

Internet-Draft

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**NOTE: This document still has many rough spots which will need further editing. At this time, the reader should read it for major concepts.**

~~**NOTE: This version (Ver. 0.91) contains changes (over Ver. 0.9) in the following sections: Abstract - minor wording changes; Intro. - minor wording changes; Section 2: Simplified, removed redundant paragraphs; Added Section 3: Old section 2 paragraphs about IPP objects, fixed old section 2.2.2 on Jobs and 2.2.4 on Job Templates; Added Section 4: on naming and directory schemas; Deleted Old section 3 and 4; Section 5: Fixed User Operations (including deletion of empty table rows), Section 6: Major modifications on Object Attributes; All other sections: minor changes, some fixes to security section.**~~

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## 62 Abstract

63 This Internet-Draft specifies an Internet Printing Protocol (IPP).  
64 This protocol is heavily influence by the semantic operations and  
65 attributes defined in ISO/IEC 10175 Document Printing Application  
66 (DPA) parts 1 and 3. It also incorporates some of the  
67 implementation and interoperability lessons learned from other  
68 printing related standards such as POSIX System Administration -  
69 Part 4 (POSIX 1378.4) and X/Open A Printing System  
70 Interoperability Specification(PSIS).

71 IPP is defined as a set of abstract data types and operations. The  
72 operations are implemented using a simple request and response  
73 mechanism built on top of HTTP. The abstract data types are  
74 encoded as simple ASCII text strings.

75 The IPP protocol initially covers only end user operations on  
76 basic print service objects. Future versions of the protocol will  
77 cover operator and administrator operations. Authentication is  
78 realized by mechanisms outside the scope of the protocol, but the  
79 protocol does introduce some access control functionality so that  
80 only authorized end users are allowed to submit print jobs to  
81 devices whose implementation and site policy support ~~with~~-access  
82 control. Also, the Cancel Job operation requires some  
83 authentication ~~and authorization~~ so that jobs can only be canceled  
84 by ~~authorized~~ the end-users who submitted the job. Extended  
85 monitoring and management is possible through other protocols such  
86 as the SNMP Printer MIB [1].. In the areas where there are no  
87 existing standards, some proposed and emerging standards are being  
88 worked (management, security, etc.). As these services become  
89 more stable, this document (and hence the protocol) can be updated  
90 to reflect the integration and relationships with these other  
91 standards.

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## 1. Introduction

The Internet Printing Protocol (IPP) is an application level protocol that can be used for distributed printing on the Internet. The protocol is heavily influenced by the printing model introduced in the Document Printing Application (ISO/IEC 10175 DPA) standard, which describes a distributed printing service. DPA identifies the end ~~user~~ and administrative roles associated with a distributed printing service, and defines the set of operations supported by the service. This IPP specification deals initially only with the end user role. These ideas and concepts, when unified with other Internet protocols and services, realize a distributed print service for the Internet.

## 2. Distributed Printing

This document assumes a distributed computing environment where requesters of print services (clients, applications, PC drivers, etc.) cooperate and interact with print service providers. Although the underlying configuration may be a complex n-tier client/server system, an important simplifying step in this protocol is that the only object the requester of the print service ever sees is a "printer". It is important, however, to understand that in a real system, other components of a print service exist.

### 2.1 Generic Print System Components

Every distributed print service, including those using the Internet Printing Protocol, includes elements from the following list.

- End ~~user~~ Users: End Users are humans (or agents who work on behalf of a human) who submit print jobs.
- Print clients: Print clients are computer network nodes with which humans interact in order to manipulate the distributed print service. A print client uses some protocol to invoke print service operations on another node. Each operation has arguments and results associated with it. The print client provides arguments which add information about the operation requested, and receives results which describe the status and outcome of the operation.
- Print servers: Printer servers may be embedded in an output device or implemented in a separate system which is associated

387 with an output device. The print server receives requests from  
388 the print client and send [s](#) back results which describe the  
389 status and outcome of the operation requested. A print server  
390 normally provides queuing, job management, and device  
391 management functions.

392 - Queues. Print jobs may be queued or stored on a spool prior to  
393 printing. This allows a print service provider to accept one or  
394 more print jobs while the printer (or printers) is busy  
395 processing another job. Queues, if present, may be implemented  
396 in the client, in the server, in the output device, or in some  
397 combination of the three.

398 - Output Devices. Output devices interpret the print data and  
399 generate some form of output. In the case of a laser printer,  
400 for example, this normally means rasterizing the print data and  
401 putting the resulting marks on paper. An output device may  
402 receive print data directly from a client or through a Print  
403 server.

404 A specific implementation of a print service may not include all  
405 of the elements described here, and the physical packaging of  
406 elements is up to the implementation. For example, an output  
407 device may include a queue or a print server may include a  
408 rasterizer.

## 409 2.2 IPP Components

410 The print model defined by the Internet Printing Protocol  
411 simplifies the user's view of the system components described in  
412 the previous section by encapsulating the important elements of  
413 the system into three simple objects:

- 414 - [End Users](#)
- 415 - [Clients](#)
- 416 - Printers (section xxx)
- 417 - Print Jobs (section xxx)
- 418 - Job Templates (section xxx)

419 These objects are not encapsulations of both data and behavior as  
420 in other object oriented models, but are simple collections of  
421 attribute/value pairs. [We may try to fix this in our new design,  
422 but it's not high priority.]  
423

424 Clients interact with these using the following operations:

- 425 - Print (section xxx)
- 426 - Cancel Job (section xxx)
- 427 - Get Attributes(section xxx)
- 428 - Get Jobs (section xxx)

## 429 3. IPP Objects

431 This section describes the IPP objects.



## 3.1 Printer

One of the most significant objects in the IPP model is the Printer. To the end ~~—~~ user, the Printer object represents the functionality of the actual output device along with the queuing, job management, and device management functions often associated with a print server. An IPP Printer object implements the Internet Printing Protocol. Using the protocol, end ~~—~~ users may query the attributes of the Printer, submit jobs to the Printer, determine subsequent states of submitted and queued jobs and state of the Printer, and cancel their own print jobs. The realization of a Printer object may take on different forms for any given configuration of real components. However, the details of the configuration of real components must be transparent to the end ~~—~~ user.

Some examples of [configurations containing an](#) IPP Printer object include:

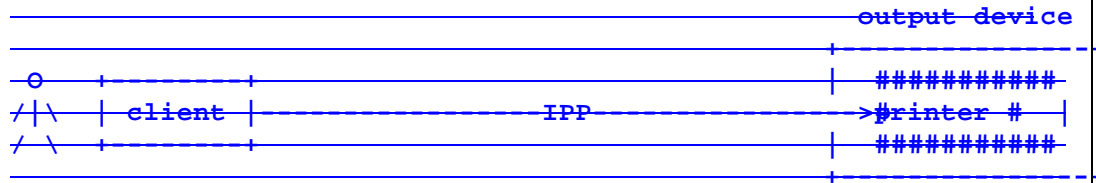
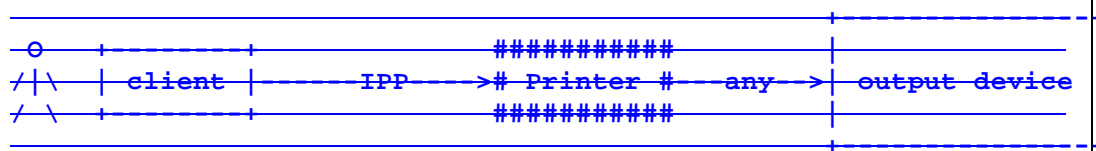
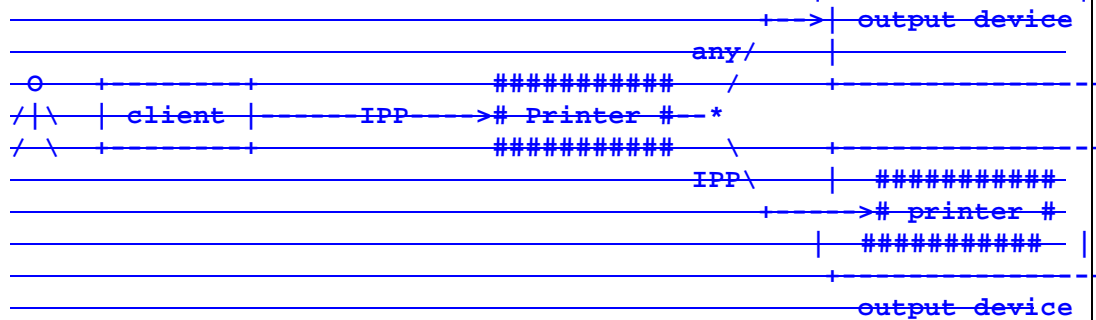
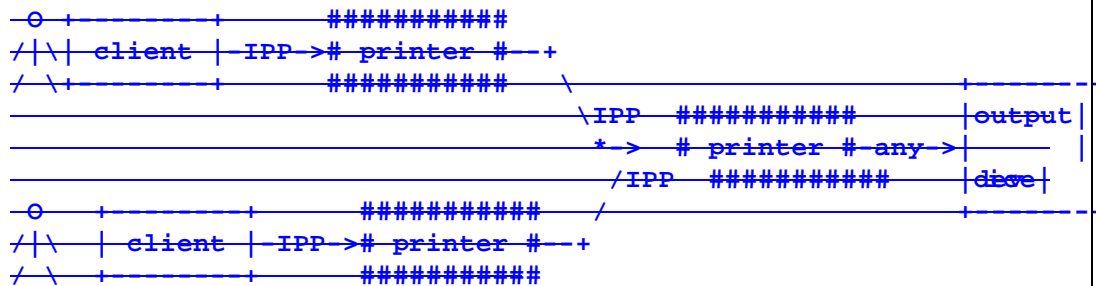
- An output device, with ~~a~~ no spooling capabilities, supporting IPP
- An output device, with a built-in spooler, supporting IPP
- A print server with one or more associated output devices with the print server supporting IPP.
  - The associated output devices may or may not be capable of spooling jobs
  - The associated output devices may or may not support IPP
- A print server with one or more downstream print servers and/or output devices where the upstream print server supports IPP
- [ISSUE: Is this previous example too much?](#)

See the following figures for some examples on how to view IPP Printer objects on top of other printing system models:

**Legend:**

##### indicates an IPP printer object which is either embedded in an output device or is hosted in a server. An IPP printer object may or may not queue/spool.

any indicates any network protocol or direct connect, including IPP

**embedded printer:****hosted printer:****fan out:****fan in:****embedded printer:**

### hosted printer:

A Job object is used to model a job. A job can consist of one or more documents. However, there are no separate document objects. The impact of this is that there are no attributes that pertain to one document in a job but not to others, except for a single attribute that specifies the document data, its location, and its format. Note: In future versions, documents may become separate objects with attributes whose scope and application are different from the corresponding job attributes.

Authors: deBry, Hastings, Herriot, — Isaacson —  
[Page 1110]

- identify the print job(section xxx)
- assist in selecting the Printer (section xxx)
- report job status (section xxx)
- assist in scheduling and processing (section xxx)
- describe the documents in the job (section xxx)
- produce the document (section xxx)

ISSUE: This list needs to b e fixed to match the final job attributes sections (they don't match right now).

### 3.3 Job Template

A Job Template object is used to model job defaults. A Job Template is essentially a set of job attributes that ~~a client references to~~ initialize a newly created job object. ~~Attributes which are sent along with the job at the time the job is submitted override the attributes in the Job Template object.~~

ISSUE: a job template needs more work. It is currently believed that when a client needs to present a Print Dialog box to an end-user, it gets potential job values and default job values from a Printer. The default values are from the Job Template associated with the Printer named by the end-user. If a end-user sends a job to a Printer, the P rinter may set unspecified attributes to the value of the associated Job Template.

### 3.4 Object Relationships

Instances of objects within the system have relationships which must be maintained persistently along with the persistent storage of the objects themselves. A Printer can contain zero, or more Job objects. A Job object contains one or more Documents. A Printer object is associated with one or more Job Template objects.

### 3.5 Object Identity

All instances of all objects have an identifier attribute that makes them unique so that they can be unambiguously referenced. ~~In the object oriented model, these are the globally unique object references which are created by factories or constructors.~~

The following objects have the following mandatory identifier attributes:

Object	Identifier	Containing Object
Printer	printer-name	None
Job	job-identifier	Printer
Job Template	job-template-name	None

## 4. Naming

Clients identify Printer objects by using an HTTP type URL. For example, a URL for a Printer object named "printer-1" whose network node's domain name is "some.domain.com", might look like:

http://some.domain.com/printer-1

In this case, the URL identifies the use of the HTTP protocol. The Printer is located at the node identified by the DNS name "some.domain.com" and "printer-1" is the name of the Printer.

Another example is the following URL:

http://1.2.3.4: ~~3803042~~/printer-2

In this case, the URL identifies the use of the HTTP protocol. The Printer is located at the node identified by the IP address of "1.2.3.4" using port ~~3803042~~ for the HTTP server, and "printer-2" is the name of the Printer.

It is not necessary to expose the Job Template objects that might be associated with a given printer as separate objects. They can be exposed in two ways through URL naming.

- The Job Template can be hidden from the end user by a URL that represents just Job Template name (but does not expose the Printer object name) as the two URLs 1) <http://some.domain.com/two-sided-printer> and 2) <http://some.domain.com/draft-printer>. These look like two different locations, but underneath they represent the same Printer object but using two different Job Template default attribute sets.

- The Job Template can be exposed along with the name of the Printer object directly in the URL as in: <http://some.domain.com/hr-printer/resumes>. In this case there is a "resumes" Job Template associated with the "hr-printer" Printer.

ISSUE: Should IPP propose a new standard port number (say 380) for an HTTP server which has been optimized to support the IPP protocol over that HTTP implmentation? IPP should work for any valid HTTP server, however, there might be some specializations can be performed for IPP operations.

#### 4.1 Directory Services

IPP does not require any specific directory service. However, this specification does define a generic schema that can be used for any specific instance of a directory service. That is, some of the attributes from the Printer object are called out as attributes that may be added to a directory entry which represents that Printer. This allows directory users to find and locate IPP Printers by either a simple name look up or by some filtered attribute search.

#### 4.2 Directory Entry Schema

The following attributes define the generic directory entry schema. All directories entries for IPP Printers in all types of directories should support at least these attributes.

Name, description, owner, location, address

#### 4.2.1 Status

~~[ Such a dynamic value seem like it could be a problem in some name service entries.]~~

~~The printer status field in the directory entry is really a "summary" attribute of the true printer state. The following mapping takes place between the Printer Status attribute in the directory entry and the printer state attribute in the Printer object:~~

~~"Not Connected"~~

~~STATE\_NOT\_CONNECTED~~

~~STATE\_PAUSED\_NOT\_CONNECTED~~

~~"Shutdown"~~

~~STATE\_SHUTDOWN~~

~~"Active"~~

~~STATE\_IDLE~~

~~STATE\_PAUSED~~

~~STATE\_PRINTING~~

~~"Stopped"~~

~~STATE\_STOPPED~~

~~STATE\_PAUSED\_STOPPED~~

~~Even though the Printer may not be up and running, the directory entry still exists in the directory. In this case, the directory entry represents the fact that it may begin running at some future time.~~

#### 4.2.1 Name

This is the printers name. It is a URL so it contains sufficient information to not only name, but to address the printer using IPP as well.

#### 4.2.2 Description

This is a free form string that can contain any site specific descriptive information about this printer.

#### 4.2.3 Location

This is a free form string that can contain any site specific location information.

In order for filtered searches to be more effective, a given site may use some regular structuring within the string values such as "SITE:USA-San Jose,BUILDING: A1,FLOOR:2,ROOM:555" or "department5-2ndFloor-A5-IndianHills-Chicago-IL-USA".

#### 4.2.4 Print Quality

This indicates a somewhat subjective evaluation of the overall printing quality: "high", "medium", or "low".

ISSUE: Does this subsume the need for Resolution and Speed?

~~Authors~~ deBry, Hastings, Herriot, Isaacson

4.2.5 Cost

This indicates a somewhat subjective evaluation of the overall cost of printing at this printer : "high", "medium", or "low".

## 4.2.6 Resolution

This is the maximum resolution of the Printer in dpi. ~~a single valued, maximum resolution in either the horizontal or vertical direction of the print device in dpi.~~

The syntax shall be the same as that of the printer-resolution-select job attribute . That syntax allows a single integer to specify the maximum resolution or a pair of integers to specify the maximum resolution when the x and y dimensions differ. When two integers are specified, the first is in the x direction, ie., the direction fo the shortes t dimension of the medium, so that the value is independent of whether the Printer feeds long edge or short edge first.

## 4.2.7 Color Supported

This is a BOOLEAN for either yes, color printing is supported, or no color printing is not supported.

4.2.8 Fonts Supported

This attribute takes on a list of fonts that are supported by the printer. This is replicated from the fonts-supported attribute in the Printer object.

## 4.2.9 Maximum Speed

This is the maximum speed of the printer ppm, ipm, lpm, or cps. They syntax and values are the same as the maximum-printer-speed Printer attribute. ~~in the units defined in Maximum Speed Units~~

ISSUE: Should this be "high", "medium", and "low"??

~~4.2.10 Maximum Speed Units~~

~~This is the units of the maximum speed rating of the print device. This can be: pages per minute, sheets per minutes, characters per second, etc.~~

ISSUE: Delete ??

4.2.10 ~~Plug and Play~~ Device Id

This is the IEEE P1284 Device Id. This attribute can be used for automatic driver download and other automatic configuration tasks. It can be used to generate a platform specific id such as the Windows Plug-and-Play id.

## 4.2.10 Model

This is a simple text string defined by the manufacturer.

ISSUE: Is this needed if we use the P1284 Device Id??

## 4.2.11 Manufacturer

This is a simple text string defined by the manufacturer. There is no registration, and there is a possibility of overlap, but the goal is to keep this simple, not too complex.

ISSUE: Is this needed if we use the P1284 Device Id??

ISSUE: Would the company name registered with IAN for use in specifying Internet addresses be required? Recommended?

## 4.2.12 Type

This is the printing mechanism of the print device: laser, ink jet, thermal, etc. The syntax and values are the same as for the printer-types Printer attribute. The value of the attribute shall be single-valued, while the printer-types attribute is multi-valued. A Printer that is of several types may appear multiple times in the directory. ISSUE: no.

ISSUE: Is this needed if we use the P1284 Device Id??

4.2.13 Document Formats ~~PDLs~~ Supported

This is a list of all of the document formats ~~page description languages (PDLs)~~ that the printer and/or its interpreter(s) support. The syntax and values are the same as those for the document-formats-supported Printer attributes.

## 4.2.14 Sides Supported

This attribute specifies the capabilities of the Printer for marking on sides of the medium. The syntax and values shall be the same as the sides-supported Printer attribute. Standard values are: 1-sided (simplex), 2-sided-long-binding-edge (duplex), and 2-sided-short-binding-edge (tumble). is either a 1 or a 2 to indicate the maximum number of sides on which the printer can automatically print.

4.2.15 Finishings Supported

This attribute identifies the finishing operations supported by the Printer. The standard finishing objects are defined in the section on the finishing job attribute.



## 5. IPP Operations

~~IPP defines the following end user operations:~~

The following symbols are used in the tables below:

P      perform the operation directly  
 PF     perform the operation; forward to Output Device sometimes  
 UA     unsupported in an Output Device unless it supports queuing  
 U      unsupported operation

IPP defines the following end user operations:

Operation	Print Server	Output Device
Print	PF	P
Cancel Job	PF	P
Get Attributes	PF	P
Get Jobs	PF	P

5.1 IPP Operations Using HTTPAll IPP operations are defined using HTTP as the underlying communication protocol.5.1.1 HTTP OverviewIPP is based on the existing HTTP standard. IPP is a lightweight application-level protocol designed with the Internet in mind. It is a generic, stateless, object-oriented protocol which can be used for any task through extension of its request methods (commands).HTTP allows an open-ended set of methods to be used to indicate the purpose of a request. It builds on the discipline of reference provided by the Uniform Resource Location (URL) and message formats similar to those used by Internet Mail and the Multipurpose Internet Mail Extensions (MIME).HTTP is based on a request-response paradigm. A requesting program (a client) establishes a connection with a receiving program (a server) and sends a request to the server in the form of a request method, a URL, and protocol version, followed by a MIME-like message containing request modifiers, client information, and possibly print data. The server responds with a status line, including its protocol version, and a success or failure code, followed by a MIME-like message containing server information, entity meta-information, and possibly some content.Current practice requires that the connection be established by the client prior to each request and closed by the server after sending the response. Both clients and servers must be capable of handling cases where either party closes the connection

827 prematurely, due to user action, auto mated time out, or program  
 828 failure.

### 829 5.1.2 IPP Operation Encoding

830 IPP messages consist of requests from client to server and  
 831 responses from server to client.

832 HTTP MESSAGE = Request | Response

833  
 834 Requests and responses use the generic message format of RFC 822  
 835 for transferring entities. Both messages may include optional  
 836 header fields and an entity body. The entity body is separated  
 837 from the headers by a null line (a line with nothing preceding the  
 838 CRLF).

839  
 840 Request = Request-line  
 841 \* (General-Header  
 842 | Request-Header  
 843 | Entity-Header)  
 844 CRLF  
 845 [ Entity-Body ]

846  
 847 Response = Status-line  
 848 \* (General-Header  
 849 | Request-Header  
 850 | Entity-Header)  
 851 CRLF  
 852 [ Entity-Body ]

853  
 854  
 855 All IPP headers conform to the syntax

856 IPP Header = field name ":" [field-value] CRLF.

857  
 858 IPP/1.0 defines the octet sequence CR LF as the end-of-line marker  
 859 for all protocol elements except the entity-body. In this  
 860 document, the sequence CR LF is shown as CRLF.

861 Note that HTTP 1.1 defines a slightly different syntax, allowing  
 862 for dynamically generated messages to be transmitted. This would  
 863 be required for cases such as PC driver generated Print  
 864 Operations. HTTP 1.1 defines a message header which specifies a  
 865 transfer encoding called "chunks".

### 866 5.1.2.1 HTTP Request-Header Fields

867 HTTP request header fields allow the client to pass additional  
 868 information about the request, and about the client itself, to the  
 869 server. All header fields are optional and when used it is  
 870 assumed that IPP wo uld use these headers in a standard way. IPP  
 871 requests will be completely encapsulated within the entity body of  
 872 an HTTP request.

873  
 874 HTTP Entity-Header = Content-Encoding  
 875 | Content-Length  
 876 | Content-Type

| extension-header

The **Content-Length** field must always be a valid length. This means that for any Print Operations based on HTTP 1.0, the entire content must be generated before this header can be built. HTTP 1.1 provides the notion of "chunks" which will allow the content to be generated dynamically as the data is sent.

**Content-Type** will always be "Application/IPP".

The http method token indicates the method to be performed on the resource identified by the Request-URL. The method is case-sensitive. The http methods used will be "Post" and "Get".

#### 5.1.2.2 Print

The Print operation allows a user to submit a Print Job to the print server. A Print Job contains the information needed by the Print object to print a document or set of documents. When the print operation is invoked, the Entity-Body included in the HTTP request is an IPP Print Job. The concrete syntax of the Print Job is defined in section xxx. The response to a print request includes the Job Identifier (a URL) assigned by the Printer.

#### 5.1.2.3 Cancel Job

This method allows a user to cancel one specific Print Job any time after the print job has been established on the Printer Object. Some pages may be printed before a job is terminated if printing has already started when the Cancel Job operation is received.

The Cancel HTTP request will be sent to the URL identifying the job to be canceled.

#### 5.1.2.4 Get Attributes

This operation allows a user to obtain information from the Print object concerning jobs, printers, and print queues, based on ISO 10175. The entity-body of the Get Attributes operation contains the set of attributes that the requester is interested in. However, the attribute values may be null and are ignored by the server. The attribute list is returned in the response with the appropriate attribute values filled in. If no attribute list is supplied, then all attributes defined for that object are returned.

#### 5.1.2.5 Get Jobs

The Get Jobs operation allows a client to retrieve attributes of the specified job.

#### 5.1.3 The Print-Job

The entity body of a print request will contain a Print Job, as defined below. The headers defined here are IPP headers, but follow the same syntax as the basic HTTP headers.

Print Job = Print-Job-Object-Header section (1.2.1)  
[Job Attributes] section (1.2.4)  
\*(Documents)  
Job Attribute = Attribute name : Attribute value CRLF  
Document = Document-Header section (1.2.2)  
[Document attributes] section (1.2.5)  
[Content-Header section (1.2.3)  
content]

#### 5.1.3.1 Print Job Object Header

Print-Job-Object Header = Content-Encoding  
Content-Length  
Content-Type  
extension-header

Content-Type is always "IPP Print Object". Other header fields are as defined for HTTP 1.0.

#### 5.1.3.2 Document Header

The document header allows the insertion of multiple documents within a job. At this point only a limited number of document attributes are defined. However, this structure allows the addition of other attributes which can be specified on a document boundary.

Document Header = Content-Encoding  
Content-Length  
Content-Type  
extension-header

Content type is always "IPP Document". Other header fields area as defined in HTTP 1.0.

#### 5.1.3.3 Document-Content Header

The document-content-header provides additional meta-information about the document. The document content header is an optional field and would not be present if the document was pointed to by a document URL attribute. It is composed of a number of document header fields as follows:

Document-Content-Header = Content-Encoding  
Content-Length  
Content-Type  
extension-header

Content-Type is defined as :

Content-Type = Data Stream Format "/" Version

Thus, for example, if the document to be printed was a Postscript Level 2 document, the Content-Type would be specified as:

Content-Type: Postscript/2.0

Other header fields are as defined by HTTP 1.0.

#### 5.1.3.4 Job Attributes

Job attributes are defined in section xxx. Attributes will always be sent as

Job-Attribute = attribute name ":" Attribute value CRLF

Attribute value = Value | \*(Value "," Value)

#### 5.1.3.5 Document Attributes

Document attributes are defined in section yyy. At this point a limited number of attribute may be specified on a document basis. The syntax for a document attribute is

Document-Attribute = attribute name ":" Attribute value CRLF

Attribute value = Value | \*( Value "," Value)

### 5.2 Print Operation

~~When an end-user uses GUI to submit a job, the GUI-client client submits a Print Request according to the syntax and semantics of this standard and receives a Print Response according to this standard. The end-user or submitting application selects a Printer which implies a Job Template. gets an HTML form from the default printer. If the end-user changes the selected printer, the GUI client gets the HTML form from that printer. The HTML form comes with the values supported by the printer and it is initialized by the values from the job template associated with the named printer.~~

[Further work needs to done to define the above concept.]

#### 5.2.1 Print Request

The following abstract data types are part of the Print Request .  
Note: The Printer name is not needed since it is a URL and it is the target of the entire operation. +

~~Printer Name~~      ~~Note: I don't think that this is needed~~

Job and Document Attributes      A set of Job object and Document attributes as defined in section xxx

Job Return Attributes      The set of Job attributes to return in the response

Printer Return Attributes      The set of Printer attributes to return in the response

~~Authors~~ deBry, Hastings, Herriot, Isaacson

Document            Note: What if there are multiple documents and  
Contents            each has a different size? How does this map on  
                     top of the HTTP header that has one size? Does  
                     it require multiple HTTP operations?

1011

1012

1013    5.2.2 Print Response

1014        The following abstract data types are part of the Print Response:

1015

          Job Id            Used for all other operations on this Job.

          Job Status        Job state information

          Printer State     Optional Printer state information

          Message           Optional message Note: Is this needed?

          Errors            Optional Error Information

1016

1017

1018    5.3 Cancel Job Operation

1019    5.3.1 Cancel Job Request

1020        The following abstract data types are part of the Cancel Job

1021        Request. Note: The Job Id is not needed as data within the1022        operation since the Job URL is the target of the entire1023        operation. +

1024

~~Job Id            The identifier of the job to be canceled~~

          Document Number   Optional document number  
                             of the document to  
                             Issue: We don't need this i f we do not allow  
                             canceled of a single document in a multi-  
                             document job, right?

          Message           Optional message to the operator.

1025

1026    5.3.2 Cancel Job Re sponse

1027        The following abstract data types are part of the Cancel Job

1028        Response:

1029

          Job Status        Optional Job status information

          Errors            Optional Error Information

1030

1031    5.4 Get Attributes Operations

1032    5.4.1 Get Attributes Request

1033        The following abstract data types are part of the Get Attributes

1034        Request:

Selector	A Job Id or Printer Name URL <u>ISSUE: Is this just the target URL of the operation and it is not needed here within the operation?</u>
Requested Attributes	A set of attributes in which the requestor is interested

#### 5.4.2 Get Attributes Response

The following abstract data types are part of the Get Attributes Response:

Result Attributes	The requested attributes of the object
Errors	Optional error information

### 5.5 Get Jobs Operation

#### ~~Get Jobs Request~~ 5.5.1 ~~Get~~ Jobs Request

The following abstract data types are part of the Get Jobs Request:

Filtering	A lightweight filtering mechanism, such as all jobs versus a particular <u>end</u> user's jobs.
Requested Attributes	A set of job attributes in which the requestor is interested

#### 5.5.2 Get Jobs Response ~~Get Jobs Response~~

The following abstract data types are part of the Get Jobs Response:

Result Attributes	Attribute set containing the returned results.
Errors	Optional Error Information

## 6. Object Attributes

This section describes the attributes, syntaxes, and values that are part of IPP. The sections below show the objects and their associated attributes which are included within the scope of this protocol. The text in these sections has been heavily influenced by the ISO/IEC 10175 DPA (Final, June 1996).

### 6.1 Attribute Syntaxes

**~~NOTE: This is what Tom has submitted:~~**

1065 ~~Each attribute shall be in one of the following data syntaxes:~~

1066 ~~string arbitrary ASCII strings, no control characters,~~  
 1067 ~~except <SPACE>.~~

1068 ~~string pair strings separated by ":"~~

1069 ~~name arbitrary ASCII strings, no control characters, and~~  
 1070 ~~no <SPACE> char acters.~~

1071 ~~type 1 enum standard names, must revise the standard to add~~  
 1072 ~~a new name. No private names are allowed.~~

1073 ~~type 2 enum standard names, but an implementor can add new~~  
 1074 ~~by proposing them to the PWG for registration~~  
 1075 ~~(or an IANA appointed registry advisor after the~~  
 1076 ~~PWG is no longer certified) anytime. IANA keeps~~  
 1077 ~~the registry.~~

1078 ~~Implementors can add private (un-registered)~~  
 1079 ~~with a suitable distinguishing prefix, such as~~  
 1080 ~~xxx where xxx is the company name~~  
 1081 ~~registered with IANA.~~

1082 ~~type 3 enum standard names, but an implementor can add new~~  
 1083 ~~names by submitting a registration request directly~~  
 1084 ~~to IANA, no PWG or IANA appointed registry advisor~~  
 1085 ~~review is required.~~

1086 ~~Implementors can add private (un-registered) names~~  
 1087 ~~with a suitable distinguishing pr efix, such as~~  
 1088 ~~xxx where xxx is the company name registered with~~  
 1089 ~~IANA.~~

1090 ~~type 3 pair two type 3 enum names separated by ":".~~

1091 ~~cardinal 0 .. n represented as ASCII digits~~

1092 ~~ordinal 1 .. n represented as ASCII digits~~

1093 ~~ordinal pair two ordinals separated by ":"~~

1094 ~~boolean tokens: yes, y, true, or t and no, n, false, or f.~~

1095 ~~date/time date/time in ??? format~~

1096 ~~url Universal Resource Locator~~

1097 ~~octet string arbitrary binary octets~~

1098 ~~string units ordinal followed by type 2 enum units~~

1099

1100

1101 ~~**NOTE: This is what Bob has**~~  
 1102 ~~**submitted:**~~

1103 The sections below reference the following syntax items:

<u>string</u>	<u>arbitrary ASCII strings, no control</u> <u>characters, except &lt;SPACE&gt;.TBD</u>
<u>stringPair</u>	<u>string ":" string</u>
<u>stringState</u>	<u>string state</u>
<u>name</u>	<u>arbitrary ASCII strings, no control</u> <u>characters, and no &lt;SPACE&gt;</u> <u>characters.TBD</u>
<u>URL</u>	<u>Universal Resource LocatorTBD</u>
<u>dateTime</u>	<u>date and time in RFC 822 formatTBD</u>
<u>deltaTime</u>	<u>[hours ":"] minutes</u>
<u>cardinal</u>	<u>0 .. n represent ed as ASCII digits</u>
<u>type1Enum</u>	<u>standard names, must revise the IPP</u> <u>standard to add a new name. No private</u> <u>names are allowed.TBD</u>



<u>type2Enum</u>	<u>standard names, but an implementor can add new TBD by proposing them to the PWG for registration (or an IANA-appointed registry advisor after the PWG is no longer certified) anytime. IANA keeps the registry. Implementors can add private (un-registered) with a suitable distinguishing prefix, such as -xxx- where xxx is the company name registered with IANA.</u>
<u>type3Enum</u>	<u>standard names, but an implementor can add new names by submitting a registration request directly to IANA, no PWG or IANA-appointed registry advisor review is required. Implementors can add private (un-registered) names with a suitable distinguishing prefix, such as -xxx- where xxx is the company name registered with IANA.TBD</u>
<u>type2EnumState</u>	<u>type2Enum state</u>
<u>type3EnumState</u>	<u>type3Enum state</u>
<u>state</u>	<u>TBD</u>
<u>Boolean</u>	<u>tokens: yes, y, true, or t and no, n, false, or f.TBD</u>
<u>positiveInteger</u>	<u>1 .. n represented as ASCII di gitsTBD</u>
<u>positiveIntegerCross</u>	<u>positiveInteger [ "x" positiveInteger ]</u>
<u>positiveIntegerCross</u>	<u>positiveIntegerCross state</u>
<u>State</u>	
<u>positiveIntegerRange</u>	<u>positiveInteger ":" positiveInteger</u>
<u>positiveIntegerUnits</u>	<u>positiveInteger units</u>
<u>positiveIntegerState</u>	<u>positiveInteger state</u>
<u>units</u>	<u>"ppm"   "ipm"   "spm"   "cps"   "lpm"</u>
<u>type3Locale</u>	<u>type3Country ":" type3Language ":" type3CodeSet</u>
<u>type3Country</u>	<u>type3Enum</u>
<u>type3Language</u>	<u>type3Enum</u>
<u>type3CodeSet</u>	<u>type3Enum</u>
<u>type2Format</u>	<u>name [ "/" version ]</u>
<u>version</u>	<u>name</u>
<u>type3LocaleSt ate</u>	<u>type3Locale state</u>

1104 ~~string: TBD~~  
1105 ~~stringPair: string ":" string~~  
1106 ~~stringState: string state~~  
1107 ~~name: TBD~~  
1108 ~~URL: TBD~~  
1109 ~~dateTime: TBD~~  
1110 ~~deltaTime: [hours ":" ] minutes~~  
1111 ~~cardinal: TBD~~  
1112 ~~type1Enum: TBD~~  
1113 ~~type2Enum: TBD~~  
1114 ~~type3Enum: TBD~~  
1115 ~~type2EnumState: type2Enum state~~  
1116 ~~type3EnumState: type3Enum state~~  
1117 ~~state: TBD~~  
1118 ~~Boolean: TBD~~  
1119 ~~positiveInteger: TBD~~  
1120 ~~positiveIntegerCross: positiveInteger [ "x" positiveInteger ]~~  
1121 ~~positiveIntegerCrossState: positiveIntegerCross state~~  
1122 ~~positiveIntegerRange: positiveInteger ":" positiveInteger~~

```

positiveIntegerUnits: positiveInteger units
positiveIntegerState: positiveInteger state
units: "ppm" | "ipm" | "spm" | "cps" | "lpm"
type3Locale: type3Country ":" type3Language ":" type3CodeSet
type3Country: type3Enum
type3Language: type3Enum
type3CodeSet: type3Enum
type2Format: name [ "/" version ]
version: name
type3LocaleState: type3Locale state

```

## 6.2 Job Attributes

A job object contains a set of job attributes and one or more documents. A client shall create a job and send it to a server using the Print operation. A client may use a job template associated with the selected printer in order to initialize the job.

Each section heading below contains the name of an attribute and its syntax in parentheses using the rules of RFC 822.

### 6.2.1 Job Informational Attributes (Set by a Client [/End User](#))

The client may specify these attributes in the Print operation to provide information to identify a print -job.

The client may also specify these attributes in the operations: Get-Attributes, and Get-Jobs.

#### 6.2.1.1 job-name (string)

This attribute supplies a human readable string for naming the print-job.

This attribute is intended for to be printed on a start sheet, returned in a Get-Jobs result, or used in notification messages.

If the client does not specify this attribute, a Printer shall set it to the name of the file of the first document in the job.

### 6.2.2 Job Informational Attributes (Set by a Printer )

The Print shall add all of these attributes to a job to provide information to identify a print -job.

The client may specify these attributes in the operations: Get-Attributes and Get-Jobs, but not in Print.

6.2.2.1 job-identifier ( ~~urlstring~~ )

This attribute provides the job -identifier for this job on the Printer. The Printer shall generate a job -identifier value as a URL that is unique on that Printer, but need not be unique across the distributed environment.

The value of the job -identifier attribute shall be returned by the Printer as part of the PrintResult in the Print operation.

## 6.2.2.2 job-originator (name)

This attribute specifies the name of the person submitting the print job. The Printer shall set this attribute to the most authentic name that it can obtain from the client. The operation-user-name attribute is intended to be a source of the most authentic name.

## 6.2.2.3 job-originating-host (name)

This attribute identifies the originating host of the job. The Printer shall set this attribute to the value of the operation-host-name which is intended to be the most authentic host name of the client.

## 6.2.2.4 notification-address (name)

This address specifies the email address of the client. The client specifies this attribute in the operation- notification-address attribute which the Printer in turn uses to set this attribute.

The Printer shall use this attribute as the address for sending messages to a job submitter when an event occurs that the end user has registered an interest in or when certain other events occur, such as Cancel-Job.

Note: The only type of notification is email.

ISSUE: can the email address be inferred with job-originator and the originating-host.

## 6.2.2.5 job-locale (type3Locale)

This attribute identifies the locale of the job. The Printer sets this attribute from the value of the operation-locale.

The Printer shall use this attribute to determine the locale for notification messages that it sends.

The type3EnumTrip consists of 3 colon separated type 3 enums. The first shall be is the two-character country code from ISO 639. The second shall be is the two-character language code from ISO 3166. The third is the code-set from the IANA Code Set Registry.

ISSUE: is there a more standard syntax for locale?

1206  
1207  
1208  
1209  
1210

### 1211 6.2.3 Printer Selection Attributes (Set by Client/End User)

1212 The client shall specify this attribute to select a particular  
1213 Printer.

1214 The client may also specify these attributes in the operations:  
1215 Get-Attributes, and Get-Jobs.

1216 **Issue:** this attribute may be implicit in the specified URL in the  
1217 Print operation.

#### 1218 6.2.3.1 printer-name-requested (URL)

1219 This attribute identifies the printer that the client requests  
1220 for printing the job.

1221 ISSUE: We decided to delete this attri bute!

### 1222 6.2.4 Job Status Attributes (Set by Printer)

1223 The Printer shall add these attributes to a job when a client  
1224 submits a job, and the Printer shall assign appropriate values to  
1225 each such job -status attribute.  
1226

1227 The Printer uses these attributes to specify the job status  
1228 before, during and after the processing of the print -job by the  
1229 Printer.

1230 The client may specify job -status attributes in: Get-Attributes  
1231 and Get-Jobs, but not Print.

#### 1232 6.2.4.1 current-job-state (typeName) 1233

1234 This attribute identifies the current state of the job with the  
1235 following values: unknown, pre-processing, pending, processing,  
1236 printing, held, terminating, retained, completed.

<u>unknown</u>	<u>The job state is not known, or is indeterminate.</u>
<u>pre-processing</u>	<u>The job has been created on the server by the create-job sub-operation of the print-request, but a print-request with a TRUE value for the job-submission-complete component of the PrintArgument has not yet been received and no document has started processing. The job maybe in the process of being checked by the server for attributes, defaults being applied, a printer being selected, etc.</u>

<u>held</u>	<u>The job is waiting to be released for scheduling for any number of reasons as specified by the value of the job's job-state-reasons attribute.</u>
<u>pending</u>	<u>The job's job-submission-complete attribute is TRUE since the server has received a print-request with the job-submission-complete parameter TRUE and the job is waiting to start processing on a printer.</u>
<u>processing</u>	<u>The server is processing the job, or has made the job ready for printing, but the output device is not yet printing it, either because the job hasn't reached the output device or because the job is queued in the output device or some other spooler, awaiting the output device to print it.</u>
<u>printing</u>	<u>The server has completed processing the job and the output device is currently printing the job on at least one printer. That is, a print engine is either printing pages of the job, or failing in its attempt to print pages of the job because of some wait state, such as, start-wait, end-wait, needs-attention, etc. The complete job state includes the detailed status represented in the printers' printer-state attribute(s).</u>
<u>paused</u>	<u>The job has been paused as a result of a PauseJob operation.</u>
<u>interrupted</u>	<u>The job was interrupted by the InterruptJob request for an intervening job, and shall resume processing automatically once the intervening job has completed.</u>
<u>terminating</u>	<u>The job has been cancelled by a CancelJob request or aborted by the server and is in the process of terminating. The job's job-state-reasons attribute contains the reasons that the job is being terminated.</u>
<u>retained</u>	<u>The job is being retained at the server as a result of the job's job-retention-period being non-zero. The job has (1) completed successfully or with warnings or errors, (2) been aborted while printing by the server, or (3) been cancelled by the CancelJob request before or during processing. The job's job-state-reasons attribute contains the reasons that the job has been retained.</u> <u>While in the retained state, all of the job's document data (and resources, if any) shall be retained by the server; thus a job in the retained state could be reprinted, using some means outside the scope of ISO/IEC 10175-Part 1.</u>

completedThe job has:

- (1) completed successfully or with  
warnings or errors,
- (2) been aborted by the server while  
printing, or
- (3) been cancelled by the CancelJob  
request,

AND the job's:

- (1) job-retention-period was zero or has  
expired, or
- (2) job-discard-time has arriv ed.

The job's job-state-reasons attribute contains  
the reason(s) that the job has been completed.  
While in the completed state, a job's document  
data (and resources if any) need not be  
retained by the server; thus a job in the  
completed state could not be reprinted. The  
length of time that a job may be in this  
state, before transitioning to unknown, is  
implementation-dependent. However, servers  
that implement the completed job-state shall  
retain, as a minimum, the following attributes  
for any job in the co mpleted state: job-  
identifier, job-owner, job-name, current-job-  
state, printers-assigned, and job-state-  
reasons.

1237

1238       The IPP protocol supports all values for job states, but Printers  
1239       are need only support those states which are appropriate for the  
1240       particular implementation.

## 1241     6.2.4.2 printer-assigned (name)

1242       This attribute identifies the Output Device to which the Printer  
1243       has assigned this job.

1244       If an Output Device implements a Printer, the Printer does not set  
1245       this attribute.

1246       If a Print Server implements a Printer, the value shall be empty  
1247       until the Printer assigns an Output Device to the job..

1248       **ISSUE:** Is this attribute appropriate for a model in which we are  
1249       hiding the downstream Printer.   The printers -assigned value shall  
1250       not be the same as the printer requested by the end user.

1251       The value of the job's printer -assigned attribute shall remain  
1252       after the job has completed, so that end users can determine the  
1253       Output Device on which the job was printed.

## 1254     6.2.4.3 submission-time (dateTime)

1255       This attribute indicates the time at which ~~the~~ this job was  
1256       accepted by the Printer. If the Printer does not support the  
1257       notion of time, the attribute is not stored as part of the job  
1258       object.

## 1259 6.2.4.4 job-message-from-administrator (string)

1260 This attribute provides a message from an operator, system  
 1261 administrator or 'intelligent' process to indicate to the [end](#) user  
 1262 the reasons for modification or other management action taken on a  
 1263 job.

## 1264 6.2.4.5 completion-time (dateTime)

1265 This attribute indicates the time at which this job completed.  
 1266 This time is useful for jobs which are retained after printing.  
 1267 [If the Printer does not support the notion of time, the attribute](#)  
 1268 [is not stored as part of the Job object.](#)

## 1269 6.2.4.6 job-state-reasons (1#type2Enum)

1270 This attribute identifies the reason or reasons that the job is in  
 1271 the state that it is in (e.g., held, terminating, retained,  
 1272 completed, etc.). The printer shall indicate the particular  
 1273 reason(s) by setting the value of the job -state-reasons attribute.  
 1274 It is valid for the printer to set the value of the  
 1275 job-state-reasons attribute to the empty set.

1276 The following standard values are defined:

<a href="#">documents-needed</a>	<a href="#">The complete job has been accepted by the server (the value of the job-submission-complete element was TRUE in the last print-request for the job), but the server is waiting for its files to be transferred before the job can be scheduled to be printed.</a>
<a href="#">job-hold-set</a>	<a href="#">The value of the job's job-hold attribute is TRUE.</a>
<a href="#">job-print-after-specified</a>	<a href="#">The value of the job's job-print-after attribute has specified a time specification that has not yet occurred.</a>
<a href="#">Required-resources-not-ready</a>	<a href="#">At least one of the resources needed by the job, such as media, fonts, resource objects, etc., is not ready on any of the physical printer's for which the job is a candidate.</a>
<a href="#">Successful completion</a>	<a href="#">The job completed successfully.</a>
<a href="#">Completed-with-warnings</a>	<a href="#">The job completed with warnings.</a>
<a href="#">Completed-with-errors</a>	<a href="#">The job completed with errors (and possibly warnings too).</a>
<a href="#">Cancelled-by-user</a>	<a href="#">The job was cancelled by the user using the CancelJob request.</a>
<a href="#">Cancelled-by-operator</a>	<a href="#">The job was cancelled by the operator using the CancelJob request.</a>
<a href="#">Aborted-by-system</a>	<a href="#">The job was aborted by the system.</a>
<a href="#">Logfile-pending</a>	<a href="#">The job's logfile is pending file transfer.</a>
<a href="#">Logfile-transferring</a>	<a href="#">The job's logfile is being transferred.</a>

1277

1278 ~~documents needed, job hold set, job print after specified, job~~  
 1279 ~~off peak specified, required resources not ready, successful~~

1280 ~~completion, completed with warnings, completed with errors,~~  
1281 ~~cancelled by user, cancelled by operator, aborted by system,~~  
1282 ~~logfile pending, logfile transferring~~impressions completed  
1283 ~~(cardinal)~~

#### 1284 6.2.4.7 impressions-completed (cardinal)

1285 This attribute contains the number of impressions that the Printer  
1286 has completed printing. If the Printer cannot report this number,  
1287 the Printer leaves this attribute unspecified.

#### 1288 6.2.4.8 media-sheets-completed (cardinal)

1289 This attribute contains the number of media-sheets that the  
1290 Printer has completed printing. If the Printer cannot report this  
1291 number, the Printer leaves this attribute unspecified.

#### 1292 6.2.5 Job Sheet Attributes (Set by Client/End User)

1293 The client shall specify these attributes to control the printing  
1294 of ~~of~~ job sheets.

1295 The client may also specify job sheet attributes in: Get-  
1296 Attributes and Get-Jobs.

1297 job-sheets (type3Enum) This attribute determines what type of job-  
1298 sheets the Printer shall print with the job.

1299 The standard values are: none, and default-sheet.

1300 The value 'nNone' means that the Printer shall print no job  
1301 sheets. The value 'dDefault-sheet' means that the Printer shall  
1302 print the job sheets defined by an administrator. If the  
1303 administrator's policy is not to support none, the Printer shall  
1304 use the default-sheet value if the client supplies the "none"  
1305 value.

#### 1306 6.2.6 Notification Attributes (Set by a Client/End User)

1307 The client shall specify these attributes to indicate events that  
1308 the client is interested in.

1309 The client may also specify notification attributes in: Get-  
1310 Attributes and Get-Jobs.

##### 1311 6.2.6.1 notification-events (#type1Enum)

1312 This attribute specifies the events about which the end user want  
1313 to be notified.

1314 This attribute will support ~~four~~three events classes: none, job-  
1315 completion, job-problems and printer-problems. ~~, If attribute~~  
1316 ~~contains no values, then the client is requesting no notification.~~

1317 If this attribute contains the event none, the Printer shall not  
1318 notify. This value is useful if an administrator has set up a  
1319 notification Printer default but the end user does not which



notification. If the none value and other values are supplied,  
the Printer shall ignore the none value.

This attribute will support only one delivery method, namely email. The attribute notification-address specifies the email address.

If this attribute contains the event job-completion, the Printer shall notify the client when the job containing this attribute completes.

If this attribute contains the event job-problem, the Printer shall notify the client when the job containing this attribute has a problem while the job is printing. Problems include: paper jam and out-of-paper.

If this attribute contains the event printer-problem, the Printer shall notify the client when the job containing this attribute has a problem while the job is printing or waiting to print. Problems include: paper jam and out-of-paper.

~~ISSUE: is there a problem with an attribute with an empty value being different from no attribute. Otherwise, we need a special value of 'none'. 'none', unlike other values should not be combined with other values. This particular case does not seem like a case where an administrator wants to prevent the use of 'none', so empty seems like a good solution.~~

**ISSUE:** Email is quite deficient for timely notification to an end-user who receives a lot of email, but there are no other choices. The internet community needs to solve this problem, perhaps with an extremely-urgent email. Intranet usage may have other solutions.

#### 6.2.7 Job Scheduling Attributes (Set by Client/End User)

The client shall specify these attributes to provide the Printer with information for the scheduling a print -job.

The client may also specify these attributes in: Get-Attributes and Get-Jobs.

~~job hold (Boolean) This attribute specifies whether the print job is a candidate for scheduling for printing or not, when the Printer would otherwise place the job in the pending or processing states~~

~~When the value is FALSE, the Printer shall not hold the job from being scheduled for printing, unless there are other reasons (see the current job state and the job state reasons job status attributes).~~

~~When the value is TRUE, the Printer shall place the job in the held state and add the job hold set value to the job's job state reasons attribute and shall not schedule the print job for printing. If the job enters the held state because its job hold attribute was TRUE, a client shall reset the job's~~

1366 ~~job hold attribute to FALSE by means of the ModifyJob operation~~  
 1367 ~~before the printer can schedule the job for printing. When the~~  
 1368 ~~value is set to FALSE as a result of the ModifyJob operation, the~~  
 1369 ~~printer shall remove the job hold set value from the~~  
 1370 ~~job state reasons attribute and, if no other reasons remain, shall~~  
 1371 ~~change the job's current job state to pending so that the job~~  
 1372 ~~becomes a candidate for being scheduled on printer(s).~~

1373 ~~ISSUE: the above few sentences assume a ModifyJob operation, which~~  
 1374 ~~is not in version 1.0. But without this operation, the job hold~~  
 1375 ~~operation is not very useful. Perhaps we should remove job hold.~~

#### 1376 6.2.7.1 job-priority (typeName)

1377 This attribute specifies a priority for scheduling the print -job.  
 1378 Printers that employ a priority -based scheduling algorithm use  
 1379 this attribute.

1380 There are three standard values: high, defaultmedium, and low.  
 1381 Among those jobs that are ready to print, a Printer shall print  
 1382 all such jobs with a high priority before printing those with a  
 1383 defaultmedium or low priority, and a Printer shall print all such  
 1384 jobs with a defaultmedium priority before printing those with a  
 1385 low priority.

1386 If the client does not specify this attribute, the Printer assumes  
 1387 that the end user places no constraints concerning priority on the  
 1388 scheduling of the print -job, and it has a priority value of  
 1389 default~~the value of the Printer's maximum end-user priority~~  
 1390 ~~attribute. If that attribute is unspecified, the Printer uses the~~  
 1391 ~~value of 'high'.~~

1392 An operator can modify a job to have any priority. An end-user is  
 1393 restricted ~~byte~~ to the value of the maxium-end-user-priority ~~p~~Printer  
 1394 attribute .maximum end user priority.

#### 1395 6.2.7.2 job-print-after (dateTime)

1396 This attribute specifies the calendar date and time of day after  
 1397 which the print-job shall become a candidate for printing.

1398 If the value of this attribute is in the future, the Printer shall  
 1399 set the value of the job's **current-job-state** to **held** and add the  
 1400 **job-print-after-specified** value to the job's **job-state-reasons**  
 1401 attribute and shall not schedule the print-job for printing until  
 1402 the specified date and time has passed. When the specified date  
 1403 and time arrives, the Printer shall remove the **job-print-after-**  
 1404 **specified** value from the job's **job-state-reason** attribute and, if  
 1405 no other reasons remain, shall change the job's **current-job-state**  
 1406 to **pending** so that the job becomes a candidate for being scheduled  
 1407 to print.

1408 If this attribute is unspecified or the value is in the past, the  
 1409 job shall be a candidate for scheduling immediately.

1410

## 6.2.7.3 job-print-off-peak (type3Enum)

This attribute specifies the off-peak period during which the print-job shall become a candidate for printing.

Standard values are: 'evening', 'night', 'weekend', 'second-shift', 'third-shift'.

If this attribute is specified, it contains a value with which an administrator has associated allowable print times. An administrator is encouraged to pick names that suggest the type of off-peak period , such as 'night', 'weekend', 'thirdShift'.

If this attribute is unspecified, the job shall be a candidate for scheduling immediately.

## 6.2.7.4 job-retention-period (deltaTime)

The retention time is expressed in hours and minutes, e.g. 6:00 (6 hours), or 20 (20 minutes).

This attribute specifies the minimum period of time following the completion of job processing and printing that the server shall keep job attributes and document data. The Printer may keep these attributes and data longer than the value of the job-retention-period attribute.

ISSUE: Should this be deleted?

6.2.8 Job Production Attributes (Set by Client/End User)

The client shall specify these attributes to affect the rendering, production and finishing of the document s in the job. Similar types of instructions may also be contained in the document to be printed.

If there is a conflict between the value of one of these attributes, and a corresponding instruction in the document (either implicit or explicit), the value of the attribute shall take precedence over the document instruction.

Job Production and Resource Attributes each address a similar set of features but they have different uses.

A job production attribute provides a client with a way to request some feature that is not embedded within the document data. After some program has merged the production attributes into the document data After the information from these attributes has been folded into the document data (possibly during a translation process of the document data), these attributes are no longer relevant and shall can be discarded from a job. Instead, the resource attributes specify the resources needed to print the job as modified by the job production attributes.

Note: until companies that supply interpreters for PDL's, such as PostScript and PCL allow a way to specify overrides for internal job production instructions, a Printer may not be able to implement these attributes for some PDL's.

A job resource attribute tells a Printer what features the job needs. A program that translates document data to a Printer's PDL, and/or merges production attributes into the document data should add job resource attributes to a job.

For example, a job production attribute medium-select with the value of 'letter' requests that a job be printed on letter paper, but gives no information about what resources the job needs. A resource production attribute media-used with the values of 'letter' and 'ledger' tell a Printer that the job needs letter and ledger paper, but gives no information about which pages use each medium.

~~After the information from these attributes has been folded into the document data (possibly during a translation process of the document data), these attributes are no longer relevant and can be discarded from a job. Instead, the resource attributes specify the resources needed to print the job as modified by the job production attributes.~~  
Note: until companies that supply interpreters for PDL's, such as PostScript and PCL allow a way to specify overrides for internal job production instructions, a Printer may not be able to implement these attributes for some PDL's.

The client may also specify document production -instruction attributes in: Get-Attributes and GetJobs.

#### 6.2.8.1 medium-select (type2Enum)

This attribute identifies the medium that the Printer shall use for all pages of the document regardless of what media are specified within the document.

The values for medium include medium-names, medium-sizes, input-trays and electronic forms so that one attribute specifies the media.

Standard values are defined (taken from ISO DPA and the Printer MIB)+

~~TBD~~

<u>default</u>	<u>The default medium for the output device</u>
<u>iso-a4-white</u>	<u>Specifies the ISO A4 white medium</u>
<u>iso-a4-coloured</u>	<u>Specifies the ISO A4 coloured medium</u>
<u>iso-a4-transparent</u>	<u>Specifies the ISO A4 transparent medium</u>
<u>iso-a3-white</u>	<u>Specifies the ISO A3 white medium</u>
<u>iso-a3-coloured</u>	<u>Specifies the ISO A3 coloured medium</u>
<u>iso-a5-white</u>	<u>Specifies the ISO A5 white medium</u>
<u>iso-a5-coloured</u>	<u>Specifies the ISO A5 coloured medium</u>

<u>iso-b4-white</u>	<u>Specifies the ISO B4 white medium</u>
<u>iso-b4-coloured</u>	<u>Specifies the ISO B4 coloured medium</u>
<u>iso-b5-white</u>	<u>Specifies the ISO B5 white medium</u>
<u>iso-b5-coloured</u>	<u>Specifies the ISO B5 coloured medium</u>
<u>jis-b4-white</u>	<u>Specifies the JIS B4 white medium</u>
<u>jis-b4-coloured</u>	<u>Specifies the JIS B4 coloured medium</u>
<u>jis-b5-white</u>	<u>Specifies the JIS B5 white medium</u>
<u>jis-b5-coloured</u>	<u>Specifies the JIS B5 coloured medium</u>

1494

1495

1496

The following stand ard values are defined for North American media:

<u>na-letter white</u>	<u>Specifies the North American letter white medium</u>
<u>na-letter coloured</u>	<u>Specifies the North American letter coloured medium</u>
<u>na-letter transparent</u>	<u>Specifies the North American letter transparent medium</u>
<u>na-legal white</u>	<u>Specifies the North American legal white medium</u>
<u>na-legal coloured</u>	<u>Specifies the North American legal coloured medium</u>

1497

1498

The following standard values are defined for envelopes:

<u>iso-b4-envelope</u>	<u>Specifies the ISO B4 envelope medium</u>
<u>iso-b5-envelope</u>	<u>Specifies the ISO B5 envelope medium</u>
<u>iso-c3-envelope</u>	<u>Specifies the ISO C3 envelope medium</u>
<u>iso-c4-envelope</u>	<u>Specifies the ISO C4 envelope medium</u>
<u>iso-c5-envelope</u>	<u>Specifies the ISO C5 envelope medium</u>
<u>iso-c6-envelope</u>	<u>Specifies the ISO C6 envelope medium</u>
<u>iso-designated-long-envelope</u>	<u>Specifies the ISO Designated Long envelope medium</u>
<u>na-10x13-envelope</u>	<u>Specifies the North American 10x13 envelope medium</u>
<u>na-9x12-envelope</u>	<u>Specifies the North American 9x12 envelope medium</u>
<u>monarch-envelope</u>	<u>Specifies the Monarch envelope</u>
<u>na-number-10-envelope</u>	<u>Specifies the North American number 10 business envelope medium</u>
<u>na-7x9-envelope</u>	<u>Specifies the North American 7x9 inch envelope</u>
<u>na-9x11-envelope</u>	<u>Specifies the North American 9x11 inch envelope</u>
<u>na-10x14-envelope</u>	<u>Specifies the North American 10x14 inch envelope</u>
<u>na-number-9-envelope</u>	<u>Specifies the North American number 9 business envelope</u>
<u>na-6x9-envelope</u>	<u>Specifies the North American 6x9 inch envelope</u>
<u>na-10x15-envelope</u>	<u>Specifies the North American 10x15 inch envelope</u>

1499

1500

1501

The following standard values are defined for the less commonly used media (white-only):

<u>executive-white</u>	<u>Specifies the white executive medium</u>
<u>folio-white</u>	<u>Specifies the folio white medium</u>
<u>invoice-white</u>	<u>Specifies the white invoice medium</u>
<u>ledger-white</u>	<u>Specifies the white ledger medium</u>
<u>quarto-white</u>	<u>Specified the white quarto medium</u>
<u>iso-a0-white</u>	<u>Specifies the ISO A0 white medium</u>
<u>iso-a1-white</u>	<u>Specifies the ISO A1 white medium</u>
<u>iso-a2-white</u>	<u>Specifies the ISO A2 white medium</u>
<u>iso-a6-white</u>	<u>Specifies the ISO A6 white medium</u>
<u>iso-a7-white</u>	<u>Specifies the ISO A7 white medium</u>
<u>iso-a8-white</u>	<u>Specifies the ISO A8 white medium</u>
<u>iso-a9-white</u>	<u>Specifies the ISO A9 white medium</u>
<u>iso-l0-white</u>	<u>Specifies the ISO A10 white medium</u>
<u>iso-b0-white</u>	<u>Specifies the ISO B0 white medium</u>
<u>iso-b1-white</u>	<u>Specifies the ISO B1 white medium</u>
<u>iso-b2-white</u>	<u>Specifies the ISO B2 white medium</u>
<u>iso-b3-white</u>	<u>Specifies the ISO B3 white medium</u>
<u>iso-b6-white</u>	<u>Specifies the ISO B6 white medium</u>
<u>iso-b7-white</u>	<u>Specifies the ISO B7 white medium</u>
<u>iso-b8-white</u>	<u>Specifies the ISO B8 white medium</u>
<u>iso-b9-white</u>	<u>Specifies the ISO B9 white medium</u>
<u>iso-b10-white</u>	<u>Specifies the ISO B10 white medium</u>
<u>jis-b0-white</u>	<u>Specifies the JIS B0 white medium</u>
<u>jis-b1-white</u>	<u>Specifies the JIS B1 white medium</u>
<u>jis-b2-white</u>	<u>Specifies the JIS B2 white medium</u>
<u>jis-b3-white</u>	<u>Specifies the JIS B3 white medium</u>
<u>jis-b6-white</u>	<u>Specifies the JIS B6 white medium</u>
<u>jis-b7-white</u>	<u>Specifies the JIS B7 white medium</u>
<u>jis-b8-white</u>	<u>Specifies the JIS B8 white medium</u>
<u>jis-b9-white</u>	<u>Specifies the JIS B9 white medium</u>
<u>jis-b10-white</u>	<u>Specifies the JIS B10 white medium</u>

1502

1503 The following standard values are defined for engineering media:

<u>a</u>	<u>Specifies the engineering A size medium</u>
<u>b</u>	<u>Specifies the engineering B size medium</u>
<u>c</u>	<u>Specifies the engineering C size medium</u>
<u>d</u>	<u>Specifies the engineering D size medium</u>
<u>e</u>	<u>Specifies the engineering E size medium</u>

1504

1505 6.2.8.2 number-up (positiveInteger)

1506 This attribute specifies the number of source page -images to  
 1507 impose upon a single side of an instance of a selected medium. —

1508 In general, only certain numeric values are valid for this  
 1509 attribute, depending upon the Printer implementation to which the  
 1510 print-request is directed. Typical supported values are 2 and 4.  
 1511 If this attribute is unspecified or has a value of 1, then the  
 1512 Printer does not apply any number-up transformation to the pages.

1513 This attribute primarily controls the translation, scaling and  
 1514 rotation of page images, but a site may choose to add  
 1515 embellishments, such as borders to each logical page.

1516 ISSUE: should there be a separate attribute to control  
 1517 embellishments, especially for the 1-up case [?-](#)

#### 1518 6.2.8.3 ~~-finishing~~ (type2Enum)

1519 This attribute identifies the finishing operation that the Printer  
 1520 should apply to each copy of the printed document. Examples  
 1521 include stapling, saddle -stitching, hole -drilling, binding with  
 1522 tape, etc.

1523 Standard values for this attribute ~~are are: include:TBD.~~

<a href="#"><u>staple</u></a>	<a href="#"><u>This indicates that staples are to be used to bind the document. The exact number and placement of the staples is site-defined; other finishing object attributes may be included to provide this information.</u></a>
<a href="#"><u>staple-top-left</u></a>	<a href="#"><u>This indicates that one or more staples should be placed on the top left corner of the document</u></a>
<a href="#"><u>staple-bottom-left</u></a>	<a href="#"><u>This indicates that one or more staples should be placed on the bottom left corner of the document</u></a>
<a href="#"><u>staple-top-right</u></a>	<a href="#"><u>This indicates that one or more staples should be placed on the top right corner of the document</u></a>
<a href="#"><u>staple-bottom-right</u></a>	<a href="#"><u>This indicates that one or more staples should be placed on the bottom right corner of the document</u></a>
<a href="#"><u>saddle-stitch</u></a>	<a href="#"><u>This indicates that one or more staples (wire stitches) are to be used to bind the document along the middle fold. The exact number and placement of the stitches is site-defined.</u></a>
<a href="#"><u>edge-stitch</u></a>	<a href="#"><u>This indicates that one or more staples (wire stitches) are to be used to bind the document along one edge. The exact number and placement of the staples is site-defined.</u></a>
<a href="#"><u>punch</u></a>	<a href="#"><u>This indicates that holes are required in the finished document. The exact number and placement of the holes is site-defined. The punch specification may be satisfied (in a site- and implementation-specific manner) either by drilling/punching, or by substituting predrilled media.</u></a>
<a href="#"><u>cover</u></a>	<a href="#"><u>This value is specified when it is desired to select a non-printed (or pre-printed) cover for the document. This does not supplant the specification of a printed cover (on cover stock medium) by the document itself.</u></a>
<a href="#"><u>bind</u></a>	<a href="#"><u>This indicates that a binding is to be applied to the document; the type and placement of the binding is site-defined.</u></a>

[none](#) [Perform no finishing. See 9.1.2](#)

1524

1525 6.2.8.3 sides (type2Enum)

1526 This attribute specifies whether the document should be printed in  
1527 one of three ways: 1-sided (simplex), 2-sided- ~~long~~ [binding](#)-edge  
1528 (duplex), 2-sided- ~~short~~ [binding](#)-edge (tumble).

1529 The standard values are: 1-sided, 2-sided-long-edge, 2-sided-  
1530 short-edge.

1531 6.2.8.4 copies (positiveInteger)

1532 This attribute specifies the number of copies of the job to be  
1533 printed. If this attribute is unspecified, its default value is 1  
1534 copy.

1535

1536 6.2.8.5 printer-resolution-select (positiveIntegerCross)

1537 This attribute specifies the resolution that the Printer should  
1538 use.

1539 The syntax allows a single integer to specify the resolution or a  
1540 pair of integers to specify the resolution when the x and y  
1541 dimensions differ. When two integers are specified, the first is  
1542 in the ~~x paper feed~~ [direction, ie., in the direction fo the](#)  
1543 [shortest dimension of the medium, so that the value is independent](#)  
1544 [of whether the printer feeds long edge or short edge first.](#)

1545 6.2.8.6 print-quality (type2Enum)

1546 This attribute specifies the print quality that the Printer should  
1547 use.

1548 The standard values are [:](#)

1549 <a href="#">draft</a>	<a href="#">Lowest quality available on the printer</a>
1550 <a href="#">normal</a>	<a href="#">Normal or intermediate quality on the printer</a>
1551 <a href="#">high</a>	<a href="#">Highest quality available on the printer</a>

1552

1553 ~~± TBD.~~

1554 6.2.8.7 page-select (positiveIntegerRange)

1555 This attribute specifies the pages in the document that the  
1556 Printer shall use. This attribute is unlikely to be useful for  
1557 jobs with more than one document or in Job Templates. If this  
1558 attribute is unspecified, then the Printer prints all pages in a  
1559 document.

1560 6.2.8.8 files-are-one-document (Boolean)

1561 This attribute is relevant only if a job consists of two or more  
1562 documents. It controls finishing operations, job-sheet placement,  
1563 and the order of documents when the copies attribute exceeds 1.



If the files for the job are a and b and this attribute is **true**, then files a and b are treated as a single document for finishing operations. Also, there will be no slip sheets between files a and b. If more than one copy is made, the ordering must be a, b, a, b, .... The attribute **files-are-interleaved** is ignored.

If the files for the job are a and b and this attribute is **false** or **unspecified**, then each file is treated as a single document for finishing operations. Also, a client may specify that a slip sheet be between files a and b. If more than one copy is made, and the attribute **files-are-interleaved** false or unspecified, the ordering is a, a, b, b, .... If more than one copy is made, and the attribute **files-are-interleaved** true, the ordering is a, b, a, b, ....

#### 6.2.8.9 files-are-interleaved (Boolean)

This attribute is used in conjunction with **files-are-one-document** (q.v.).

ISSUE: Should the files-are-one-document and files-are-interleaved be combined into a single enum attribute?

#### 6.2.9 Attributes for Conversion of Text Files (Set by Client/End User)

The client shall specify these attributes to control formatting for text documents or HTML documents. If the client does not specify any of these attributes, a Printer shall use its own defaults.

A client need not specify these attributes for other types of documents, such as PostScript or PCL.

##### 6.2.9.1 width (cardinalUnits)

This attribute specifies the media width for the document in characters.

##### 6.2.9.2 length (cardinalUnits)

This attribute specifies the media length for the document in characters.

##### 6.2.9.3 left-margin (cardinalUnits)

This attribute specifies the left-margin for the document in characters.

##### 6.2.9.4 right-margin (cardinalUnits)

This attribute specifies the right-margin for the document in characters.

##### 6.2.9.5 top-margin (cardinalUnits)

This attribute specifies the top-margin for the document in lines.

## 1603 6.2.9.6 bottom-margin (cardinalUnits)

1604 This attribute specifies the bottom-margin for the document in  
1605 lines.  
1606

## 1607 6.2.9.7 repeated-tab-stops (cardinalUnits)

1608 This attribute specifies the tab stops for the document in  
1609 characters.

## 1610 6.2.9.8 header-text (string)

1611 This attribute specifies the header text for the document.

## 1612 6.2.9.9 footer-text (string)

1613 This attribute specifies the footer text for the document.

1614 6.2.9.10 font-size (cardinalUnits)

1615 This attribute specifies the font-size in points for text in the  
1616 document. The value of this attribute affects the size of the  
1617 other text attributes.

1618 If this attribute is omitted, the Printer shall assume a value of  
1619 10. A value of 10 with a fixed pitch font, shall produce 12  
1620 characters per inch in the horizontal direction and with 6 lines  
1621 per inch in the vertical direction.

## 1622 6.2.9.11 number-pages (Boolean)

1623 This attribute specifies that the pages should be numbered in the  
1624 document.

1625 default-font (string) This attribute specifies the font to use for  
1626 all text in the document.

## 1627 6.2.9.12 default-code-set (type3Enum)

1628 This attribute specifies the code-set in which the document is  
1629 encoded.

## 1630 6.2.9.13 content-orientation (type2Enum)

1631 This attribute specifies the orientation of the document.

1632 The standard values are ~~+ landscape or portrait.~~

portrait      The page orientation such that the sides  
are longer than the top when the page is  
held in the intended human reading  
orientation

landscape      The page orientation such that the sides are shorter than the top when the page is held in the intended human readable orientation. Land scape is defined to be a rotation of the page by +90 degrees with respect to the medium (i.e. anti-clockwise) from the portrait orientation  
NOTE - The +90 direction was chosen because simple finishing on the long edge is the same edge whether portrait or landscape

reverse-  
portrait      The page orientation defined to be a rotation of 180 degrees with respect to portrait

reverse-  
landscape      The page orientation defined to be a rotation of 180 degrees with respect to landscape. Landscape is defined to be a rotation of the page by -90 degrees with respect to the medium (i.e. clockwise) from the portrait orientation  
NOTE - Reverse-landscape was added because some applications rotate landscape -90 degrees from portrait, rather than +90 degrees.

1633

#### 1634 6.2.10 Job Resource Attributes (Set by the program that produces or 1635 senses the PDL )

1636 A program described below shall add these attributes, which  
1637 describe the resources needed to print the job.

1638 A Printer may use these attributes to validate and schedule the  
1639 print-job without inter preting the contents of the document. This  
1640 provides the opportunity for a Printer to support a broad set of  
1641 document formats yet still support fast efficient scheduling and  
1642 validation of each job.

1643

1644 The client /end user shall not specify these attributes. Instead,  
1645 it is the duty of the program that translates the document to the  
1646 printer's PDL (or analyzes it) to add these attributess and their  
1647 values to the job. Such a program may execute at a number of  
1648 different points in time:

1649 1. The program produces a final form document and stores it in  
1650 a file before the end-user submits the print job.

1651 2. The program produces a final form document data stream when  
1652 the end-user specifies "Print" to the application program  
1653 (Windows GDI driver).

1654 3. The program translates a revisable or final form document  
1655 into a PDL that the printer understands.

1656 If any of these attributes is unspecified, the Printer shall  
1657 assume that the all resources required by the document of the type  
1658 specified by the missing attributes are ready , ie., are available  
1659 to the Printer and/or output device without human intervention.  
1660 These attributes may be unspecified if the translation program

1661 fails to provides such values, or if no translation occurs (e.g.  
1662 the document is a PostScript document.

1663 Note: The Printer does not use these attributes during the actual  
1664 printing of a document.

1665 Note: these attributes allow more than one value wherever it is  
1666 possible for a job to specify more than one value of the  
1667 corresponding job attribute, possibly by embedded instructions.

1668 The client may specify these attributes in: Get-Attributes and  
1669 Get-Jobs.

1670 [See the section on job production attributes for an explanation of](#)  
1671 [how the job resource attributes differ from the job production](#)  
1672 [attributes.](#)

1673 \_\_\_\_\_  
1674  
1675 6.2.10.1 document-format-used (1#type2Format)

1676 This attribute identifies the document format [s](#) needed to print [the](#)  
1677 [document\(s\) in](#) this job.

1678  
1679 A format consists of two elements, a name and a version. The  
1680 latter element is optional.

1681 The syntax is for type2Format:

1682 name [ "/" version ]

1683 Examples include: PostScript, PostScript/2.0 and PCL/5e

1684 ISSUE: do we want the version to be optional?

1685 ~~\*~~

1686  
1687 6.2.10.2 fonts-used (1#string)

1688 This attribute identifies the font resources used ~~in the~~  
1689 [document\(s\) in the](#) job.

1690 6.2.10.3 code-sets-used (1#type3Enum)

1691 This attribute identifies the code-sets used in the document [\(s\) in](#)  
1692 [the Job](#). This attribute is relevant only for files that are not in  
1693 ASCII, such as text files and possibly PCL files. PostScript files  
1694 are always ASCII. Normally there is at most 1 code-set.

1695 Standard values are defined in the section [specifying the default-](#)  
1696 [code-set attribute. on default fonts.](#)

1697 6.2.10.4 media-used (1#type2Enum)

1698 This attribute identifies the media, media-sizes, input-trays or  
1699 electronic forms needed to print the [document\(s\) in the](#) job.

1700 Standard values for this attribute are defined in the section  
1701 [specifying the ~~on~~-medium-select attribute](#).

1702  
1703 6.2.10.5 sides-used (type2Enum)

1704 This attribute specifies whether a job needs [1~~one~~](#)-sided, [two~~2~~](#)-  
1705 sided-long [-binding-](#)edge, or [two~~2~~](#)-sided-short [-binding-](#)edge  
1706 printing.

1707 Standard values for this attribute are defined in the section  
1708 [specifying ~~on~~ the sides attribute](#).

1709  
1710 6.2.10.6 print-quality-used (type2Enum)

1711 This attribute specifies what print quality the job needs.

1712  
1713 Standard values for this attribute are defined in the section  
1714 [specifying the ~~on~~-print-quality attribute](#).

1715 6.2.10.7 finishing-used (type2Enum)

1716 This attribute specifies what finishing the job needs.

1717 Standard values for this attribute are defined in the section  
1718 [specifying the ~~on~~-finishing attribute](#).

1719 6.2.10.8 printer-resolution-used (positiveIntegerCrossState)

1720 This attribute specifies what resolution the job needs.

1721 6.2.10.9 total-job-octets (positiveInteger)

1722 This attribute specifies the total size of the job in octets. This  
1723 attribute is the first of three that a translation program can use  
1724 to specify the size of a job.

1725 6.2.10.10 job-impression-count (positiveInteger)

1726 This attribute specifies the total size of the job in impressions.

1727 6.2.10.11 job-media-sheet-count (positiveInteger)

1728 This attribute specifies the total size of the job in media-  
1729 sheets.

1730 6.2.11 Number of Documents [\(Set by Client\)](#)

1731 This group contains a single attribute which specifies the number  
1732 of documents in the job.

1733  
1734 The client shall specify this attribute in Print and may specify  
1735 this attribute in: Get-Attributes and Get-Jobs.

## 1736 6.2.11.1 number-of-documents (positiveInteger)

1737 This attribute specifies the number of documents in the job. Each  
1738 document shall contain its own set of document content attributes  
1739 described below.

1740 6.2.12 Document Data (Set by a Client/End User)

1741 This group of attributes describes the document data for the job.  
1742 These attributes also include the document data or reference it.

1743 All job attributes in other sections of this document occur only  
1744 once per job and apply to all documents in a job.

1745 The client may specify document -data attributes in Print. The  
1746 client must specify either the document-URL or document-  
1747 content path in Print.

1748 Except for document-content, the client may specify document -data  
1749 attributes in: Get-Attributes, and Get-Jobs.

1750  
1751  
1752  
1753  
1754

## 6.2.12.1 document-format (type2Format)

1755 This attribute identifies the document format of this document.

1756 If the client does not specify this attribute, then the Printer  
1757 shall attempt to determine the format in order to decide if the  
1758 document data needs to be translated.

1759 ISSUE: do we want the version to be optional?

## 1760 6.2.12.2 document-name (name)

1761 This attribute contains the name of the document used by the  
1762 client to initially identify the document.

1763  
1764

## 6.2.12.3 document-URL (name)

1765 This attribute contains the URL of the document if the client  
1766 specified the document with a URL.

1767 If this attribute is specified, then document-content ~~and~~  
1768 ~~document path~~ shall be unspecified.

## 1769 6.2.12.4 document-content (octetString)

1770 This attribute contains the actual contents of the document.

1771 If this attribute is specified, then ~~document path and~~ document-  
1772 URL shall be unspecified.

This attribute shall be used during the transmission of the Print operation over a network. A Printer shall save the document data to a file and reference it with the document-URL or document-path attribute. A Get-Attribute or Get-Jobs operation shall always find that this attribute is unspecified.

#### ~~6.2.12.5 document path (name)~~

~~This attribute contains a path which references a file containing the document.~~

~~If this attribute is specified, then document content and document URL shall be unspecified.~~

~~This attribute shall not be used during the transmission of the Print operation over a network. It is intended to reference the file when document data is on the printer.~~

~~ISSUE: is this attribute necessary or is document URL sufficient?~~

### 6.3 Operation Attributes (Set by Client)

NOTE: These attributes have just been introduced and they are not as stable as the attributes in the other sections. Some work is still needed to show the relationship between these attributes, job attributes, printer attributes, and authentication and authorization.

The client shall set these attributes and associate them with an operation rather than an object.

It is intended that a client program rather than an end-user has control over the setting of these values so that they cannot be easily forged.

#### 6.3.1 operation-locale (type3Locale)

This attribute identifies the locale of the client. The Printer uses this attribute to determine the locale of messages in the result of the operation or in errors returned by the operation.

The standard values are defined in the section on the job-locale attribute. The type3EnumTrip consists of 3 colon separated type 3 enums. The first is the country. The second is the language. The third is the code set.

If an operation does not specify this attribute, the Printer shall assume that the operation has the same locale as the Printer.

#### 6.3.2 operation-notification-address (name)

This attribute identifies the email-address of the client. The Printer uses this attribute to determine the email address for any notifications that occur in the Printer.

1815       ISSUE: can this address be determined from the next two  
1816       attributes: operation-user-name and operation-host-name?

### 1817   6.3.3 operation-user-name (name)

1818       This attribute identifies the most authenticated end user name  
1819       that the client can supply. This name identifies the end user  
1820       performing the operation.

1821       This value shall be set by the system rather than the end-user in  
1822       order to minimize the chance of forgery.

### 1823   6.3.4 operation-host-name (name)

1824       This attribute identifies the most authenticated host name that  
1825       the client can supply. This name identifies the host from which  
1826       the operation comes.

1827       This value shall be set by the system rather than the end-user in  
1828       order to minimize the chance of forgery.

## 1829   6.4 Printer Attributes (Set by the Administrator)

1830       A printer object may be realized in ~~either~~ a Print Server or  
1831       Output Device ~~—~~. Note: How these attribute are set by an  
1832       Administrator is outside the scope of this specification.

1833       A Printer Object in an Output Device contains a set of printer  
1834       object attributes that represent an Output Device capable of  
1835       rendering a document in visible form. Examples include electronic  
1836       and electro-mechanical printers such as laser printers, ink-jet  
1837       printers, and various kinds of impact printers, but may include  
1838       other types of output devices such as microfiche imagers and  
1839       plotters as well.

1840       A Printer Object in a Print Server that supplies queuing,  
1841       spooling, and scheduling for an Output device that does not queue  
1842       or spool.

1843

1844       A Printer Object in a Print Server contains a set of printer  
1845       object attributes that are the union of the Printer objects in the  
1846       downstream Output Devices. This object extends the capabilities  
1847       of an Output Device. For example, an administrator might define a  
1848       single Print Server to represent all of the Output Devices of the  
1849       same type and capability in a single location, associated with a  
1850       particular server. A end user/~~client~~ would normally send a  
1851       print-job to a Print Server, and allow the Print Server to assign  
1852       the job to a particular Output Device based on the relative load  
1853       and availability of the printers under its control, thus providing  
1854       a load balancing service. However, nothing precludes an  
1855       administrator from configuring a print system so that a end  
1856       user/~~client~~ can send a print-job directly to an Output Device.

1857       A Print Server, in the most common case, controls exactly one  
1858       downstream Output Device. The Print Server's Printer object has



1859 attributes whose values are the same as those of the Printer  
1860 object in the downstream Output Device.

1861 The attributes defined in this section provide information about  
1862 a particular Printer.

#### 1863 6.4.1 printer-name (name)

1864 This attribute uniquely identifies the printer on its host.

#### 1865 6.4.2 printer-location ~~text~~(string)

1866 This attribute identifies the location of this printer.

#### 1867 6.4.3 printer-model (string)

1868 This attribute identifies the make and model of the printer.

#### 1869 6.4.4 printer-types (type2Enum)

1870 This attribute identifies the marking technology of the printer.

1871 The [standard](#) value for this attribute are the descriptive names  
1872 specified by ISO DPA [which have corresponding enum symbolic and](#)  
1873 [numeric values assigned by the Printer MIB \(RFC 1759\)](#). These  
1874 [standard](#) values are:

<a href="#">other</a>	<a href="#">Other than the standard values</a>
<a href="#">unknown</a>	<a href="#">Unknown printer type</a>
<a href="#">electrophotographic-LED</a>	<a href="#">electrophotographic LED</a>
<a href="#">electrophotographic-</a>	<a href="#">electrophotographic laser</a>
<a href="#">laser</a>	
<a href="#">electrophotographic-</a>	<a href="#">other electrophotographic</a>
<a href="#">other</a>	
<a href="#">impact-moving-head-dot-</a>	<a href="#">9-pin impact moving head dot</a>
<a href="#">matrix-9-pin</a>	<a href="#">matrix</a>
<a href="#">impact-moving-head-dot-</a>	<a href="#">24-pin impact moving head dot</a>
<a href="#">matrix-24-pin</a>	<a href="#">matrix</a>
<a href="#">impact-moving-head-dot-</a>	<a href="#">neither 9-pin nor 24-pin moving</a>
<a href="#">matrix-other</a>	<a href="#">head dot matrix</a>
<a href="#">impact-moving-head-</a>	<a href="#">fully formed impact moving head</a>
<a href="#">fully-formed</a>	
<a href="#">impact-band</a>	<a href="#">impact band</a>
<a href="#">impact-other</a>	<a href="#">impact other</a>
<a href="#">inkjet-aqueous</a>	<a href="#">aqueous inkjet</a>
<a href="#">inkjet-solid</a>	<a href="#">solid inkjet</a>
<a href="#">inkjet-other</a>	<a href="#">other inkjet</a>
<a href="#">pen</a>	<a href="#">pen</a>
<a href="#">thermal-transfe r</a>	<a href="#">thermal transfer</a>
<a href="#">thermal-sensitive</a>	<a href="#">thermal sensitive</a>
<a href="#">thermal-diffusion</a>	<a href="#">thermal diffusion</a>
<a href="#">thermal-other</a>	<a href="#">other thermal</a>
<a href="#">electro-erosion</a>	<a href="#">electro-erosion</a>
<a href="#">electro-static</a>	<a href="#">electro-static</a>
<a href="#">photographic-microfiche</a>	<a href="#">photographic microfiche</a>
<a href="#">photographic-</a>	<a href="#">photographic imagesetter</a>
<a href="#">imagesetter</a>	
<a href="#">photographic-other</a>	<a href="#">other photographic</a>

	<u>ion-deposition</u>	<u>ion deposition</u>
	<u>E-beam</u>	<u>E-beam</u>
	<u>typesetter</u>	<u>typesetter</u>
1875	<del>other, unknown, electrophotographic LED, electrophotographic</del>	
1876	<del>laser, electrophotographic other, impact moving head dot matrix 9</del>	
1877	<del>pin, impact moving head dot matrix 24 pin, impact moving head,</del>	
1878	<del>dot matrix other, impact moving head fully formed, impact band,</del>	
1879	<del>impact other, inkjet aqueous, inkjet solid, inkjet other, pen,</del>	
1880	<del>thermal transfer, thermal sensitive, thermal diffusion, thermal</del>	
1881	<del>other, electro, erosion, electro static, photographic microfiche,</del>	
1882	<del>photographic imagesetter, photographic other, ion deposition, E</del>	
1883	<del>beam, typesetter.</del>	

1884 **ISSUE:** Should they be from the printer MIB instead. In the printer  
 1885 MIB hyphens do not exist. Instead the first letter after a hyphen  
 1886 is upper case. THIS ISSUE IS CLOSED: We will use the xxx-yyy-zzz  
 1887 format rather than the xxxYyyZzz format.

#### 1888 6.4.5 printer-state (type1Enum)

1889 This attribute identifies the current state of the printer. The  
 1890 protocol support all values for printer states, however a Printer  
 1891 shall only generate the printer states which are appropriate for  
 1892 the particular implementation.

1893 The following standard values are defined:

<u>unknown</u>	<u>The printer state is not known, or is indeterminate, or is not returned by the operation</u>
<u>idle</u>	<u>The printer is ready to accept jobs, but none have been scheduled on it.</u>
<u>printing</u>	<u>The printer is currently printing a job</u>
<u>needs-attention</u>	<u>The printer needs human attention (no special skills required). This state typically includes adding paper, clearing a jam, changing the medium, etc.</u>
<u>paused</u>	<u>The operator has (temporarily) paused the printer, by means outside the scope of this part of ISO/IEC 10175.</u>
<u>shutdown</u>	<u>The printer has been taken out of service, (for a long time), whether for repairs or others reasons. The printer's message generic attribute may be used to record a reason and estimated time for return to service</u>
<u>job-start-wait</u>	<u>The currently processing job was started with the job-start-wait attribute set, and is awaiting operator intervention or time-out.</u>
<u>job-end-wait</u>	<u>The currently processing job was started with the job-end-wait attribute set, and is awaiting operator intervention or time-out.</u>
<u>job-password-wait</u>	<u>The currently processing job was started with the job-password attribute set, and is awaiting the operator or user to enter the password supplied by the job-password attribute.</u>

<u>needs-key-operator</u>	<u>The printer needs the attention of a key operator. Key operator functions are printer-specific, but typically include adding toner or developer, or attending to a hardware fault.</u>
<u>connecting-to-printer</u>	<u>The server has scheduled a job on the printer and is in the process of connecting to a shared network printer (and may not be able to actually start printing the job for an arbitrarily long time depending on the usage of the printer by other servers).</u>
<u>timed-out</u>	<u>The server was able to connect to the printer (or is always connected), but was unable to get a response from the printer in the time specified by the printer's printer-timeout-period attribute.</u>

~~unknown, idle, printing, needs attention, paused, shutdown,  
job start wait, job end wait, job password wait,  
needs key operator, connecting to printer, state timed out~~

#### 6.4.6 printer-state-message (string)

This attributes specifies a message that gives further information about the current printer state. .

#### 6.4.7 message (string)

This attribute provides a message from an operator, system administrator or 'intelligent' process to indicate to the end user information or status of the printer, such as why it is unavailable or when it is expected to be available. ~~the reasons for modification or other management action taken on a job~~.

#### 6.4.8 locale (type3Locale)

This attribute specifies the locale that the Printer operates in.

The standard values are defined in the section on the job-locale attribute.

#### 6.4.9 notification-events (#type2Enum)

This attribute specifies the events on whose occurrence the Printer should notify those addresses specified by the notification-addresses attribute.

If the attribute is unspecified or empty, the Printer does not perform notification, though the Printer still checks the jobs' notification-events attribute.

In this attribute, job-problem and printer-problem have the same meaning.

The standard values are defined in the section on the job's notification-events attribute.

## 1921 6.4.10 notification-addresses (#name)

1922 This attribute specifies the email addresses to which the Printer  
1923 should send messages when events specified by the notification-  
1924 events attribute occur.

1925 If the attribute is unspecified or empty, the Printer does not  
1926 perform notification, though the Printer still checks the jobs'  
1927 notification-events attribute.

## 1928 6.4.11 end-user-acl (#name)

1929 This attribute specifies the [end](#) users who are allowed to print on  
1930 the Printer.

1931 If the attribute is unspecified or empty, the Printer allows  
1932 anyone to print.

1933 ISSUE: this does not fully solve the internet authorization  
1934 problem because of authentication issues.

## 1935 6.4.12 maximum-printer-speed (positiveIntegerUnits)

1936 This attribute indicates the maximum printer speed of the Printer.  
1937 A job cannot control a Printer's speed, but a Printer Browser can  
1938 use printer speed as a criteria.

1939 The standard units are a type2Enum and are: ppm, ipm, spm, lpm,  
1940 cps.

## 1941 6.4.13 fonts-substitutions (#stringPair)

1942 This attribute specifies an appropriate substitute for a font that  
1943 is advertised as supported in the fonts-supported attribute, even  
1944 though the Printer doesn't actually have the font available.

1945 This attribute consists of a set of font pairs: a font name and  
1946 the font to use instead.

## 1947 6.4.14 fonts-supported (1#stringState)

1948 This attribute identifies the font resources supported by this  
1949 printer and indicates the state of readiness for each font.

1950 The standard names are defined in the section on default-font.

1951 Each item in the list contains the pair consisting of a font name  
1952 and a state indicating the font's readiness state.

## 1953 1954 6.4.15 media-supported (1#nameState)

1955 This attribute identifies the media, media-sizes, input trays, and  
1956 electronic forms supported by this printer, and indicates the  
1957 state of readiness for each medium resource.  
1958

1959        There may be just two states: ready and needs-installing, or there  
1960        may be a third state: needs-purchasing.

1961        The standard names are defined in the section on the section on  
1962        the medium-select.

#### 1963    6.4.16 document-formats-supported (1#type2FormatState)

1964        |  
1965        This attribute identifies the document -formats, including the  
1966        document-format-versions, supported by the Printer. This set  
1967        includes both the formats that are native to the Printer and  
1968        those formats that the Printer can translate to one that is  
1969        native to the Printer. From the client's point of view, this set  
1970        contains all formats in which documents can be submitted to this  
1971        Printer.

1972        Proprietary document format identifiers, and versions are assigned  
1973        by the owners of those formats.

1974        The state of readiness for each format is also included, though  
1975        all formats should normally always be ready.

#### 1976    6.4.17 numbers-up-supported (1#positiveIntegerState)

1977        This attribute identifies the number -up values supported by this  
1978        printer..

1979        The state of readiness for each number-up value is also included,  
1980        though all number-up conversions should always be ready.

#### 1981    6.4.18 finishings-supported (#type2EnumState)

1982        |        This attribute identifies the ~~per document~~ finishing operations  
1983        supported by this Printer and states of readiness for each  
1984        finishing.

1985        The standard finishing objects are defined in the section on the  
1986        finishing [Job](#) attribute.

#### 1987    6.4.19 sides-supported (1#type2EnumState)

1989        This attribute indicates the values of the sides attribute  
1990        supported by this printer and the states of readiness of each  
1991        value.

1992        The standard values are defined in the section on the sides  
1993        attribute.

#### 1994    6.4.20 print-qualities-supported (1#type2EnumState)

1995        This attribute indicates the values of the printer-quality  
1996        attribute supported by this printer and the states of readiness  
1997        for each print-quality value.

1998        The standard values are defined in the printer-quality attribute.

1999 6.4.21 printer-resolutions-supported (1#positiveIntegerCrossState)

2000 This attribute indicates the values of the printer-resolution-  
2001 select attribute supported by this printer and their states of  
2002 readiness.

2003 The state of readiness for each printer resolution is also  
2004 included, though normally all printer-resolutions should always be  
2005 ready.

2006 The syntax is discussed in the section on the printer-resolution-  
2007 select attribute.

2008 6.4.22 code-sets-supported (1#type3EnumState)

2009 This attribute indicates the values of the default-code-set  
2010 attribute supported by this printer and the states of readiness  
2011 for each code-set.

2012 The standard values are defined in the default-code-set attribute.

2013 6.4.23 off-peak-times-supported (#type3EnumState)

2014 This attribute indicates the values of the job-print-off-peak  
2015 attribute supported by this printer and the states of readiness  
2016 for each value.

2017 If this attribute is unspecified, then the Printer has no off-peak  
2018 periods.

2019 The standard values are defined in the section on the job-print-  
2020 off-peak attribute.

2021 Note: this document does not define how an administrator  
2022 associates the off-peak names with actual time periods.

2023 6.4.24 events-supported (#type2EnumState)

2024 This attribute indicates the values of the job and printer  
2025 notification-events attribute supported by this Printer and the  
2026 states of readiness for each value.

2027 If this attribute is unspecified, then the Printer does not  
2028 support notification.

2029 The standard values are defined in the section on the  
2030 notification-events attribute.

2031 6.4.25 locales-supported (1#type3LocaleState)

2032 This attribute indicates the values of the job-locale attribute  
2033 supported by this Printer and the states of readiness for each  
2034 value.

2035 The standard values are defined in the section on the job-locale  
2036 attribute.

## 6.4.26 job-sheets-supported (#type3EnumState)

This attribute identifies the job-sheet values supported by this printer, and the state of readiness for each job-sheet.

To allow no job sheets, the system administrator shall include the value none as a value for this attribute. The client specifies that there are no job sheets by using the value none as the value of the job-sheets attribute.

If the job-sheets attribute is not specified or contains a value which the Printer does not support, then the server shall select from among the values of this attribute. The server shall not select the value none unless it is the only value specified for the job-sheets-supported attribute.

NOTE - It is preferable for the server to produce some job jobsheet, even if not the desired one, rather than produce none at all or reject the job.

## 6.4.27 maximum-copies (positiveInteger)

This attribute indicates the maximum number of copies of a document that can be rendered by this printer in a single print-job.

If the attribute is unspecified or has a value of 0, there is no limit on the maximum number of copies for this Printer.

## 6.4.28 maximum-job-octets (positiveInteger)

This attribute indicates that the Printer shall accept a job only if its size in octets is less than the value specified by this attribute.

If the attribute is unspecified or has a value of 0, there is no limit on the size of a job in octets.

## 6.4.29 maximum-impressions (positiveInteger)

This attribute indicates that the Printer shall accept a job only if its size in impression is less than the value specified by this attribute.

If the attribute is unspecified or has a value of 0, there is no limit on the size of a job in impressions.

## 6.4.30 maximum-media-sheets (positiveInteger)

This attribute indicates that the Printer shall accept a job only if its size in media-sheets is less than the value specified by this attribute.

If the attribute is unspecified or has a value of 0, there is no limit on the size of a job in media-sheets.

## 2079 6.4.31 maximum-job-retention-period (deltaTime)

2080 This attribute indicates that when the Printer accepts a job, the  
2081 retention period must not exceed the value of this attribute.  
2082 Otherwise, the Printer sets the job's retention-period to the  
2083 value of this attribute.

2084 If this attribute is unspecified, then the Printer places no limit  
2085 on the retention time.

2086 [ISSUE: Should this be deleted?](#)

## 2087 6.4.32 maximum-end-user-priority (typeEnum)

2088 This attribute indicates that when the Printer accepts a job, the  
2089 job-priority must not exceed the value of this attribute.  
2090 Otherwise, the Printer sets the job's job-priority to the value of  
2091 this attribute.

2092 If this attribute is unspecified, then the Printer places no limit  
2093 on the job-priority time.

2094 The standard values are defined in the section on the job-priority  
2095 attribute.

2096

2097

2098

## 2099 6.5 Job Templates

2100 The attributes for a Job Template can be any of the Job object  
2101 attributes defined in the sections:

2102 Job Sheet Attributes  
2103 Notification Attributes  
2104 Job Scheduling Attributes  
2105 (except job-print-after)  
2106 Job Production Attributes  
2107 (except page-select)  
2108 Attributes for Conversion of Text Files  
2109  
2110

## 2111 6.6 Conformance

2112

2113

2114 A conforming implementation shall implement all operations,  
2115 objects and attributes defined in this document. IPP is explicitly  
2116 designed to be extensible. This means that in addition to the  
2117 attributes defined in this specification, specific implementation  
2118 instances may support not only the basic protocol as defined in  
2119 this specification, but might add vendor specific extensions.

2120 Also, for the core set of attributes listed in this specification,  
2121 it is not required that a conforming server support all (standard)  
2122 values of all supported attributes. For example, it is not  
2123 required that a printer implement all finishing methods indicated  
2124 by the standard values.



The explicit requirement of the term "supported", with respect to one of the attributes that deal with printer functions or resources, is that the server shall recognize the attribute and those values that are supported, and shall be able to respond to a query about which values that printer does, in fact, support.

Additional attributes can be proposed to be registered by going through the type 2 enum process which will register their specification after approval with IANA.

## 7. Security Considerations

This protocol does not identify any new authentication mechanisms. The authentication mechanisms built into HTTP (such as SSL and SHTTPS) are recommended.

This protocol does define a simple authorization mechanism by introducing the "end-user-acl" attribute as part of the Printer object. This ACL attribute is a multi-valued list of all of the authenticated names of end-users. This protocol does not specify ~~specifiy~~ what the domain is for names in this ACL attribute .

ISSUE: Will it always be possible for a Printer to obtain a meaningful authenticated name t hat the Printer can match against the end-user-acl, or will some other mechanism be necessary, such as a password?

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2263

2264

## 10. Appendix A: Extended Operations

The following symbols are used in the tables below:

P perform the operation directly  
PF perform the operation; forward to Output Device sometimes  
UA unsupported in an Output Device unless it supports queuing  
U unsupported operation

Lower priority end user operations are:

Operation	Print Server	Output Device
- Modify Job	P	UA
- Resubmit Job	P	UA

Management operations are:

Operation	Print Server	Output Device
- Clean Queue	PF	UA
- Disallow Queuing	P	UA
- Allow Queuing	P	UA
- Pause Printing	P	P
- Resume Printing	P	P
- Promote Job	PF	UA
- Shutdown Printer	P	P
- Startup Printer	P	P
- Create Printer	P	U
- Delete Printer	P	U
- Set Attribute	P	P

## 10.1 Modify Job Operation

## 10.1.1 Modify Job Argument

The following abstract data types are part of the Modify Job Argument (the attributes that can be modified may be severely restricted):

Job Id	Which job to modify.
	[There are no document attributes to modify.]
Job Attributes	Attribute set for Job attributes. Only replacement is possible; the GUI fetches the value and then sets a new one.
Message	Optional Message.
Common Arguments	

## 10.1.2 Modify Job Result

The following abstract data types are part of the Modify Job Result:

Modify Status	Modify result attributes.
Errors	Optional Error Information

NOTE: job-hold can be added as a Job attribute when Modify Job is supported as an IPP operation.

## 10.2 Resubmit Job Operation

### 10.2.1 Resubmit Job Argument ~~Error! Bookmark not defined~~ ~~Error! Bookmark not defined.~~

The following abstract data types are part of the Resubmit Argument:

	.
Destination Printer Name	Optional name of the destination printer.
Operation	MOVE or COPY
Job Set	A set of jobs to move or copy. Each entry in the set has: Job Id, Document Number, Job attributes, and Document attributes.
Message	Optional Message
Common Arguments	

### 10.2.2 Resubmit Job Result

The following abstract data types are part of the Resubmit Job Result:

Resubmit Job Set	A set of jobs that were resubmitted. Each element in the set has: Old Job Id, New Job Id, and an attribute set with info about the results of the move or copy.
Errors	Optional Error Information