CUPS Implementation of IPP

CUPS−IPP−1.1

Easy Software Products

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1 Scope

1.1 Identification

This document provides an overview of the Internet Printing Protocol ("IPP") version 1.1 as implemented in the Common UNIX Printing System ("CUPS") version 1.1.

1.2 System Overview

CUPS provides a portable printing layer for UNIX®−based operating systems. It has been developed by Easy Software Products to promote a standard printing solution for all UNIX vendors and users. CUPS provides the System V and Berkeley command−line interfaces.

CUPS uses the Internet Printing Protocol ("IPP") as the basis for managing print jobs and queues. The Line Printer Daemon ("LPD") Server Message Block ("SMB"), and AppSocket (a.k.a. JetDirect) protocols are also supported with reduced functionality. CUPS adds network printer browsing and PostScript Printer Description ("PPD") based printing options to support real−world printing under UNIX.

CUPS includes an image file RIP that supports printing of image files to non−PostScript printers. A customized version of GNU Ghostscript 7.05 for CUPS called ESP Ghostscript is available separately to support printing of PostScript files within the CUPS driver framework. Sample drivers for Dymo, EPSON, HP, and OKIDATA printers are included that use these filters.

Drivers for thousands of printers are provided with our ESP Print Pro software, available at:

```
http://www.easysw.com/printpro/
```

CUPS is licensed under the GNU General Public License and GNU Library General Public License. Please contact Easy Software Products for commercial support and "binary distribution" rights.

1.3 Document Overview

This document is organized into the following sections:

- 1 − Scope
- 2 − References
- 3 − Overview
- 4 − Operations
- 5 − Attributes
- A − Glossary

2 References

2.1 CUPS Documentation

The following CUPS documentation is referenced by this document:

- CUPS−CMP−1.1: CUPS Configuration Management Plan
- CUPS−IDD−1.1: CUPS System Interface Design Description
- CUPS−IPP−1.1: CUPS Implementation of IPP
- CUPS−SAM−1.1.x: CUPS Software Administrators Manual
- CUPS−SDD−1.1: CUPS Software Design Description
- CUPS−SPM−1.1.x: CUPS Software Programming Manual
- CUPS−SSR−1.1: CUPS Software Security Report
- CUPS−STP−1.1: CUPS Software Test Plan
- CUPS−SUM−1.1.x: CUPS Software Users Manual
- CUPS−SVD−1.1: CUPS Software Version Description

2.2 Other Documents

The following non−CUPS documents are referenced by this document:

- Adobe PostScript Printer Description File Format Specification, Version 4.3.
- Adobe PostScript Language Reference, Third Edition.
- IPP/1.1: Implementers Guide
- RFC 1179, Line Printer Daemon Protocol
- RFC 2396, Uniform Resource Identifiers (URI): Generic Syntax
- RFC 2567, Design Goals for an Internet Printing Protocol
- RFC 2568, Rationale for the Structure of the Model and Protocol for the Internet Printing Protocol
- RFC 2569, Mapping between LPD and IPP Protocols
- RFC 2616, Hypertext Transfer Protocol −− HTTP/1.1
- RFC 2617, HTTP Authentication: Basic and Digest Access Authentication
- RFC 2910, IPP/1.1: Encoding and Transport
- RFC 2911, IPP/1.1: Model and Semantics
- RFC 3380, IPP: Job and Printer Set Operations

3 Overview

CUPS 1.1 implements IPP/1.1 and the operations and attributes defined in the "IPP: Job and Printer Set Operations", "IPP/1.1: Output−bin Attribute Extension", and "IPP/1.1: finishings 'fold',' trim', and 'bale' attribute values extension" specifications.

CUPS also provides 13 new operations and many new attributes to support multiple IPP printers and printer classes on a single host.

3.1 IPP URIs

CUPS supports both the "http" and "ipp" methods. The following resource names are used:

method://hostname:port/
: Can be used for all "get" operations.

method://hostname:port/admin
: Used for all administrative operations.

method://hostname:port/classes/name
: Specifies a printer class.

method://hostname:port/jobs/id
: Specifies a job.

method://hostname:port/printers/name
: Specifies a printer.

So a typical printer URI would be "ipp://foo.bar.com/printers/LaserJet".

In addition, the CUPS server also supports normal browser access to "method://hostname:port/admin/", "method://hostname:port/classes/", "method://hostname:port/jobs/", and "method://hostname:port/printers/" to view and manage resources on the server dynamically.

3.2 CUPS IPP Operations

CUPS provides 13 extension operations in addition to most of the standard IPP and registered extension operations:

Operation Name	CUPS	Code	Brief Description
Print−Job	1.0	0x0002	Print a file.
Validate−Job	1.0	0x0004	Validate job attributes.
Create−Job	1.1	0x0005	Create a print job.
Send−Document	1.1	0x0006	Send a file for a print job.
Cancel−Job	1.0	0x0008	Cancel a print job.
Get−Job−Attributes	1.0	0x0009	Get job attributes.
Get−Jobs	1.0	0x000A	Get all jobs.
Get−Printer−Attributes	1.0	0x000B	Get printer attributes.
Hold−Job	1.1	0x000C	Hold a job for printing.
Release−Job	1.1	0x000D	Release a job for printing.

Pause−Printer	1.0	0x0010	Pause printing on a printer.
Resume−Printer	1.0	0x0011	Resume printing on a printer.
Purge−Jobs	1.0	0x0012	Purge all jobs.
Set−Job−Attributes	1.1	0x0014	Set attributes for a pending or held job.
CUPS−Get−Default	1.0	0x4001	Get the default destination.
CUPS−Get−Printers	1.0	0x4002	Get all of the available printers.
CUPS−Add−Modify−Printer	1.0	0x4003	Add or modify a printer.
CUPS−Delete−Printer	1.0	0x4004	Delete a printer.
CUPS−Get−Classes	1.0	0x4005	Get all of the available printer classes.
CUPS−Add−Modify−Class	1.0	0x4006	Add or modify a printer class.
CUPS−Delete−Class	1.0	0x4007	Delete a printer class.
CUPS−Accept−Jobs	1.0	0x4008	Accept jobs on a printer or printer class.
CUPS−Reject−Jobs	1.0	0x4009	Reject jobs on a printer or printer class.
CUPS−Set−Default	1.0	0x400A	Set the default destination.
CUPS−Get−Devices	1.1	0x400B	Get all of the available devices.
CUPS−Get−PPDs	1.1	0x400C	Get all of the available PPDs.
CUPS−Move−Job	1.1	0x400D	Move a job to a different printer.

4 Operations

The following sections describe the operations supported by CUPS. In the interest of brevity, operations which use only the standard IPP attributes are not described.

4.1 Print−Job Operation

The Print−Job operation (0x0002) prints a file.

4.1.1 Print−Job Request

The following groups of attributes are supplied as part of the Print−Job request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.1 of the IPP Model and Semantics document.

"printer−uri" (uri):

The client MUST supply a URI for the specified printer.

Group 2: Job Template Attributes

"job−billing" (text(MAX)):

(CUPS 1.1 and higher)

The client OPTIONALLY supplies a billing string that is logged with the page accounting information.

"job−sheets" (1setof type3 keyword | name(MAX)):

(CUPS 1.1 and higher)

The client OPTIONALLY supplies one or two banner pages that are printed before and after any files in the print job. The name of "none" is reserved to indicate that no banner page should be printed. If the client does not specify this attribute then the value of the "job−sheets−default" printer object attribute is used.

Note: Standard IPP only allows specification of a single job−sheets attribute value.

"media" (1setof type3 keyword | name(MAX)):

The client OPTIONALLY supplies one or more media attributes specifying the size, type, source, and color of the output media. If the client does not specify this attribute then the value of the "media−default" printer object attribute is used.

Note: Standard IPP only allows specification of a single media attribute value.

Other Job Template Attributes

The Print−Job request is followed by a file to be printed.

4.1.2 Print−Job Response

The following groups of attributes are send as part of the Print−Job Response:

Group 1: Operation Attributes

Status Message:

The standard response status message.

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.2 of the IPP Model and Semantics document.

Group 2: Job Attributes

Standard Job Attributes

4.2 Create−Job Operation

The Create−Job operation (0x0005) creates a new, empty print job.

4.2.1 Create−Job Request

The following groups of attributes are supplied as part of the Create−Job request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.1 of the IPP Model and Semantics document.

"printer−uri" (uri):

The client MUST supply a URI for the specified printer.

Group 2: Job Template Attributes

"job−billing" (text(MAX)):

(CUPS 1.1 and higher)

The client OPTIONALLY supplies a billing string that is logged with the page accounting information.

"job−sheets" (1setof type3 keyword | name(MAX)):

(CUPS 1.1 and higher)

The client OPTIONALLY supplies one or two banner pages that are printed before and after any files in the print job. The name of "none" is reserved to indicate that no banner page should be printed. If the client does not specify this attribute then the value of the "job−sheets−default" printer object attribute is used.

Note: Standard IPP only allows specification of a single job−sheets attribute value.

"media" (1setof type3 keyword | name(MAX)):

The client OPTIONALLY supplies one or more media attributes specifying the size, type, source, and color of the output media. If the client does not specify this attribute then the value of the "media−default" printer object attribute is used.

Note: Standard IPP only allows specification of a single media attribute value.

Standard Job Template Attributes

4.2.2 Create−Job Response

The following groups of attributes are send as part of the Create−Job Response:

Group 1: Operation Attributes

Status Message:

The standard response status message.

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.2 of the IPP Model and Semantics document.

Group 2: Job Attributes

Standard Job Attributes

4.3 Set−Job−Attributes Operation

The Set−Job−Attributes operation (0x0014) changes the attributes of an active (not completed) job.

4.3.1 Set−Job−Attributes Request

The following groups of attributes are supplied as part of the Set−Job−Attributes request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.1 of the IPP Model and Semantics document.

"printer−uri" (uri) and "job−id" (integer)

OR

"job−uri":

The client MUST supply a URI for the specified printer and a job ID number, or the job URI.

Group 2: Job Template Attributes

"job−sheets" (1setof type3 keyword | name(MAX)):

(CUPS 1.1 and higher)

The client OPTIONALLY supplies one or two banner pages that are printed before and after any files in the print job. The name of "none" is reserved to indicate that no banner page should be printed. If the client does not specify this attribute then the value of the "job−sheets−default" printer object attribute is used.

Note: Standard IPP only allows specification of a single job−sheets attribute value.

"media" (1setof type3 keyword | name(MAX)):

The client OPTIONALLY supplies one or more media attributes specifying the size, type, source, and color of the output media. If the client does not specify this attribute then the value of the "media−default" printer object attribute is used.

Note: Standard IPP only allows specification of a single media attribute value.

Other Job Template Attributes

4.3.2 Set−Job−Attributes Response

The following groups of attributes are send as part of the Set−Job−Attributes Response:

Group 1: Operation Attributes

Status Message:

The standard response status message.

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.2 of the IPP Model and Semantics document.

4.4 CUPS−Get−Default Operation

The CUPS−Get−Default operation (0x4001) returns the default printer URI and attributes.

4.4.1 CUPS−Get−Default Request

The following groups of attributes are supplied as part of the CUPS−Get−Default request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.1 of the IPP Model and Semantics document.

"requested−attributes" (1setOf keyword) :

The client OPTIONALLY supplies a set of attribute names and/or attribute group names in whose values the requester is interested. If the client omits this attribute, the server responds as if this attribute had been supplied with a value of 'all'.

4.4.2 CUPS−Get−Default Response

The following groups of attributes are send as part of the CUPS−Get−Default Response:

Group 1: Operation Attributes

Status Message:

The standard response status message.

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.2 of the IPP Model and Semantics document.

Group 2: Printer Object Attributes

The set of requested attributes and their current values.

4.5 CUPS−Get−Printers Operation

The CUPS−Get−Printers operation (0x4002) returns the printer attributes for every printer known to the system. This may include printers that are not served directly by the server.

4.5.1 CUPS−Get−Printers Request

The following groups of attributes are supplied as part of the CUPS−Get−Printers request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.1 of the IPP Model and Semantics document.

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

The client OPTIONALLY supplies this attribute limiting the number of printers that are returned.

"printer−info" (text(127)):

(CUPS 1.1 and higher)

The client OPTIONALLY supplies this attribute to select which printers are returned.

"printer−location" (text(127)):

(CUPS 1.1 and higher)

The client OPTIONALLY supplies this attribute to select which printers are returned.

"printer−type" (type2 enum):

(CUPS 1.1 and higher)

The client OPTIONALLY supplies a printer type enumeration to select which printers are returned.

"printer−type−mask" (type2 enum):

(CUPS 1.1 and higher)

The client OPTIONALLY supplies a printer type mask enumeration to select which bits are used in the "printer−type" attribute.

"requested−attributes" (1setOf keyword) :

The client OPTIONALLY supplies a set of attribute names and/or attribute group names in whose values the requester is interested. If the client omits this attribute, the server responds as if this attribute had been supplied with a value of 'all'.

4.5.2 CUPS−Get−Printers Response

The following groups of attributes are send as part of the CUPS−Get−Printers Response:

Group 1: Operation Attributes

Status Message:

The standard response status message.

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.2 of the IPP Model and Semantics document.

Group 2: Printer Object Attributes

The set of requested attributes and their current values for each printer.

4.6 CUPS−Add−Modify−Printer Operation

The CUPS−Add−Modify−Printer operation (0x4003) adds a new printer or modifies an existing printer on the system.

> **Note:**
>
> This operation requires administrative priviledges and must be POSTed to "/admin/". POSTs to other paths will result in a client−error−not−authorized (IPP_NOT_AUTHORIZED) error.

4.6.1 CUPS−Add−Modify−Printer Request

The following groups of attributes are supplied as part of the CUPS−Add−Modify−Printer request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.1 of the IPP Model and Semantics document.

"printer−uri" (uri):

The client MUST supply a URI for the specified printer.

Group 2: Printer Object Attributes

"banner−end−default" (name(127)):

(CUPS 1.1 and higher)

The client OPTIONALLY supplies a banner page name that is printed after files in a job. The reserved name "none" is used to specify that no banner page should be printed.

"banner−start−default" (name(127)):

(CUPS 1.1 and higher)

The client OPTIONALLY supplies a banner page name that is printed before files in a job. The reserved name "none" is used to specify that no banner page should be printed.

"device−uri" (uri):

The client OPTIONALLY supplies a device URI for the specified printer.

"ppd−name" (name(127)):

The client OPTIONALLY supplies a PPD name for the specified printer.

"printer−is−accepting−jobs" (boolean):

The client OPTIONALLY supplies this boolean attribute indicating whether or not the printer object should accept new jobs.

"printer−info" (text(127)):

The client OPTIONALLY supplies this attribute indicating the printer information string.

"printer−location" (text(127)):

The client OPTIONALLY supplies this attribute indicating a textual location of the printer.

"printer−more−info" (uri):

The client OPTIONALLY supplies this attribute indicating a URI for additional printer information.

"printer−state" (type2 enum):

The client OPTIONALLY supplies this attribute indicating the initial/current state of the printer. Only the "idle" and "stopped" enumerations are recognized.

"printer−state−message" (text(MAX)):

The client OPTIONALLY supplies this attribute indicating a textual reason for the current printer state.

"requesting−user−name−allowed" (1setof name(127) | delete)

OR

"requesting−user−name−denied" (1setof name(127) | delete):

The client OPTIONALLY supplies one of these attributes to specify an access control list for incoming print jobs. To allow all users access to a printer, use the delete tag for the attribute value.

The CUPS−Add−Modify−Printer request can optionally be followed by a PPD file or System V interface script to be used for the printer. The "ppd−name" attribute overrides any file that is attached to the end of the request with a local CUPS PPD file.

4.6.2 CUPS−Add−Modify−Printer Response

The following groups of attributes are send as part of the CUPS−Add−Modify−Printer Response:

Group 1: Operation Attributes

Status Message:

The standard response status message.

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.2 of the IPP Model and Semantics document.

4.7 CUPS−Delete−Printer Operation

The CUPS−Delete−Printer operation (0x4004) removes an existing printer from the system.

> **Note:**
>
> This operation requires administrative priviledges and must be POSTed to "/admin/". POSTs to other paths will result in a client−error−not−authorized (IPP_NOT_AUTHORIZED) error.

4.7.1 CUPS−Delete−Printer Request

The following groups of attributes are supplied as part of the CUPS−Delete−Printer request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.1 of the IPP Model and Semantics document.

"printer−uri" (uri):

The client MUST supply a URI for the specified printer.

4.7.2 CUPS−Delete−Printer Response

The following groups of attributes are send as part of the CUPS−Delete−Printer Response:

Group 1: Operation Attributes

Status Message:

The standard response status message.

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.2 of the IPP Model and Semantics document.

4.8 CUPS−Get−Classes Operation

The CUPS−Get−Classes operation (0x4005) returns the printer attributes for every printer class known to the system. This may include printer classes that are not served directly by the server.

4.8.1 CUPS−Get−Classes Request

The following groups of attributes are supplied as part of the CUPS−Get−Classes request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.1 of the IPP Model and Semantics document.

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

The client OPTIONALLY supplies this attribute limiting the number of printer classes that are returned.

"printer−info" (text(127)):

(CUPS 1.1 and higher)

The client OPTIONALLY supplies this attribute to select which printer classes are returned.

"printer−location" (text(127)):

(CUPS 1.1 and higher)

The client OPTIONALLY supplies this attribute to select which printer classes are returned.

"printer−type" (type2 enum):

(CUPS 1.1 and higher)

The client OPTIONALLY supplies a printer type enumeration to select which printer classes are returned.

"printer−type−mask" (type2 enum):

(CUPS 1.1 and higher)

The client OPTIONALLY supplies a printer type mask enumeration to select which bits are used in the "printer−type" attribute.

"requested−attributes" (1setOf keyword) :

The client OPTIONALLY supplies a set of attribute names and/or attribute group names in whose values the requester is interested. If the client omits this attribute, the server responds as if this attribute had been supplied with a value of 'all'.

4.8.2 CUPS−Get−Classes Response

The following groups of attributes are send as part of the CUPS−Get−Classes Response:

Group 1: Operation Attributes

Status Message:

The standard response status message.

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.2 of the IPP Model and Semantics document.

Group 2: Printer Class Object Attributes

The set of requested attributes and their current values for each printer class.

4.9 CUPS−Add−Modify−Class Operation

The CUPS−Add−Modify−Class operation (0x4006) adds a new printer class or modifies and existing printer class on the system.

> **Note:**
>
> This operation requires administrative priviledges and must be POSTed to "/admin/". POSTs to other paths will result in a client−error−not−authorized (IPP_NOT_AUTHORIZED) error.

4.9.1 CUPS−Add−Modify−Class Request

The following groups of attributes are supplied as part of the CUPS−Add−Modify−Class request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.1 of the IPP Model and Semantics document.

"printer−uri" (uri):

The client MUST supply a URI for the specified printer class.

Group 2: Printer Object Attributes

"member−uris" (1setof uri):

The client OPTIONALLY supplies the "member−uris" set specifying the printers and printer classes that are part of the class.

"printer−is−accepting−jobs" (boolean):

The client OPTIONALLY supplies this boolean attribute indicating whether or not the class object should accept new jobs.

"printer−info" (text(127)):

The client OPTIONALLY supplies this attribute indicating the printer information string.

"printer−location" (text(127)):

The client OPTIONALLY supplies this attribute indicating a textual location of the class.

"printer−more−info" (uri):

The client OPTIONALLY supplies this attribute indicating a URI for additional class information.

"printer−state" (type2 enum):

The client OPTIONALLY supplies this attribute indicating the initial/current state of the class. Only the "idle" and "stopped" enumerations are recognized.

"printer−state−message" (text(MAX)):

The client OPTIONALLY supplies this attribute indicating a textual reason for the current class state.

"requesting−user−name−allowed" (1setof name(127))

OR

"requesting−user−name−denied" (1setof name(127)):

The client OPTIONALLY supplies one of these attributes to specify an access control list for incoming print jobs. To allow all users access to a class, use the delete tag for the attribute value.

4.9.2 CUPS−Add−Modify−Class Response

The following groups of attributes are send as part of the CUPS−Add−Modify−Class Response:

Group 1: Operation Attributes

Status Message:

The standard response status message.

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.2 of the IPP Model and Semantics document.

4.10 CUPS−Delete−Class Operation

The CUPS−Delete−Class operation (0x4007) removes an existing printer class from the system.

> **Note:**
>
> This operation requires administrative priviledges and must be POSTed to "/admin/". POSTs to other paths will result in a client−error−not−authorized (IPP_NOT_AUTHORIZED) error.

4.10.1 CUPS−Delete−Class Request

The following groups of attributes are supplied as part of the CUPS−Delete−Class request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.1 of the IPP Model and Semantics document.

"printer−uri" (uri):

The client MUST supply a URI for the specified printer class.

4.10.2 CUPS−Delete−Class Response

The following groups of attributes are send as part of the CUPS−Delete−Class Response:

Group 1: Operation Attributes

Status Message:

The standard response status message.

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.2 of the IPP Model and Semantics document.

4.11 CUPS−Accept−Jobs Operation

The CUPS−Accept−Jobs operation (0x4008) sets the "printer−is−accepting−jobs" attribute to true for the specified printer or printer class.

> **Note:**
>
> This operation requires administrative priviledges and must be POSTed to "/admin/". POSTs to other paths will result in a client−error−not−authorized (IPP_NOT_AUTHORIZED) error.

4.11.1 CUPS−Accept−Jobs Request

The following groups of attributes are supplied as part of the CUPS−Accept−Jobs request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.1 of the IPP Model and Semantics document.

"printer−uri" (uri):

The client MUST supply a URI for the specified printer or printer class.

4.11.2 CUPS−Accept−Jobs Response

The following groups of attributes are send as part of the CUPS−Accept−Jobs Response:

Group 1: Operation Attributes

Status Message:

The standard response status message.

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.2 of the IPP Model and Semantics document.

4.12 CUPS−Reject−Jobs Operation

The CUPS−Reject−Jobs operation (0x4009) sets the "printer−is−accepting−jobs" attribute to false for the specified printer or printer class.

> **Note:**
>
> This operation requires administrative priviledges and must be POSTed to "/admin/". POSTs to other paths will result in a client−error−not−authorized (IPP_NOT_AUTHORIZED) error.

4.12.1 CUPS−Reject−Jobs Request

The following groups of attributes are supplied as part of the CUPS−Reject−Jobs request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.1 of the IPP Model and Semantics document.

"printer−uri" (uri):

The client MUST supply a URI for the specified printer or printer class.

Group 2: Printer Object Attributes

"printer−state−message" (text(MAX)):

The client OPTIONALLY supplies this attribute indicating a textual reason for the current printer state.

4.12.2 CUPS−Reject−Jobs Response

The following groups of attributes are send as part of the CUPS−Reject−Jobs Response:

Group 1: Operation Attributes

Status Message:

The standard response status message.

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.2

of the IPP Model and Semantics document.

4.13 CUPS−Set−Default Operation

The CUPS−Set−Default operation (0x400A) sets the default printer destination for all clients.

> **Note:**
>
> This operation requires administrative priviledges and must be POSTed to "/admin/". POSTs to other paths will result in a client−error−not−authorized (IPP_NOT_AUTHORIZED) error.

4.13.1 CUPS−Set−Default Request

The following groups of attributes are supplied as part of the CUPS−Set−Default request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.1 of the IPP Model and Semantics document.

"printer−uri" (uri):

The client MUST supply a URI for the specified printer or printer class.

4.13.2 CUPS−Set−Default Response

The following groups of attributes are send as part of the CUPS−Set−Default Response:

Group 1: Operation Attributes

Status Message:

The standard response status message.

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.2 of the IPP Model and Semantics document.

4.14 CUPS−Get−Devices Operation

The CUPS−Get−Devices operation (0x400B) returns all of the supported device−uri's for the server (CUPS 1.1 and higher).

4.14.1 CUPS−Get−Devices Request

The following groups of attributes are supplied as part of the CUPS−Get−Devices request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.1 of the IPP Model and Semantics document.

"device−class" (type1 keyword):

The client OPTIONALLY supplies a device class keyword to select which devices are returned.

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

The client OPTIONALLY supplies this attribute limiting the number of devices that are returned.

"requested−attributes" (1setOf keyword) :

The client OPTIONALLY supplies a set of attribute names and/or attribute group names in whose values the requester is interested. If the client omits this attribute, the server responds as if this attribute had been supplied with a value of 'all'.

4.14.2 CUPS−Get−Devices Response

The following groups of attributes are send as part of the CUPS−Get−Devices Response:

Group 1: Operation Attributes

Status Message:

The standard response status message.

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.2 of the IPP Model and Semantics document.

Group 2: Device Object Attributes

The set of requested attributes and their current values for each device.

4.15 CUPS−Get−PPDs Operation

The CUPS−Get−PPDs operation (0x400C) returns all of the locally available PPD files on the system (CUPS 1.1 and higher).

4.15.1 CUPS−Get−PPDs Request

The following groups of attributes are supplied as part of the CUPS−Get−PPDs request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.1 of the IPP Model and Semantics document.

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

The client OPTIONALLY supplies this attribute limiting the number of PPDs that are returned.

"ppd−make" (text(127)):

The client OPTIONALLY supplies a printer manufacturer to select which PPDs are returned.

"requested−attributes" (1setOf keyword) :

The client OPTIONALLY supplies a set of attribute names and/or attribute group names in whose values the requester is interested. If the client omits this attribute, the server responds as if this attribute had been supplied with a value of 'all'.

4.15.2 CUPS−Get−PPDs Response

The following groups of attributes are send as part of the CUPS−Get−PPDs Response:

Group 1: Operation Attributes

Status Message:

The standard response status message.

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.2 of the IPP Model and Semantics document.

Group 2: PPD Attributes

The set of requested attributes and their current values for each PPD file.

4.16 CUPS−Move−Job Operation

The CUPS−Move−Job operation (0x400D) moves an active print job to a different printer (CUPS 1.1 and higher).

4.16.1 CUPS−Move−Job Request

The following groups of attributes are supplied as part of the CUPS−Move−Job request:

Group 1: Operation Attributes

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.1 of the IPP Model and Semantics document.

"printer−uri" (uri) and "job−id" (integer)

OR

"job−uri":

The client MUST supply a URI for the specified printer and a job ID number, or the job URI.

Group 2: Job Template Attributes

"job−printer−uri" (uri)

The client MUST supply a URI for a printer on the same server.

4.16.2 CUPS−Move−Job Response

The following groups of attributes are send as part of the CUPS−Move−Job Response:

Group 1: Operation Attributes

Status Message:

The standard response status message.

Natural Language and Character Set:

The "attributes−charset" and "attributes−natural−language" attributes as described in section 3.1.4.2 of the IPP Model and Semantics document.

5 Attributes

CUPS provides many extension attributes to support multiple devices, PPD files, standard job filters, printers, and printer classes.

5.1 Device Attributes

Device attributes are returned by the CUPS−Get−Devices operation and enumerate all of the available hardware devices and network protocols that are supported by the server.

5.1.1 device−class (type2 keyword)

The device−class attribute specifies the class of device and can be one of the following:

- "file" − a disk file.
- "direct" − a parallel or fixed−rate serial data port, currently used for Centronics, IEEE−1284, and USB printer ports.
- "serial" − a variable−rate serial port.
- "network" − a network connection, typically via AppSocket, HTTP, IPP, LPD, or SMB/CIFS protocols.

5.1.2 device−info (text(127))

The device−info attribute specifies a human−readable string describing the device, e.g. "Parallel Port #1".

5.1.3 device−make−and−model (text(127))

The device−makr−and−model attribute specifies a device identification string provided by the printer connected to the device. If the device or printer does not support identification then this attribute contains the string "unknown".

5.1.4 device−uri (uri)

The device−uri attribute specifies a unique identifier for the device. The actual format of the device−uri string depends on the value of the device−class attribute:

- "file" − The device−uri will be of the form "file:/path/to/filename".
- "direct" − The device−uri will be of the form "method:/dev/filename", where method may be "parallel" or "usb" in the current implementation.
- "serial" − The device−uri will be of the form "serial:/dev/filename?baud=value+parity=value+flow=value". The baud value is the data rate in bits per second; the supported values depend on the underlying hardware. The parity value can be one of "none", "even", or "odd". The flow value can be one of "none", "soft" (XON/XOFF handshaking), "hard" or "rts/cts" (RTS/CTS handshaking), or "dtrdsr" (DTR/DSR handshaking).

  The URI returned by CUPS−Get−Devices will contain the maximum baud rate supported by the device and the best type of flow control available ("soft" or "hard").
- "network" − The device−uri will be of the form "method://[username:password@]hostname[:port]/[resource]", where method may be "http", "ipp",

"lpd", "smb", or "socket" in the current implementation.

The URI returned by CUPS−Get−Devices will only contain the method name followed by two slashes ("method://"). It is up to the client application to add the appropriate host and other information when adding a new printer.

The URI returned by Get−Printer−Attributes and CUPS−Get−Printers has any username and password information stripped; the information is still stored and used by the server internally to perform any needed authentication.

5.2 Job Template Attributes

5.2.1 blackplot (boolean)

The blackplot attribute specifies whether HP−GL/2 plot files should be rendered entirely in black ink (blackplot=true) or using the colors and shades specified in the file (blackplot=false). The default value is false.

5.2.2 brightness (integer(0:200))

The brightness attribute specifies the overall brightness of the printed output in percent. A brightness of 100 is normal, while 200 is twice as bright and 50 is half as bright. The default value is 100.

Brightness is applied to the Cyan, Magenta, Yellow, and Black values using the function "f(x) = brightness / 100 * x".

5.2.3 columns (integer(1:4))

The columns attribute specifies the number of columns to generate when printing text files. The default value is 1.

5.2.4 cpi (type2 enum)

The cpi attribute specifies the number of characters per inch when printing text files. Only the values 10, 12, and 17 are currently supported. The default value is 10.

5.2.5 fitplot (boolean)

The fitplot attribute specifies whether to scale HP−GL/2 plot files to fit on the selected media (fitplot=true) or use the physical scale specified in the plot file (fitplot=false). The default value is false.

5.2.6 gamma (integer(1:10000))

The gamma attribute specifies the luminance correction for the output. A value of 1000 specifies no correction, while values of 2000 and 500 will generate lighter and darker output, respectively. The default value is 1000.

Gamma is applied to the Red, Green, and Blue values (or luminance for grayscale output) using the function "$f(x) = x^{(1000/gamma)}$".

5.2.7 hue (integer(−180:180))

The hue attribute specifies a color hue rotation when printing image files. The default value is 0.

5.2.8 job−billing (text(MAX))

(CUPS 1.1 and higher)

The job−billing attribute provides a text value to associate with a job for billing purposes.

5.2.9 job−hold−until (keyword | name(MAX))

(CUPS 1.1 and higher)

The job−hold−until attribute specifies a hold time. In addition to the standard IPP/1.1 keyword names, CUPS supports name values of the form "HH:MM" and "HH:MM:SS" that specify a hold time. The hold time is in Greenwich Mean Time (GMT) and *not* in the local time zone. If the specified time is less than the current time, the job is held until the next day.

5.2.10 job−sheets (1setof type3 keyword | name(MAX))

(CUPS 1.1 and higher)

The job−sheets attribute specifies one or two banner files that are printed before and after a job. The reserved value of "none" disables banner printing. The default value is stored in the job−sheets−default attribute.

If only one value is supplied, the banner file is printed before the job. If two values are supplied, the first value is used as the starting banner file and the second as the ending banner file.

5.2.11 job−originating−host−name (name(MAX))

(CUPS 1.1.5 and higher)

The job−originating−host−name attribute specifies the host from which the job was queued. The value will be the hostname or IP address of the client depending on whether hostname resolution is enabled. The localhost address (127.0.0.1) is **always** resolved to the name "localhost".

This attribute is read−only.

5.2.12 lpi (type2 enum)

The lpi attribute specifies the number of lines per inch when printing text files. Only the values 6 and 8 are currently supported. The default value is 6.

5.2.13 mirror (boolean)

The mirror attribute specifies whether pages are mirrored on their X axis, which is useful for printing transfer images on special media. The default value is false.

5.2.14 natural−scaling (integer(1:1000))

(CUPS 1.1.9 and higher)

The natural−scaling attribute specifies the scaling of image files with respect to the natural image size. A value of 100 specifies that the image file should exactly the natural size, while 50 is half the natural size and 200 is twice the natural size. The default value is 100.

The ppi option can be used to override the natural resolution of the image, which controls the natural size.

5.2.15 number−up−layout (type2 keyword)

(CUPS 1.1.15 and higher)

The number−up−layout attribute specifies the order each input page is placed on each output page. The following keywords are presently defined:

- `btlr` − Bottom to top, left to right
- `btrl` − Bottom to top, right to left
- `lrbt` − Left to right, bottom to top
- `lrtb` − Left to right, top to bottom (default)
- `rlbt` − Right to left, bottom to top
- `rltb` − Right to left, top to bottom
- `tblr` − Top to bottom, left to right
- `tbrl` − Top to bottom, right to left

5.2.16 page−border (type2 keyword)

(CUPS 1.1.15 and higher)

The page−border attribute specifies whether a border is draw around each page. The following keywords are presently defined:

- `double` − Two hairline borders are drawn
- `double−thick` − Two 1pt borders are drawn
- `none` − No border is drawn (default)
- `single` − A single hairline border is drawn
- `single−thick` − A single 1pt border is drawn

5.2.17 page−bottom (integer(0:MAX))

The page−bottom attribute specifies the bottom margin in points (72 points equals 1 inch). The default value is the device physical margin.

5.2.18 page−label (text(MAX))

(CUPS 1.1.7 and higher)

The page−label attribute provides a text value to place in the header and footer on each page. If a classification level is set on the server, then this classification is printed before the page label.

5.2.19 page−left (integer(0:MAX))

The page−left attribute specifies the left margin in points (72 points equals 1 inch). The default value is the device physical margin.

5.2.20 page−right (integer(0:MAX))

The page−right attribute specifies the right margin in points (72 points equals 1 inch). The default value is the device physical margin.

5.2.21 page−set (type2 keyword)

The page−set attribute specifies which pages to print in a file. The supported keywords are "all", "even", and "odd". The default value is "all".

5.2.22 page−top (integer(0:MAX))

The page−top attribute specifies the top margin in points (72 points equals 1 inch). The default value is the device physical margin.

5.2.23 penwidth (integer(0:MAX))

The penwidth attribute specifies the default pen width in micrometers when printing HP−GL/2 plot files. The default value is 1000 (1 millimeter).

5.2.24 position (type2 keyword)

The position attribute specifies the location of image files on the media. The following keyword values are recognized:

- `center` − Center the image on the page (default)
- `top` − Print the image centered at the top of the page
- `left` − Print the image centered on the left of page
- `right` − Print the image centered on the right of the page
- `top−left` − Print the image at the top left corner of the page
- `top−right` − Print the image at the top right corner of the page
- `bottom` − Print the image centered at the bottom of the page
- `bottom−left` − Print the image at the bottom left corner of the page
- `bottom−right` − Print the image at the bottom right corner of the page

5.2.25 ppi (integer(1:MAX))

The ppi attribute specifies the resolution of an image file in pixels per inch. The default value is the resolution included with the file or 128 if no resolution information is available.

5.2.26 prettyprint (boolean)

The prettyprint attribute specifies whether text files should be printed with a shaded header and keyword highlighting (prettyprint=true) or without additional formatting (prettyprint=false). The default value is false.

5.2.27 saturation (integer(0:200))

The saturation attribute specifies the color saturation when printing image files. A saturation of 100 is normal, while values of 50 and 200 will be half and twice as colorful, respectively. The default value is 100.

5.2.28 scaling (integer(1:1000))

The scaling attribute specifies the scaling of image files with respect to the selected media. A value of 100 specifies that the image file should fit 100% of the page, or as much as possible given the image dimensions. The default value is unspecified.

The scaling attribute overrides the ppi attribute if specified.

5.2.29 wrap (boolean)

The wrap attribute specifies whether long lines should be wrapped (wrap=true) or not (wrap=false) when printing text files. The default value is true.

5.3 PPD Attributes

5.3.1 ppd−natural−language (naturalLanguage)

The ppd−natural−language attribute specifies the language encoding of the PPD file (the LanguageVersion attribute in the PPD file). If the language is unknown or undefined then "en" (English) is assumed.

5.3.2 ppd−make (text(127))

The ppd−make attribute specifies the manufacturer of the printer (the Manufacturer attribute in the PPD file). If the manufacturer is not specified in the PPD file then an educated guess is made using the NickName attribute in the PPD file.

5.3.3 ppd−make−and−model (text(127))

The ppd−make−and−model attribute specifies the manufacturer and model name of the PPD file (the NickName attribute in the PPD file). If the make and model is not specified in the PPD file then the ModelName or ShortNickName attributes are used instead.

5.3.4 ppd−name (name(255))

The ppd−name attribute specifies the PPD filename on the server relative to the model directory. The forward slash (/) is used to delineate directories.

5.4 Printer Attributes

5.4.1 job−k−limit (integer)

(CUPS 1.1 and higher)

The job−k−limit attribute specifies the maximum number of kilobytes that may be printed by a user, including banner files. The default value of 0 specifies that there is no limit.

5.4.2 job−page−limit (integer)

(CUPS 1.1 and higher)

The job−page−limit attribute specifies the maximum number of pages that may be printed by a user, including banner files. The default value of 0 specifies that there is no limit.

5.4.3 job−quota−period (integer)

(CUPS 1.1 and higher)

The job−quota−period attribute specifies the time period used for quota calculations, in seconds. The default value of 0 specifies that the limits apply to all jobs that have been printed by a user that are still known to the system.

5.4.4 job−sheets−supported (1setof type3 keyword | name(MAX))

(CUPS 1.1 and higher)

The job−sheets−supported attribute specifies the available banner files. There will always be at least one banner file available called "none".

5.4.5 printer−type (type2 enum)

The printer−type attribute specifies printer type and capability bits for the printer or class. The default value is computed from internal state information and the PPD file for the printer. The following bits are defined:

Bit	Description
0x00000001	Is a printer class.
0x00000002	Is a remote destination.
0x00000004	Can print in black.
0x00000008	Can print in color.
0x00000010	Can print on both sides of the page in hardware.
0x00000020	Can staple output.
0x00000040	Can do fast copies in hardware.
0x00000080	Can do fast copy collation in hardware.
0x00000100	Can punch output.
0x00000200	Can cover output.
0x00000400	Can bind output.
0x00000800	Can sort output.
0x00001000	Can handle media up to US−Legal/A4.
0x00002000	Can handle media from US−Legal/A4 to ISO−C/A2.
0x00004000	Can handle media larger than ISO−C/A2.

0x00008000	Can handle user−defined media sizes.
0x00010000	Is an implicit (server−generated) class.
0x00020000	Is a network default printer.
0x00040000	Is a facsimile device.

5.4.6 printer−type−mask (type2 enum)

(CUPS 1.1 and higher)

The printer−type−mask attribute is used to choose printers or classes with the CUPS−Get−Printers and CUPS−Get−Classes operations. The bits are defined identically to the printer−type attribute and default to all 1's.

5.4.7 requesting−user−name−allowed (1setof name(127))

(CUPS 1.1 and higher)

The requesting−user−name−allowed attribute lists all of the users that are allowed to access a printer or class. Either this attribute or the requesting−user−name−denied attribute will be defined, but not both.

5.4.8 requesting−user−name−denied (1setof name(127))

(CUPS 1.1 and higher)

The requesting−user−name−denied attribute lists all of the users that are not allowed to access a printer or class. Either this attribute or the requesting−user−name−allowed attribute will be defined, but not both.

5.5 Printer Class Attributes

5.5.1 member−names (1setof name(127))

The member−names attribute specifies each of the printer−name attributes of the member printers and classes. Each name corresponds to the same element of the member−uris attribute.

5.5.2 member−uris (1setof uri)

The member−uris attribute specifies each of the printer−uri attributes of the member printers and classes. Each URI corresponds to the same element of the member−names attribute.

A Glossary

A.1 Terms

C
: A computer language.

parallel
: Sending or receiving data more than 1 bit at a time.

pipe
: A one−way communications channel between two programs.

serial
: Sending or receiving data 1 bit at a time.

socket
: A two−way network communications channel.

A.2 Acronyms

ASCII
: American Standard Code for Information Interchange

CUPS
: Common UNIX Printing System

ESC/P
: EPSON Standard Code for Printers

FTP
: File Transfer Protocol

HP−GL
: Hewlett−Packard Graphics Language

HP−PCL
: Hewlett−Packard Page Control Language

HP−PJL
: Hewlett−Packard Printer Job Language

IETF
: Internet Engineering Task Force

IPP
: Internet Printing Protocol

ISO
: International Standards Organization

LPD
: Line Printer Daemon

MIME
: Multimedia Internet Mail Exchange

PPD
: PostScript Printer Description

SMB
: Server Message Block

TFTP
: Trivial File Transfer Protocol