1.7. For example, if the request indicates 'job-state', all implementations MUST reject the request. As another example, if the request indicates an attribute that is supported, but not settable by this implementation, such as, say, "printer-name", the implementation rejects the request.

5.2 New status code: 'server-error-printer-is-in-standby-mode'

Type of registration: status code

Keyword symbolic name of this status code value: 'server-error-printer-is-in-standby-mode'

Numeric value (to be assigned by the IPP Designated Expert in consultation with IANA):

Operations that this status code may be used with: Shutdown-Printer

Specification of this status code (follow the style of IPP Model Section 13 APPENDIX B: Status Codes and Suggested Status Code Messages):

13.1.5.8 server-error-printer-is-in-standby-mode

The Printer has been shutdown and is only accepting the Restart-Printer (see section) and Get-Printer-Attributes operations. An operator can perform the Restart-Printer operation to allow the Printer to accept other operations.

6. Targeting Printer vs. Print Job operations

As operations are added, some of which are specifically targeted toward the printer, and others which are targeted either for the printer or the print job, the need to distinguish the IPP operation target is introduced. A straightforward method is proposed which adds:

- 1) Add an OPTIONAL operation attribute to (most) IPP Printer operations
- "device-name" (to cause explicit pass-through of the Printer operation to the named device - not necessarily by speaking IPP to the named device, but by some print or management protocol)
- 2) Add an OPTIONAL (multi-valued) attribute to IPP Printer objects
- "device-names-supported" for discovery of named devices via the IPP Printer.¹

6.1 New Printer operation attribute

device-name (name (127))

This OPTIONAL Printer operation attribute contains the name of a device which is associated with this Printer object. The named device is the actual target of the specified Printer operation (that is, the operation is passed through to the device rather than affecting the Printer object specified by the "printer-uri" operation attribute).

See the Job object attribute "output-device-assigned" in [IPP-MOD].

See the Printer object attribute "device-names-supported" in this document.

¹ The new attribute "device-names-supported" will also enhance the usefulness of the existing IPP Job object attribute "output-device-assigned". This attribute identifies the output device to which the Printer object has assigned a job, for example, when a single Printer object is supporting multiple devices.

6.2 New Printer object attribute

device-names-supported (1setOf name (127))

This OPTIONAL Printer attribute contains at least one device name which is associated with this Printer object. It OPTIONALLY contains more than one device name which is associated with this Printer object. A Printer object which is NOT associated with a named device MUST NOT set this attribute. An Administrator determines device names and configures this attribute to contain those device names via IPP SetPrinterAttributes or by some means outside the scope of this document. The precise format of these device names is implementation dependent and MAY depend on the protocol stack and the directory namespace.

See the Job object attribute "output-device-assigned" in [IPP-MOD].

See the Printer operation attribute "device-name" in this document.

6.3 Revised text for [IPP-MOD] for this extension

This proposal recommends the following text be added to the IPP-MOD document in section 3.2, "Printer Operations"

"All Printer operations are directed at Printer objects OR at named devices associated with Printer objects. A client MUST always supply the "printer-uri" operation attribute in order to identify the correct target of the operation. A client MAY also supply the "device-name" operation attribute in order to pass the operation to the named device (rather than affecting the Printer object specified by "printer-uri")."

7. Summary of ~~Set2Administrative~~ operations and Operation-Id Assignments

The ~~Set2Administrative~~ operations are summarized in the following table:

Operation Name	Operation-Id	Brief description
Set-Printer-Attributes	0x??	Sets attribute values of the target Printer object
Enable-Printer	0x??	Allows the target Printer to accept create job operations
Disable-Printer	0x??	Prevents the target Printer from accepting create job operations
Reset-Printer	0x??	Resets the target Printer to one of several indicated ways
Restart-Printer	0x??	Restarts the target Printer from a standby shutdown mode
Non-Process-Run-Out	0x??	Moves last printed sheet to the exit or stacker
Shutdown-Printer	0x??	Shuts down the target Printer in several ways

Operation Name	Operation-Id	Brief description
Set-Job-Attributes	0x??	Sets attribute values of the target Job object
Reprocess-Job	0x??	Creates a copy of a completed target job with a new Job ID and processes it
Cancel-Current-Job	0x??	Cancels the current job on the target Printer or the specified job if it is the current job
Pause-Current-Job	0x??	Pauses the current processing job on the target Printer or the specified job if it is the current job, allowing other jobs to be processed instead
Resume-Job	0x??	Resume the paused target job
Promote-Job	0x??	Promote the pending target job to be next after the current job(s) complete
Space-Current-Job	0x??	Skips or repeats the specified number of impressions for the current job on the target Printer or the specified job if it is the current job

All of the operations in this registration proposal specification are OPTIONAL for an IPP object to support. Unless the specification of an OPTIONAL operation requires support of another OPTIONAL operation, conforming implementations may support any combination of these operations.

7.1 Printer Operations

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.

1.1.1 Set-Printer-Attributes Operation

Type of registration: operation

Proposed name of this operation: Set-Printer-Attributes

Object Target: Printer

Specification of this 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 names and values that are to be set. In the response, the Printer object returns success or rejects the request with indications of which attribute or attributes could not be set.

How the Printer object validates the client-supplied attributes in the Set-Printer-Attributes request is implementation-dependent, since there are no corresponding Printer attributes that specify the allowed values that may be set on the Printer object.

The Printer MUST accept this operation in any state, i.e., for any of the values of the Printer object's "printer-state" attribute.

7.1.1.1 Settable and READ-ONLY Printer Description attributes

If the Printer supports the "printer-message-from-operator" Printer Description attribute (see [ipp-mod] section 4.4.25) and the client explicitly supplies a new value for the "printer-message-from-operator" in the request, then the Printer MUST set the "printer-message-from-operator" Printer attribute to this new value and MUST also set the "printer-message-time", "printer-message-date-time", and "printer-message-operation" attributes, if supported (see sections , , and).

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).

The following Printer Description attributes (see [ipp-mod] section 4.4) MUST NOT be settable, i.e., they are READ-ONLY:

- printer-state
- printer-state-reasons
- printer-state-message
- printer-is-accepting-jobs - see Enable-Printer/Disable-Printer
- queued-job-count
- printer-message-time - see Set-Printer-Attributes when setting "printer-message-from-operator"
- printer-message-date-time - see Set-Printer-Attributes when setting "printer-message-from-operator"
- printer-message-operation - see Set-Printer-Attributes when setting "printer-message-from-operator"
- printer-up-time
- settable-attributes

The remaining Printer Description attributes MAY be settable using the Set-Printer-Attributes operation, depending on implementation. 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 using the Set-Printer-Attributes operation. Consider the following examples:

For example, if the "operations-supported" Printer Description attribute (see [ipp-mod] section 4.4.15) is settable, then changing its value 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.

As another example, if the "ipp-versions-supported" Printer Description attribute (see [ipp-mod] section 4.4.14) is settable, then changing its value MUST affect the protocol versions that are accepted or rejected. Such an implementation will need to be able to reject values for operations that it contains no code support for.

See the "factory-settings" operation attribute (see section) for a way to query the implementation supported values using the Get-Printer-Attributes operation. See the "reset-function" operation attribute of the Reset-Printer operation (see section) for a way to restore the values to the factory settings.

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). Otherwise, the IPP Printer MUST reject the operation and return: 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as appropriate.

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.

1.1.1.1 Set-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.

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 SHOULD supply this attribute. The Printer object MUST support this attribute. This attribute is useful for a client to select the Interpreter object to which the attribute modification should be applied. Each Printer object is modeled to contain one or more Interpreter objects. Those Printer attributes whose values vary from Interpreter to Interpreter, are modeled as Interpreter objects, while those that do not are Printer object attributes. Thus the target of a Get-Printer-Attributes or Set-Printer-Attributes operation is either the Printer object or the Interpreter object identified by the "document-format" operation attribute supplied by the client. Except for Get-Printer-Attributes and Set-Printer-Attributes, there are no other operations with the Interpreter object as a target. See [ipp-mod] section 3.2.5.1 "Get-Printer-Attributes Request".

If a client wants to set an attribute of all of the Interpreter objects to the same value, it can query the Printer's "document-format-supported" Printer Description attribute and perform separate Set-Printer-Attributes for each document format supported.

~~ISSUE 5: Do we need a way to get and/or set the "xxx" attribute for all Interpreter objects in one Get-Printer-Attributes or Set-Printer-Attributes operation? Or is it sufficient for a client to provide the equivalent functionality by stepping through all the values of the "document-format-supported" with repeating the Get or Set operation?~~

~~ISSUE 6: Ok to add the Interpreter object, even though it doesn't solve all of the attribute constraint problems. At least it gives us a more object-based description of the semantics. When we do add some sort of Printer Description attribute that enumerates combinations of Job attribute values that may not be used in combination (like PPD file constraints), it can include the "document-format" attribute among them. So introducing the Interpreter object in no way precludes a complete constraint description mechanism in the future.~~

If the Printer object does not distinguish between different sets of supported values for each different document format when validating jobs in the create and Validate-Job operations, it MUST NOT distinguish between different document formats in the Set-Printer-Attributes operation. If the Printer object does distinguish between different sets of supported values for each different document format specified by the client, this specialization applies only to the same Printer attributes as the Get-Printer-Attributes operation (see [ipp-mod] section 3.2.5.1).

If the client omits this "document-format" operation attribute, the Printer object MUST respond as if the attribute had been supplied with the value of the Printer object's "document-format-default" attribute. It is recommended that the client always supply a value for "document-format", since the Printer object's "document-format-default" may be 'application/octet-stream', in which case the set attributes and values are for the union of the document formats that the Printer can automatically sense. For more details, see the description of the 'mimeType' attribute syntax in [ipp-mod] section 4.1.9.

If the client supplies a value for the "document-format" Operation attribute that is 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.

Group 2: Printer Attributes

The client MUST supply a set of Printer attributes as defined in [ipp-mod] section 4.2 Job Template Attributes ("xxx-default", "xxx-supported", and "xxx-ready" attributes) and section 4.4 Printer Description Attributes. Each Printer attribute supplied in Group 2 replaces the value(s) of the corresponding Printer attribute on the target Printer object. If a Printer object attribute had not been configured yet and so had the 'no-value' out-of-band value (see [ipp-mod] 4.1), the supplied value(s) replace the 'no-value' value. For attributes that can have multiple values (1setOf), all values supplied by the client replace all values of the corresponding Printer object attribute.

1.1.1.2Set-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.

In the case of attributes that are supported, but are not settable by the implementation, i.e., are not among the values of the Printer's "settable-attributes" Printer Description attribute (see section), the Printer object returns the client-supplied attribute(s) with a substituted value of 'not-supported' (same out-of-band value as for attributes that are not supported). This value's syntax type is "out-of-band" and its encoding is defined by special rules for "out-of-band" values in the "Encoding and Transport" document [IPP-PRO]. Its value indicates that the attribute is either not settable or is not supported at all.

ISSUE 7: Why not have a separate out-of-band 'not-settable' value, so that the client can distinguish between the cases of the attribute isn't supported versus the attribute is supported, but is not settable? True, the client can query the "settable-attributes" to see which attributes can be set, before or after issuing the Set-Printer-Attributes operation.

TH> I think that providing a separate out-of-band code is useful, since a reply could contain both unsupported attributes and ones that were supported, but are not settable in this implementation.

HRL> What's wrong with what's already described? How is the new proposal better?

7.1.2Disable-Printer Operation

Type of registration: operation

Proposed name of this operation: Disable-Printer

Object Target: Printer

Specification of this operation:

This OPTIONAL operation allows a client to stop the Printer object from accepting jobs, i.e., cause the Printer to reject subsequent create job operations (Print-Job, Print-URI, and Create-Job operation) and return the 'server-error-not-accepting-jobs' status code. The Printer still accepts all other operations. All previously submitted Jobs and currently processing Jobs continue unaffected. The Printer sets the value of its "printer-is-accepting-jobs" READ-ONLY Printer Description attribute to 'false' (see [ipp-mod] section 4.4.20), no matter what the previous value was. This operation has no immediate effect on the Printer's "printer-state" and "printer-state-reasons" attributes.

Note: Use the Enable-Printer operation (section) to enable a Printer to accept Jobs again.

If the Disable-Printer operation is supported, then the Enable-Printer operation MUST be supported, and vice-versa.

Note: Use the Enable-Printer and Disable-Printer operations to allow or prevent input to a Printer. Use the Pause-Printer and Resume-Printer operations to prevent or allow output from the Printer.

Whether or not the Disable-Printer operation stops jobs that are submitted using job submission protocols other than IPP, depends on implementation, i.e., on whether the IPP protocol is being used as a universal management protocol or just to manage IPP jobs, respectively. See "printer-controls-other-protocols" (section).

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). Otherwise, the IPP Printer MUST reject the operation and return: 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as appropriate.

The Disable-Printer Request and Disable-Printer Response have the same attribute groups and attributes as the Resume-Printer operation (see [ipp-mod] sections 3.2.7.1 and 3.2.7.2), including the new "printer-message-from-operator" operation attribute (see section), and with the addition of the following Group 1 operation attribute in the request:

"job-type" (type2 keyword):

The client OPTIONALLY supplies this attribute. The Printer object OPTIONALLY supports this attribute. The value of this attribute indicates the type of job to be disabled. If the client omits this attribute, the Printer assumes the 'network-jobs' value.

Standard keyword values are:

- 'network-jobs' - disable jobs submitted using the create job operations.
- 'walk-up-jobs' - disable jobs submitted locally, such as walkup copy jobs
- 'all-jobs' - disable all type of jobs

7.1.3 Enable-Printer Operation

Type of registration: operation

Proposed name of this operation: Enable-Printer

Object Target: Printer

Specification of this operation:

This OPTIONAL operation allows a client to start the Printer object accepting jobs, i.e., cause the Printer to accept subsequent create job operations (Print-Job, Print-URI, and Create-Job operation). The Printer still accepts all other operations. All previously submitted Jobs and currently processing Jobs continue unaffected. The Printer sets the value of its "printer-is-accepting-jobs" READ-ONLY Printer Description attribute to 'true' (see [ipp-mod] section 4.4.20), no matter what the previous value was. This operation has no immediate effect on the Printer's "printer-state" and "printer-state-reasons" attributes.

Note: Use the Disable-Printer operation (section) to stop a Printer from accepting Jobs.

If the Enable-Printer operation is supported, then the Disable-Printer operation MUST be supported, and vice-versa.

Note: Use the Enable-Printer and Disable-Printer operations to allow or prevent input to a Printer. Use the Pause-Printer and Resume-Printer operations to prevent or allow output from the Printer.

Whether or not the Enable-Printer operation allows acceptance of jobs that are submitted using job submission protocols other than IPP, depends on implementation, i.e., on whether the IPP protocol is being used as a universal management protocol or just to manage IPP jobs, respectively. See "printer-controls-other-protocols" (section).

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). Otherwise, the IPP Printer MUST reject the operation and return: 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as appropriate.

The Enable-Printer Request and Enable-Printer Response have the same attribute groups and attributes as the Resume-Printer operation (see [ipp-mod] sections 3.2.8.1 and 3.2.8.2), including the new "printer-message-from-operator" operation attribute (see section), and with the addition of the following Group 1 operation attribute in the request:

"job-type" (type2 keyword):

The client OPTIONALLY supplies this attribute. The Printer object OPTIONALLY supports this attribute. The value of this attribute indicates the type of job to be enabled. If the client omits this attribute, the Printer assumes the 'network-jobs' value.

Standard keyword values are:

'network-jobs' - enable jobs submitted using the create job operations.

'walk-up-jobs' - enable jobs submitted locally, such as walkup copy jobs

'all-jobs' - enable all types of jobs

7.1.4Reset-Printer operation

Type of registration: operation

Proposed name of this operation: Reset-Printer

Object Target: Printer

Specification of this operation:

This OPTIONAL operation allows a client to reset the Printer in a number of ways, depending on the "reset-function" operation attribute. The keyword values of this attribute map one-to-one to the enum values that the NMS writes into the prtGeneralReset object in the Printer MIB [RFC1759] to affect a reset operation. As in the Printer MIB, the 'reset-to-nvram' (soft reset) value MUST be supported, if this operation is supported. The other values are OPTIONAL.

As is says in the Printer MIB specification, if a device does not have NVRAM (non-volatile RAM), the device MUST none-the-less respond to this operation for the 'reset-to-nvram' value with some sort of warm reset that resets the device to some implementation-defined state that is preferably under control of the system administrator by some means outside the scope of the Printer MIB and this document.

The effect of this operation on the currently processing job(s), if any, is not specified by this document. Note: If this operation does affect the current job(s), it is expected that the operator would issue this operation on a Printer in the 'idle' state after disabling the Printer with the Disable operation in order to prevent a job from inadvertently being affected by this operation.

The Printer object MUST accept this operation in any state and transition the Printer object to the 'idle' state.

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). Otherwise, the IPP object MUST reject the operation and return: client-error-forbidden, client-error-not-authenticated, and client-error-not-authorized as appropriate.

The Reset-Printer Request and Reset-Printer Response have the same attribute groups and attributes as the Pause-Printer operation (see [ipp-mod] sections 3.2.7.1 and 3.2.7.2), including the new "printer-message-from-operator" operation attribute (see section), the new "when" operation attribute (see section), and with the addition of the following Group 1 operation attributes in the request:

"reset-function" (type3 keyword):

The client OPTIONALLY supplies this attribute. The Printer object MUST support this attribute, if it supports this operation. The value of this attribute indicates the reset function to be performed. If the client omits this attribute, the Printer assumes the 'reset-to-nvram' value.

Standard keyword values are:

'power-cycle-reset' - Cold start, i.e., to the state when the device is powered up.

'reset-to-nvram' - Warm start.

'reset-to-factory-defaults' - reset NVRAM to factory defaults, i.e. to factory settings and/or values established at install time.

~~"non-process-run-out" (boolean):~~

~~The client OPTIONALLY supplies this operation attribute. The IPP object OPTIONALLY supports this operation attribute, if it is able to perform a non-process-run-out, i.e., remove the last few printed sheets of a job that is finished printing on a continuous forms printer. Normally, on such a printer, the last sheets of a job remain in the printer and are forced out by the next job, thereby saving time when printing one job after another. This attribute indicates whether or not the printer is~~

~~to perform "non-process run-out", i.e., move the last printed sheet to the stacker, before resetting the Printer.—~~

~~If the client does not supply this attribute and the attribute is supported, the Printer does not perform non-process run-out ('false' behavior). If the Printer does not support this attribute, the Printer is assumed to perform non-process run-out ('true' behavior).—~~

~~ISSUE 8: Is the "non-process run-out" operation attribute really needed at all or can the default behavior for Reset-Printer be defined to be to perform non-process run-out (for continuous and cut sheet printers)?~~

7.1.5 Restart-Printer operation

Type of registration: operation

Proposed name of this operation: Restart-Printer

Object Target: Printer

Specification of this operation:

This OPTIONAL operation allows a client to restart a Printer that has previously been shutdown in standby mode (see section). Standby mode is indicated by the Printer's "printer-state" being 'stopped' and its "printer-state-reasons" including the 'standby' and 'paused' values. If the Printer is not in standby mode, the Printer MUST reject this operation and return the 'client-error-not-possible' status code.

ISSUE 9: What state does the Printer comes back up on Restart-Printer and how can the client control?

Possible alternatives:

a. Restart-Printer always brings the Printer up Disabled ("printer-is-accepting-jobs" = 'false') and Paused ("printer-state" = 'stopped', and "printer-state-reasons" = 'paused') which is the state that Shutdown-Printer leaves the Printer in. Then the operator issues Enable-Printer and Resume-Printer when want to restore normal operation. The client can automatically issues these addition 2 operations depending on GUI options. Advantages: This is the simplest to implement, allows new states to be added without changing the Restart-Printer operation, and can have the same GUI interface as b:

b. Add a REQUIRED operation attribute to Restart-Printer, something like "printer-condition" with values: 'disabled-and-paused', 'enabled-and-paused', and 'enabled-and-idle'.

TH 7/26: Remove the Shutdown-Printer 'standby' mode concept. Shutdown-Printer always powers off eventually. Also remove Restart-Printer operation all together. Instead change the Disable-Printer and Enable-Printer operations to Disable-Operations and Enable-Operations, so that individual operations are enabled and disabled independent of the state of the Printer and don't otherwise affect the state of the Printer.

HRL 9/18: How can the state of the printer not be effected when you disable or enable it? Don't understand 2nd half of this issue resolution.

If the Restart-Printer operation is supported, then the Shutdown-Printer operation MUST be supported.

Issue 22: Why? This is backward, if you ask me (HRL).

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). Otherwise, the IPP object MUST reject the operation and return: client-error-forbidden, client-error-not-authenticated, and client-error-not-authorized as appropriate.

The Restart-Printer Request and Restart-Printer Response have the same attribute groups and attributes as the Resume-Printer operation (see [ipp-mod] sections 3.2.8.1 and 3.2.8.2), including the new "printer-message-from-operator" operation attribute (see section) and the following Group 1 operation attribute:

"non-process-run-out" (boolean):

~~The client OPTIONALLY supplies this operation attribute. The IPP object OPTIONALLY supports this operation attribute, if it is able to perform a non-process-run-out, i.e., remove the last few printed sheets of a job that is finished printing on a continuous forms printer. Normally, on such a printer, the last sheets of a job remain in the printer and are forced out by the next job, thereby saving time when printing one job after another. This attribute indicates whether or not the printer is to perform "non-process-run-out", i.e., move the last printed sheet to the stacker, as part of restarting the Printer.~~

~~If the client does not supply this attribute and the attribute is supported, the Printer does not perform non-process-run-out ('false' behavior). If the Printer does not support this attribute, the Printer is assumed to perform non-process-run-out ('true' behavior). ISSUE-10: Is the "non-process-run-out" operation attribute really needed at all or can the default behavior for Restart Printer be defined to be to perform non-process-run-out (for continuous and cut sheet printers)?~~

7.1.6 Non-Process-Run-Out

Type of registration: operation

Proposed name of this operation: Non-Process-Run-Out

Object Target: Printer

Specification of this operation:

This OPTIONAL operation effectively moves the last printed sheet to the exit or stacker. The terminology is common to long path continuous forms devices but may have applicability on shorter devices or in cut-sheet applications.

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). Otherwise, the IPP object MUST reject the operation and return: client-error-forbidden, client-error-not-authenticated, and client-error-not-authorized as appropriate.

The Non-Process_Run-Out Request and Response have the same attribute groups and attributes as the Pause-Printer operation (see [ipp-mod] sections 3.2.7.1 and 3.2.7.2), including the new "printer-message-from-operator" operation attribute (see section), the new "when" operation attribute (see section).

Issue 21: For all these "access" caveats, why not just say... 'authentication and access control (see ipp-mod sections 1, 8.3 and 8.5) applies to this operation'.

7.1.7 Shutdown-Printer Operation

Type of registration: operation

Proposed name of this operation: Shutdown-Printer

Object Target: Printer

Specification of this operation:

This OPTIONAL operation allows a client to shutdown a Printer, i.e., stop processing jobs and power off in some (implementation dependent) appropriate fashion. The purpose of Shutdown-Printer is to shutdown the Printer for an extended period, not to reset the device(s) or modify a Printer attribute. See Reset-Printer (section) for the way to reset the device(s). See Disable-Printer (section) for the way to stop processing without shutting down.

~~Whether the device is powered down or put into standby mode, depends on the value of the "shutdown-function" operation attribute. If the value is 'power-off', or the "shutdown-function" attribute is omitted, the Printer adds the 'shutdown' value (see [ipp-mod] section 4.4.11) to its "printer-state-reasons" Printer Description attribute immediately. If the value is 'standby', the Printer adds the 'standby' value to its "printer-state-reasons" Printer Description attribute immediately. The execution of the rest of the operation is the same for either value: The Printer is disabled immediately (see the Disable-Printer operation in section). The Printer adds the 'shutdown' value (see [ipp-mod] section 4.4.11) to its "printer-state-reasons" Printer Description attribute. The "when" operation attribute specifies how much processing occurs before the Printer is paused (see [ipp-mod] section 3.2.7) and the shutdown is complete. All other requests continue to be accepted until the printer is powered down or enters standby mode. In standby mode, the Printer acts as if a Pause-Printer had gone to completion, MUST continue to accept the Restart-Printer and Get-Printer-Attribute requests, and MUST reject all other requests returning the 'server error printer is in standby-mode' status code.~~

ISSUE 11 - Need to look at life cycle of the Printer versus standby/power-down and the other operations that can be accepted. There can be appreciable time between acceptance of this operation and when the final state of the printer, either standby or powered down is reached. Is it ok for non-submission operations to continue to be accepted during this time? May need 'moving-to-shutdown'. What about 'moving-to-standby'?

TH> Add 'moving-to-shutdown' which the Shutdown-Printer sets immediately (analogous to 'moving-to-paused'). Then the 'shutdown' values means that the shutdown has completed (and is only meaningful to a server implementation that hosts the Printer object). Thus the server can still respond to a Get-Printer-Attributes operation after the Printer is shutdown as stated in IPP/1.1.

~~HRL> Is this granularity really achievable enough of a wide enough variety of environments to be reliable or, in reality, will this be implementation dependent?~~

Whether or not the Shutdown-Printer operation affects jobs that were submitted to the device using job submission protocols other than IPP, depends on implementation, i.e., on whether the IPP protocol is being used as a universal management protocol or just to manage IPP jobs, respectively. See "printer-controls-other-protocols" (section).

The Printer object MUST accept this operation in any state and transition the Printer object to the 'idle' state.

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). Otherwise, the IPP object MUST reject the operation and return: client-error-forbidden, client-error-not-authenticated, and client-error-not-authorized as appropriate.

The Shutdown-Printer Request and Shutdown-Printer Response have the same attribute groups and attributes as the Pause-Printer operation (see [ipp-mod] sections 3.2.7.1 and 3.2.7.2), including the new "printer-message-from-operator" operation attribute (see section), the new "when" operation attribute (see section), and with the addition of the following Group 1 operation attributes in the request:

"shutdown-function" (type2 keyword)

The client OPTIONALLY supplies this attribute. The Printer object OPTIONALLY supports this attribute. This attribute indicates which shutdown function is to be performed.

Standard keyword values are:

'standby' - shutdown the Printer, but leave it in standby-mode (disabled and paused), which means that Get-Printer-Attributes and Restart-Printer operations are accepted.

'power-off' - shutdown the Printer and power it off. No operations are accepted after power off.

~~"non-process-run-out" (boolean)~~

~~The client OPTIONALLY supplies this attribute. The Printer object OPTIONALLY supports this attribute, if it is able to perform a non-process-run-out, i.e., remove the last few printed sheets of a job that is finished printing on a continuous-forms printer. Normally, on such a printer, the last sheets of a job remain in the printer and are forced out by the next job, thereby saving time when printing one job after another. This attribute indicates whether or not the printer is to perform "non-process-run-out", i.e., move the last printed sheet to the stacker, before shutting down.~~

~~If the client does not supply this attribute and the attribute is supported, the Printer does not perform non-process-run-out ('false' behavior). If the Printer does not support this attribute, the Printer is assumed to perform non-process-run-out ('true' behavior).~~

~~ISSUE 12: Is the "non-process-run-out" operation attribute really needed at all or can the default behavior for Shutdown-Printer be defined to be to perform non-process run-out (for continuous and cut-sheet printers)?~~

"synchronize" (boolean)

The client OPTIONALLY supplies this attribute. The Printer object OPTIONALLY supports this attribute. This attribute indicates whether or not the printer is to synchronize the checkpoint data for the current job ("when" = 'now') with the pages that have actually printed. If the value of the "when" attribute is not 'now' or the "when" attribute is not supplied, then the "synchronize" attribute has no meaning and the Printer MUST ignore it. If this attribute is supported, then a value of 'true' implies that the Printer will be able to resume the job at the point of synchronization when the Printer is restarted. If the implementation does not support resuming a job (either automatically or with the Resume-Job operation) after a Shutdown-Printer with "when" = 'now', then it does not implement this attribute. In this case, checkpointing implies that the job may be resumed, in the future, exactly from the point and in the state and resource context from which it left off.

~~ISSUE 13: It isn't clear which type of checkpointing is being suggested for synchronize: checkpoint a stream or checkpoint in a job that is on a disk file in the printer.~~

If the Printer supports this attribute but the client does not supply it, the Printer is assumed to perform synchronization ('true' behavior). If the Printer does not support this attribute, the Printer is assumed to not synchronize ('false' behavior).

~~If the client does not supply this attribute and the attribute is supported, the Printer does not perform synchronization ('false' behavior). If the Printer does not support this attribute, the Printer is assumed to not synchronize ('false' behavior).~~

~~ISSUE 14: Do we really need the "synchronize" operation attribute for the Shutdown-Printer operation or can synchronization be the default behavior of the Shutdown-Printer operation? It is not clear why this would ever be false? If it never makes sense to be 'false', can we remove it altogether?~~

ISSUE 15: Is the current job automatically restarted when the Printer is restarted? Or does some client have to issue a Restart-Job operation?

The question is moot, if we remove the Restart-Job operation, as suggested:

TH 7/26: Remove the Shutdown-Printer 'standby' mode concept. Shutdown-Printer always powers off eventually. Also remove Restart-Printer operation all together. Instead change the Disable-Printer and Enable-Printer operations to Disable-Operations and Enable-Operations, so that individual operations are enabled and disabled independent of the state of the Printer and don't otherwise affect the state of the Printer.

HRL> Then, how do we restart the printer?

7.2 Job Operations

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. The IPP object implementation MUST support both forms of identification for every job.

7.2.1 Set-Job-Attributes

Type of registration: operation

Proposed name of this operation: Set-Job-Attributes

Object Target: Job

Specification of this 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 names and values that are to be set. In the response, the IPP object returns success or rejects the 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). 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, and the validation is the same as the create job operations, i.e., depends on the "xxx-supported" Printer Description attributes.

The validation of the Set-Job-Attributes request is performed as if the job had been submitted originally with the new values and with "ipp-attribute-fidelity" set to 'true', i.e., all modified attributes MUST be supported along with the attributes not modified. If such a create job operation would have been accepted, then the Set-Job-Attributes MUST be accepted. If such a create job operation would have been rejected, then the Set-Job-Attributes MUST be rejected and the Job MUST be unchanged.

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

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 the attributes being set, whether the job has started marking media, and/or implementation
'processing-stopped'	'processing-stopped'	'successful-ok' or 'client-error-not-possible' depending on the attributes being set, whether the job has started marking media, and/or implementation
'completed'	'completed'	'client-error-not-possible'
'canceled'	'canceled'	'client-error-not-possible'
'aborted'	'aborted'	'client-error-not-possible'

7.2.1.1 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 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 ("xxx") attributes (see [ipp-mod] section 4.2 and extensions)

that the implementation supports.

The following Job Description attributes (see [ipp-mod] section 4.3) MUST NOT be settable, i.e., they are READ-ONLY:

- job-uri
- job-id
- job-printer-uri
- job-more-info
- job-originating-user-name - set in create operation
- job-state
- job-state-reasons
- job-state-message
- number-of-documents
- output-device-assigned
- time-at-creation
- time-at-processing
- time-at-completed
- job-printer-up-time
- date-time-at-creation
- date-time-at-processing
- date-time-at-completed
- number-of-intervening-jobs
- job-k-octets
- job-k-octets-processed
- job-impressions-completed
- job-media-sheets-completed
- attributes-charset - set in create operation
- attributes-natural-language - set in create operation

The remaining Job Description attributes MAY be settable using the Set-Job-Attributes operation, depending on implementation.

Whether or not the Set-Job-Attributes operation affects jobs that are submitted using job submission protocols other than IPP, depends on implementation, i.e., on whether the IPP protocol is being used as a universal management protocol or just to manage IPP jobs, respectively. See "printer-controls-other-protocols" (section).

Access Rights: The authenticated user (see [ipp-mod] section 8.3) performing this operation must either be the job owner or an operator or administrator of the Printer object (see [ipp-mod] sections 1 and 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.

1.1.1.3 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.

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 as defined in [ipp-mod] section 4.2 Job Template Attributes ("xxx" attributes) and section 4.3 Job Description Attributes. 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.

1.1.1.4 Set-Job-Attributes Response

The Printer 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.

The attributes returned are the same as for the create operation with the same new attribute values. In the case of attributes that are supported, but are not settable by the implementation, i.e., are not among the values of the Printer's "settable-attributes" Printer Description attribute (see section), the Printer object returns the client-supplied attribute(s) with a substituted value of 'not-supported' (same out-of-band value as for attributes that are not supported). This value's syntax type is "out-of-band" and its encoding is defined by special rules for "out-of-band" values in the "Encoding and Transport" document [IPP-PRO]. Its value indicates that the attribute is either not settable or is not supported at all.

7.2.2 Reprocess-Job Operation

This OPTIONAL operation is a create job operation that allows a client to re-process a copy of a job that had been retained in the queue after processing completed, was canceled, or was aborted (see [ipp-mod] section 4.3.7.2). This operation is the same as the Restart-Job operation (see [ipp-mod] section 3.3.7), except that the Printer creates a new job that is a copy of the target job and the target job is unchanged. The new job is assigned new values to the "job-uri" and "job-id" attributes and the new job's Job Description attributes that accumulate job progress, such as "job-impressions-completed", "job-media-sheets-completed", and "job-k-octets-processed", are initialized to 0 as with any create job operation. The target job moves to the Job History after a suitable period, independent of whether one or more Reprocess-Job operations have been performed on it.

If the Set-Job-Attributes operation is supported, then the "job-hold-until" operation attribute MUST be supported with at least the 'indefinite' value, so that a client can modify the new job before it is scheduled for processing using the Set-Job-Attributes operation. After modifying the job, the client can release the job for processing, by using the Release-Job operation specifying the newly assigned "job-uri" or "job-id" for the new job.

7.2.3 Cancel-Current-Job Operation

This OPTIONAL operation allows a client to cancel the current job on the target Printer or the specified job if it is the current job on the Printer. See [ipp-mod] section 3.3.3 for the semantics of canceling a job. Since a Job might already be marking by the time a Cancel-Current-Job is received, some media sheet pages might be printed before the job is actually terminated.

If the client does not supply a "job-id" operation attribute, the Printer MUST accept the request and cancel the current job if there is a current job 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 job 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 job might change to a different job. If the user or operator is authenticated to cancel the new job, the wrong job is canceled. To prevent this race from canceling the wrong job, the client MAY supply the "job-id" operation attribute which is checked against the current job's job-id. If the job identified by the "job-id" attribute is not the current job on the Printer, 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 job.**

Access Rights: The authenticated user (see [ipp-mod] section 8.3) performing this operation must either be the job owner of the current job or an operator or administrator of the Printer object (see [ipp-mod] sections 1 and 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.

The Cancel-Current-Job Request and Cancel-Current-Job Response have the same attribute groups and attributes as the Resume-Printer operation (see [ipp-mod] section 3.2.8), including the new "job-message-from-operator" operation attribute (see section), 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 support this operation attribute, if it supports this operation.

~~"non-process-run-out" (boolean):~~

~~The client OPTIONALLY supplies this Operation attribute. The IPP object OPTIONALLY supports this operation attribute, if it is able to perform a non-process-run-out, i.e., remove the last few printed sheets of a job that is finished printing on a continuous forms printer. Normally, on such a printer, the last sheets of a job remain in the printer and are forced out by the next job, thereby saving time when printing one job after another. However, when canceling the current job it is desirable to move the end of the canceled job to the stacker. This attribute indicates whether or not the printer is to perform "non-process-run-out", i.e., move the last printed sheet to the stacker, after canceling the current job.~~

~~If the client does not supply this attribute and the attribute is supported, the Printer does not perform non-process-run-out ('false' behavior). If the Printer does not support this attribute, the Printer is assumed to perform non-process-run-out ('true' behavior).~~

~~ISSUE 16: Why isn't non-process-run-out automatic on a continuous form printer? When would an operator want to cancel the job and NOT run out the last sheets.? It would be simpler to require process-run-out when canceling the current job (for continuous and cut-sheet printers).~~

7.2.4Pause-Current-Job operation

This OPTIONAL operation allows a client to stop the current job on the target Printer or the specified job if it is the current job on the Printer, and allow other jobs to be processed instead. The Printer moves the

current job or the target job to the 'processing-stopped' state and sets the 'job-paused' value in the job's "job-state-reasons" attribute and processes other jobs.

If the client does not supply a "job-id" operation attribute, the Printer MUST accept the request and pause the current job if there is a current job 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 job is in the 'processing' or 'processing-stopped' states, all of them are paused.

Warning: On a shared printer, there is a race condition. Between the time that a user issues this operation and its acceptance, the current job might change to a different job. If the user or operator is authenticated to pause the new job, the wrong job is paused. To prevent this race from pausing the wrong job, the client MAY supply the "job-id" operation attribute which is checked against the current job's job-id. If the job identified by the "job-id" attribute is not the current job on the Printer, 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 pauses the specified job and processed other jobs.

A paused job is resumed using the Resume-Job operation (see section). If the Pause-Current-Job operation is supported, then the Resume-Job operation MUST be supported, and vice-versa.

The Printer MUST reject a Release-Job request (and return the 'client-error-not-possible') for a job that has been paused , i.e., for a job in the 'processing-stopped' state, with the 'job-paused' value in its "job-state-reasons" attribute. The Hold-Job and Release-Job operations are for holding and releasing held jobs, not pausing and resuming paused jobs.

Access Rights: The authenticated user (see [ipp-mod] section 8.3) performing this operation must either be the job owner of the target job or an operator or administrator of the Printer object (see [ipp-mod] sections 1 and 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.

The Pause-Current-Job Request and Pause-Current-Job Response have the same attribute groups and attributes as the Resume-Printer operation (see [ipp-mod] section 3.2.8), including the new "job-message-from-operator" operation attribute (see section), the new "when" operation attribute (see section), 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.

~~"non-process-run-out" (boolean)~~

~~The client OPTIONALLY supplies this attribute. The Printer object OPTIONALLY supports this attribute, if it is able to perform a non-process-run-out, i.e., remove the last few printed sheets of a job that is finished printing on a continuous forms printer. Normally, on such a printer, the last sheets of a job remain in the printer and are forced out by the next job, thereby saving time when printing one job after another. This attribute indicates whether or not the printer is to perform "non-process-run-out", i.e., move the last printed sheet to the stacker, as part of pausing the job.~~

~~If the client does not supply this attribute and the attribute is supported, the Printer does not perform non-process run-out ('false' behavior). If the Printer does not support this attribute, the Printer is assumed to perform non-process run-out ('true' behavior).~~

~~ISSUE 17: Is the "non-process run-out" operation attribute really needed at all or can the default behavior for Pause-Current-Job be defined to be to perform non-process run-out (for continuous and cut sheet printers)?~~

"synchronize" (boolean)

The client **OPTIONALLY** supplies this attribute. The Printer object **OPTIONALLY** supports this attribute. This attribute indicates whether or not the printer is to synchronize the checkpoint data for the current job being paused with the pages that have actually printed. If this attribute is supported, then a value of 'true' implies that the Printer will be able to resume the job at the point of synchronization when the job is resumed.

If the ~~Printer supports this attribute but the~~ client does not supply ~~it, this attribute and the attribute is supported,~~ the Printer ~~is assumed to does not~~ perform synchronization ('~~false~~'**true**' behavior). If the Printer does not support this attribute, the Printer is assumed to not synchronize ('false' behavior).

~~ISSUE 18: Do we really need the "synchronize" operation attribute or can synchronization be the default behavior of the Pause-Current-Job operation?~~

7.2.5 Resume-Job operation

This **OPTIONAL** operation allows a client to stop the target job and allow other jobs to be processed instead. The Printer moves the target job to the 'pending' state and removes the 'job-paused' value from the job's "job-state-reasons" attribute.

If the target job is not in the 'processing-stopped' state with the 'job-paused' value in the job's "job-state-reasons" attribute, the Printer rejects the request and returns the 'client-error-not-possible' status code, since the job was not paused.

If the Resume-Job operation is supported, then the Pause-Current-Job operation **MUST** be supported, and vice-versa.

Access Rights: The authenticated user (see [ipp-mod] section 8.3) performing this operation must either be the job owner of the target job or an operator or administrator of the Printer object (see [ipp-mod] sections 1 and 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.

The Resume-Job Request and Resume-Job Response have the same attribute groups and attributes as the Release-Job operation (see [ipp-mod] section 3.3.6), including the new "job-message-from-operator" operation attribute (see section).

7.2.6 Promote-Job operation

This OPTIONAL operation allows a client to make the pending target job be processed next after the current job completes. This operation is specially useful in a production printing environment where the operator is involved in job scheduling.

If the target job is in the 'pending' state, this operation does not change the job's state, but causes the job to be processed after the current job(s) complete. If the target job is not in the 'pending' state, the Printer rejects the request and returns the 'client-error-not-possible' status code. The Printer returns the target job immediately after the current job(s) in a Get-Jobs response (see [ipp-mod] section 3.2.6) for the 'not-completed' jobs.

When the current job completes, is canceled, paused, or aborted, the target of this operation is processed next.

If a client issues this request (again) before the target of the operation of the original request started processing, the target of this new request is scheduled before the previous job that was to be processed next.

Note: IPP is specified not to require queues for job scheduling, since there are other implementations for scheduling multiple jobs. However, if an implementation does implement queues for jobs, then the Promote-Job puts the specified job at the front of the queue. A subsequent Promote-Job before the first job starts processing puts that specified job at the front of the queue, so that it is "in front" of the previously promoted job.

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). Otherwise, the IPP object MUST reject the operation and return: 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as appropriate.

The Promote-Job Request and Promote-Job Response have the same attribute groups and attributes as the Cancel-Job operation (see [ipp-mod] section 3.3.3), including the new "job-message-from-operator" operation attribute (see section).

7.2.7 Space-Current-Job operation

This OPTIONAL operation allows a client to repeat or skip a specified number of impressions for the current job on the target Printer or the specified job if it is the current job on the Printer. **The Printer repeats or skips the indicated number of impressions specified by the "back-space" or "forward-space" operation attribute, respectively.** This operation is typically supported in a continuous forms implementation for synchronizing the web after forms run out or media change.

If the client does not supply a "job-id" operation attribute, the Printer MUST accept this request in any state, whether or not there is a current job, and advance or backspace the media the indicated number of impressions specified by the "back-space" or "forward-space" operation attribute, respectively. If

more than one job is in the 'processing' or 'processing-stopped' states, the one that is marking is spaced and the others are unaffected.

It is reasonable (although not mandatory) to perform Space-Current-Job while the printer is stopped, paused or running.

~~Warning: On a shared printer, there is a race condition.~~ Between the time that a user issues this operation and its acceptance, the current job might change to a different job. ~~If the user or operator is authenticated to space the new job, the wrong job is spaced.~~ To prevent this race from spacing the wrong job, the client MAY supply the "job-id" operation attribute which is checked against the current job's job-id. If the job identified by the "job-id" attribute is not the current job on the Printer, i.e., is not in the 'processing' or 'processing-stopped' states, or is not the job that has impressions in the media path even if the job has completed, the Printer MUST reject this operation and return the 'client-error-not-possible' status code. Otherwise, the Printer advances or backspaces the media the indicated number of impressions specified by the "back-space" or "forward-space" operation attribute, respectively.

ISSUE 19: Is the Space-Current-Job reasonable to perform when the current job is in the 'processing' state when paper is still moving?

Access Rights: The authenticated user (see [ipp-mod] section 8.3) performing this operation must either be the job owner of the current job or an operator or administrator of the Printer object (see [ipp-mod] sections 1 and 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.

The Space-Current-Job Request and Space-Current-Job Response have the same attribute groups and attributes as the Resume-Printer operation (see [ipp-mod] section 3.2.8), including the new "job-message-from-operator" operation attribute (see section), 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 support this operation attribute, if it supports this operation.

"back-space" (integer(1:MAX)):

The client OPTIONALLY supplies this Operation attribute. The IPP object OPTIONALLY supports this operation attribute, if it is able to repeat impressions.

If the client supplies a value that specifies more impressions than the job has performed, the job is positioned at the beginning without any indication.

"forward-space" (integer(1:MAX)):

The client OPTIONALLY supplies this Operation attribute. The IPP object OPTIONALLY supports this operation attribute, if it is able to skip impressions.

If the client supplies a value that specifies more impressions than remain in the job, the job is positioned at the end without any indication.

~~"non-process-run-out" (boolean):~~

~~The client OPTIONALLY supplies this operation attribute. The IPP object OPTIONALLY supports this operation attribute, if it is able to perform a non-process-run-out, i.e., remove the last few printed sheets of a job that is finished printing on a continuous forms printer. Normally, on such a printer, the last sheets of a job remain in the printer and are forced out by the next job, thereby saving time when printing one job after another. This attribute indicates whether or not the printer is to perform "non-process-run-out", i.e., move the last printed sheet to the stacker, after spacing the Printer.~~

~~If the client does not supply this attribute and the attribute is supported, the Printer does not perform non-process-run-out ('false' behavior). If the Printer does not support this attribute, the Printer is assumed to perform non-process-run-out ('true' behavior). ISSUE 20: Is the "non-process-run-out" operation attribute really needed at all or can the default behavior for Space-Current-Job be defined to be to perform non-process-run-out (for continuous and cut-sheet printers)?~~

8. References

[ipp-mod]

R. deBry, T. Hastings, R. Herriot, S. Isaacson, P. Powell, "Internet Printing Protocol/1.0: Model and Semantics", <draft-ietf-ipp-model-v11-03.txt>, June, 1999.

[RFC2566]

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

9. Change History

This section summarizes the changes. Each sub-section is in reverse chronological order.

9.1 Changes to the June 30, 1999 version to make the July 19, 1999 version

The following changes to the June 30, 1999 version to make the July 19, 1999 version as a result of the IPP WG meeting in Copenhagen, 7/7/99-7/8/99, and the IPP telecon, 7/14/1999:

1. Sections 2.1 and 2.2: Clarified that the way to remove a message from the operator was for the client to supply a zero-length or all white space text string which is copied as usual to the "xxx-message-from-operator" attribute.

2. Section 2.3: Added "factory-settings" (boolean) operation attribute to the Get-Printer-Attributes operation.
3. Section 2.4: Added the "when" operation attribute to the Pause-Current-Job operation.
4. Section 2.4: Made the "when" operation attribute OPTIONAL for use in operations (Pause-Printer, Reset-Printer, Shutdown-Printer, and Pause-Current-Job operations).
5. Sections 2.5: Added table of operation attributes for the Printer operations to make it easy to compare.
6. Sections 2.6: Added table of operation attributes for the Job operations to make it easy to compare.
7. Section 3.1: Added "settable-attributes" (1setOf type2 keyword) READ-ONLY Printer Description attribute.
8. Section 3.2: Added "printer-controls-other-protocols" (boolean) Printer Description attribute
9. Section 3.3: Added the READ-ONLY "printer-message-time" (integer(MIN:MAX)) Printer Description attribute to keep time message updated in time ticks.
10. Section 4.2: Deleted the 'process-next' "job-state-reasons" value, so that repeated Promote-Job operations promote each job "to the front of the queue".
11. Sections 6.1.1.1 and 6.2.1.1: Replaced the table that listed all attributes with one that lists only the attributes that MUST be READ-ONLY.
12. Section 6.1.1.1: Indicated that attributes that are not specified as READ-ONLY in this document MAY be settable. If they control behavior, that changing their values MUST change the behavior.
13. Section 6.1.1.2 and 6.2.1.2: Deleted the "ipp-attribute-fidelity" operation attribute from the Set-Printer-Attributes and Set-Job-Attributes operations. All set operations are atomic.
14. Section 6.1.1.2: Add the concept of the Interpreter object to handle attributes whose values vary in the Set-Printer-Attributes and Get-Printer-Attributes, depending on the value of the "document-format" operation attribute.
15. Sections 6.1.1.3 and 6.2.1.2: Changed the "out-of-band" 'not-settable' value back to the existing 'not-supported' value.
16. Section 6.1.2 and 6.1.3: Added "job-type" operation attribute to Disable-Printer and Enable-Printer operations with values: 'network-jobs', 'walk-up-jobs', and 'all-jobs'.
17. Section 6.1.5: Clarified that Restart-Printer brings up the Printer disabled and paused, since that is the eventual state that Shutdown-Printer leaves the printer in.
18. Section 6.1.5: Indicated that if Restart-Printer is supported, then Shutdown-Printer MUST be supported.

19. Section 6.1.6: Deleted Space-Printer operation. Keep Space-Current-Job operation only which has a "job-id" operation attribute that a client MAY supply.
20. Section 6.1.6: Clarified that Shutdown-Printer is for a long period of time, not just to reset the device or change attribute values. Also that Shutdown performs an immediate Disable-Printer and an eventual Pause-Printer.
21. Sections 6.2.3, 6.2.4, and 6.2.7 : Added a "job-id" operation attribute to Cancel-Current-Job, Pause-Current-Job, and Space-Current-Job that a client MAY supply to check for race condition where current job changes
22. Section 6.2.4: Combined Pause-Job into Pause-Current-Job operation.
23. Sections 6.2.4 and 6.2.5: Pause-Current-Job puts job in 'processing-stopped' state, not 'pending-held' state.
24. Section 6.2.6: Simplified Promote-Job, so that it behaves as if the job were put at the front of the queue.

9.2 Changes to the July 19, 1999 version to make the September 19, 1999 version

The following changes to the July 19, 1999 version to make the September 19, 1999 version as a result of the IPP WG meeting in Alaska, 8/99:

1. Refer to proposal as "Set2" rather than "Administrative" operations.
2. Revise the emphasis on administrator throughout the document, although the word administrator remains wherever appropriate.
3. Convert non-process-run-out from an operations attribute to an operation.
4. Added Issue 21: For all these "access" caveats, why not just say... 'authentication and access control (see ipp-mod sections 1, 8.3 and 8.5) applies to this operation'.
5. Added Issue 22: Why? This is backward, if you ask me (HRL).
6. Per resolution of Issue 2, the "settable-attributes" Printer Description attribute, was replaced with three Printer Description attributes: "printer-settable-attributes", "job-settable-attributes", and "interpreter-settable-attributes". The latter for those implementations that have different values for Printer attributes in the Get-Printer-Attributes and Set-Printer-Attributes operations, depending on the value of the "document-format" operation attribute supplied by the client. If and when we get a Document object, then we can add a "document-settable-attributes" Printer Description attribute.