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Mapping between LPD and IPP Protocols

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Abstract

This Internet-Draft specifies the mapping between (1) the commands and operands of the "Line Printer Daemon (LPD) Protocol" specified in RFC 1179 and (2) the operations and parameters of the Internet Printing Protocol (IPP). One of the purposes of this document is to compare the functionality of the two protocols. Another purpose is to facilitate implementation of gateways between LPD and IPP.

WARNING: RFC 1179 was not on standards track. While RFC 1179 was intended to record existing practice, ~~in some areas~~ it fell short in some areas. However, this specification maps between (1) the actual current practice of RFC 1179 and (2) IPP. This document does not attempt to map the numerous divergent extensions to the LPD protocol that have been made by many implement~~ers~~.

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Mapping between the LPD and IPP Protocols

74

75 1. Introduction

76 The reader of this specification is expected to be familiar with the IPP Model and Semantics specification
77 [1], the IPP Protocol specification [2], and the Line Printer Daemon (LPD) protocol specification [3] as
78 described in RFC 1179.

79 RFC 1179 was written in 1990 in an attempt to document existing LPD protocol implementations. Since
80 then, a number of undocumented extensions have been made by vendors to support functionality specific to
81 their printing solutions. All of these extensions consist of additional control file commands~~directives~~. This
82 document does not address any of these vendor extensions. Rather it addresses existing practice within the
83 context of the features described by RFC 1179. Deviations of existing practice from RFC 1179 are so
84 indicated.

85 Other LPD control file commands in RFC 1179 are obsolete. They are intended to work on "text" only
86 formats and ~~se~~ are inappropriate for many contemporary document formats that completely specify each
87 page. This document does not address the support of these obsolete features.

88 In the area of document formats, also known as page description languages (PDL), RFC 1179 defines a
89 fixed set with no capability for extension. Consequently, some new PDL's are not supported, and some of
90 those that are supported are sufficiently unimportant now that they have not been registered for use with the
91 Printer MIB[4] and IPP[1] [2], though they could be registered if desired. See the Printer MIB specification
92 [4] and/or the IPP Model specification [1] for instructions for registration of document-formats with IANA.
93 IANA lists the registered document-formats as "printer languages".

94 This document addresses the protocol mapping for both directions: mapping of the LPD protocol to the IPP
95 protocol and mapping of the IPP protocol to the LPD protocol. The former is called the "LPD-to-IPP
96 mapper" and the latter is called the "IPP-to-LPD mapper".

97 2. Terminology

98 The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD",
99 "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be
100 interpreted as described in RFC 2119 [6].

101 RFC 1179 uses the word "command" in two contexts: for over-the-wire operations and for command file
102 functions. This document SHALL use the word "command" for the former and the phrase "functions" for
103 the latter.

104 The syntax of the LPD commands is given using ABNF [6].

105 The following tokens are used in order to make the syntax more readable:

106 LF stands for %x0A (linefeed)

107 SP stands for %x20. (space)

108 DIGIT stands for %x30-39 ("0" to "9")

09 3. Mapping from LPD Commands to IPP Operations

10 This section describes the mapping from LPD ~~commands on-the-wire~~ to IPP operations. Each of the
 11 following sub-sections appear as sub-sections of section 5 of RFC 1179.

12 The following table summarizes the IPP operation that the mapper uses when it receives an LPD command.
 13 Each section below gives more detail.

<u>LPD command</u>	<u>IPP operation</u>
<u>print-any-waiting-jobs</u>	<u>ignore</u>
<u>receive-a-printer-job</u>	<u>Print-Job or Create-Job/Send-Document</u>
<u>send queue state (short or long)</u>	<u>Get-Attributes (printer) and Get-Jobs</u>
<u>remove-jobs</u>	<u>Cancel-Job</u>

14 3.1 Print any waiting jobs

15 Command syntax:

16 print-waiting-jobs = %x01 pPrinter-~~queue~~-name LF

17 ~~In LPD, this command starts the daemon, if it isn't already running. Such an equivalent operation is not~~
 18 ~~provided in IPP, since the IPP Printer is assumed to always be running, where as in LPD, the client makes~~
 19 ~~sure that the daemon is running using this command.~~

20 This command causes the LPD daemon check its queue and print any waiting jobs. An IPP printer handles
 21 waiting jobs without such a nudge.

22 If ~~the an LPD to IPP~~ mapper receives this LPD command, it SHALL ignore it and send no IPP operation.

23 3.2 Receive a printer job

24 Command syntax:

25 receive-job = %x02 pPrinter-~~queue~~-name LF

26 The control file and data files mentioned in the following paragraphs are received via LPD sub-commands
 27 that follow this command. Their mapping to IPP commands and attributes is described later in this section.

28 The mapper maps the 'Receive a printer job' command to either:

- 29 • the Print-Job operation which includes with a single data file or
- 30 • the Create-Job operation followed by onea Send-Document operation for each data file.

31 If the IPP printer supports both Create-Job and Send-Document, and if a job consists of:

- 32 • a single data file, the mapper SHOULD use the PrintJob operation, but MAY use the Create-
 33 Job and Send-Document operations.
- 34 • more than one data file, the mapper SHALL use Create Job followed by one Send-Document
 35 for each received LPD data file.

36 If the IPP printer does not support both Create-Job and Send-Document, and if a job consists of:

- 37 • a single data file, the mapper SHALL use the PrintJob operation.
- 38 • more than one data file, the mapper submit each received LPD data file as a separate Print-
- 39 Job operation (thereby converting a single LPD job into multiple IPP jobs).

40

41 ~~If a job consists of a single data file, the PrintJob operation is RECOMMENDED.~~

42 ~~If a job consists of more than one data file, Create Job followed by Send Document for each data file is~~
43 ~~REQUIRED. If the IPP Printer doesn't support the Create Job and Send Document operations, the LPD-~~
44 ~~to-IPP mapper SHALL submit each data file as a separate Print Job operation (thereby converting a single~~
45 ~~LPD job into multiple IPP jobs).~~

46 If the mapper uses Create-Job and Send-Document, it MUST send the Create-Job operation before it sends
47 any Send-Document operations whether the LPD control file, which supplies attributes for Create-Job,
48 arrives before or after all LPD data files.

49 ~~ISSUE: Ok that I changed so that the mapper shall break a multi-document job into separate jobs, one IPP~~
50 ~~job for each LPD data file, instead of error return?~~

51 ~~NOTE: if Create Job is used, it MUST precede the Send Document operation even if the LPD control file,~~
52 ~~which supplies attributes for Create Job, arrives after all documents.~~NOTE: This specification does not
53 specify how the mapper maps: the LPD Printer-name operand to the IPP "printer-uri" parameter.

54 ~~This section describes the mapping between LPD sub-commands and IPP operations. Each of the following~~
55 ~~sub-sections appear as sub-sections of section 6 of RFC 1179. The operands of the sub-commands appear~~
56 ~~in parens in the sub-headings~~

57 The following 3 sub-sections gives further details about the mapping from LPD receive-a-printer-job sub-
58 commands to IPP operations. Each of the following sub-sections appear as sub-sections of section 6 of RFC
59 1179.

60 **3.2.1 ~~01~~ Abort job ☺**

61 Sub-command syntax:

62 abort-job = %x01 LF

63 This sub-command of receive-job is intended to abort any job transfer in process.

64 If the mapper receives this sub-command, it SHALL cancel the job that it is in the process of transmitting.

65 If the mapper is in the process of sending a Print-Job or Create-Job operation, it terminates the job either by
66 closing the connection, or it performs the Cancel-Job operation with the job-uri that it received from the
67 Print-Job or Create-Job operation.

68 NOTE: This sub-command is implied if at any time the connection between the LPD client and server is
69 terminated before an entire print job has been transferred via an LPD Receive-a-printer-job request.

70 ~~If an IPP Create-Job operation and/or a Send-Document operation were performed on behalf of the receive~~
71 ~~job command that is being aborted, an IPP Cancel Job operation should be issued for the job URI that was~~

72 ~~returned by the Printer on which the Create-Job operation was performed. Also, any temporary files created~~
73 ~~while processing the 'Receive job request' should be cleaned up, and the connection to the client should be~~
74 ~~closed. Finally, this sub-command is implied if at any time the connection between the LPD client and server~~
75 ~~is terminated before an entire print job has been transferred via an LPD 'Receive job request'.~~

76 ~~ISSUE: is IPP defined at this point to abort a job whose connection is closed before the job has been fully~~
77 ~~received. If so, that is an alternate and simpler way to abort the job.~~

78 **3.2.1 ~~02~~—Receive control file**

79 ~~Sub-command syntax: %x02 Number-of-bytes-in-control-file, Name-of-control-file~~

80 Sub-command syntax:

81 receive-control-file = %x2 number-of-bytes SP name-of-control-file LF

82 number-of-bytes = 1*DIGIT

83 name-of-control-file = "cfA" job-number client-host-name

84 _____ ; e.g. "cfA123woden"

85 job-number = 3DIGIT

86 This sub-command is roughly equivalent to the IPP Create-Job operation.

87 The mapper SHALL use the contents of the received LPD control file to create IPP parameter and attribute
88 values to transmit with the Print-Job or Create-Job operation.

89 ~~Once the control file has been received, it's contents should be translated, and an appropriate IPP~~
90 ~~Create-Job operation performed.~~

91 ~~However, some information, such as Document-Name go in the Send-Document operation.~~

92 **3.2.1 ~~03~~—Receive data file**

93 ~~Sub-command syntax: %x03 nNumber-of-bytes-in-data-file Name-of-data-file~~

94 receive-data-file = %x03 number-of-bytes SP name-of-data-file LF

95 number-of-bytes = 1*DIGIT

96 name-of-data-file = "df" letter job-number client-host-name

97 _____ ; e.g. "dfA123woden for the first file

98 letter = %x41-5A / %x61-7A ; "A" to "Z", "a" to "z" ; first file is "A",

99 _____ ; second "B", and 52nd file is "z"

100 job-number = 3DIGIT

101

102 This sub-command is roughly equivalent to the IPP Send-Document operation.

103 The mapper SHALL use the contents of the received LPD data file as the data to transmit with the IPP
104 Print-Job or Send-Document operation.

105 Although RFC-1179 alludes to a method for passing an unspecified length data file by using an octet-count
106 of zero, no implementations support this feature.. The mapper SHALL reject a job that has a value of 0 in
107 the number-of-bytes field.

108 ~~If the control file has been previously received, and it's corresponding IPP Create-Job operation performed,~~
109 ~~an IPP Send-Document operation can be performed using the job URI returned by the IPP Create-Job~~
110 ~~operation.~~

111 ~~When performing the Send-Document operation, the size of the document data MUST be specified.~~
112 ~~Unfortunately RFC 1179 alludes to a method for passing an arbitrary length data file. This is described as~~
113 ~~being done by using an octet-count of zero, however the description isn't complete, and in practice, no~~
114 ~~implementations allow sending or receiving arbitrary length data files.~~

115

116 3.3 Send queue state (short)

117 Command syntax: ~~-%x03 Printer-queue-name *(SP (User-Name / job-number))~~

118 send-queue-short = %x03 printer-name *(SP (user-name / job-number)) LF

119 ~~If the LPD command contains only the Printer-queue-name operand, the LPD to IPP mapper SHALL use~~
120 ~~the Get-Attributes operation of the corresponding IPP Printer to get printer-state information and the Get-~~
121 ~~Jobs operation of the Printer to get information about all of the jobs. With Get-Attributes, it SHALL~~
122 ~~request the "printer-state" and "printer-state-reasons" attributes. With Get-Jobs, it SHALL request the~~
123 ~~"number-of-intervening-jobs", "job-originating-user", "job-name", "document-name" (or "document-uri"),~~
124 ~~and "job-k-oetets".~~

125 The mapper's response to this command includes information about the printer and its jobs. RFC 1179
126 specifies neither the information nor the format of its response. This document requires the mapper to follow
127 existing practice as specified in this document.

128 The mapper SHALL produce a response in the following format which consists of a printer-status line
129 optionally followed by a heading line, and a list of jobs. This format is defined by examples below. Appendix
130 A contains the ABNF syntax.

131 For an printer with no jobs, the response is:

132

133 no entries

134

135 For a printer with jobs, an example of the response is:

136

137 killtree is ready and printing
 138 Rank Owner Job Files Total Size
 139 active fred 123 stuff 1204 bytes
 140 1st smith 124 resume 34576 bytes
 141 2nd fred 125 more 99 bytes
 142

143 The column numbers of above headings and job entries are:

144
 145 | | | | |
 146 01 08 19 35 63
 147

148 The mapper SHALL produce each field above from the following IPP attribute:

<u>LPD field</u>	<u>IPP attribute</u>	<u>special conversion details</u>
<u>printer-status</u>	<u>printer-state and printer-state-reasons</u>	<u>For a printer-state of idle or processing, the mapper SHALL use the formats above. For stopped, the mapper SHALL use printer-state-reasons to produce an unspecified format for the error.</u>
<u>rank</u>	<u>number-of-intervening-jobs</u>	<u>the mapper SHALL the format above</u>
<u>owner</u>	<u>job-originating-user</u>	<u>unspecified conversion; job-originating-user may be the mapper's user-name</u>
<u>job</u>	<u>job-uri</u>	<u>unspecified conversion</u>
<u>files</u>	<u>document-name</u>	<u>the mapper shall create a comma separated list of the document-names and then truncate this list to the first 24 characters</u>
<u>total-size</u>	<u>job-k-octets</u>	<u>the mapper shall multiple the value of job-k-octets by 1024.</u>

149 ISSUE: is job-k-octets the sum of the bytes of each document times the number of copies? If so, "total-size"
 150 is 1024 times job-k-octets. The model document needs clarification.

151 In order to obtain the information specified above, The LPD-to-IPP mapper SHALL use the Get-Attributes
 152 operation of the printer to get printer-status and SHOULD use the Get-Jobs operation to get information
 153 about all of the jobs. If the LPD command contains job-numbers or user-names, the mapper handles the
 154 filtering of the response because Get-Jobs has no way to limit jobs to those of a particular user. If the LPD
 155 command contains job-numbers but no user-names, the mapper MAY use Get-Attributes on each converted
 156 job-number rather than Get-Jobs.

157 NOTE: This specification does *not* define how the mapper maps the LPD Printer-name operand to the IPP
 158 "printer-uri" parameter.

159 NOTE: This specification does *not* specify how the LPD to IPP mapper maps: (1) the LPD Printer-queue-
 160 name operand to the IPP "printer-uri" parameter or (2) the LPD job-number operand to the IPP "job-uri"
 161 parameter, since the format of these URIs is opaque in the IPP protocol and is implementation-dependent.

!62 ~~NOTE: RFC 1179 does not specify what attributes are returned in response to a 'Send queue state' (short)~~
 !63 ~~command, but leaves it up to implementation. The IPP attributes specified in this specification reflect~~
 !64 ~~existing practice.~~

!65 ~~If the LPD command contains one or more User name operands, the LPD to IPP mapper SHALL get all the~~
 !66 ~~jobs as above using the Get Jobs operation on the Printer and then do its own filtering on the returned value~~
 !67 ~~of the "job-originating-user" attribute for each job.~~

!68 ~~If the LPD command contains only job number operands, the LPD to IPP mapper SHALL either (1) get all~~
 !69 ~~the jobs as above using the Get Jobs operation on the Printer and then do its own filtering or (2) get each~~
 !70 ~~specified job individually using separate Get Attributes operations (multiple jobs may be requested in a~~
 !71 ~~single IPP connection with multiple Get Attribute operations, one for each job).~~

!72 3.4 Send queue state (long)

!73 Command syntax:

!74 send-queue-long = -%x04 printer-name *(SP (user-name / job-number)) LF

!75 ---

!76 The mapper's response to this command includes information about the printer and its jobs. RFC 1179
 !77 specifies neither the information nor the format of its response. This document requires the mapper to follow
 !78 existing practice as specified in this document.

!79 The mapper SHALL produce a response in the following format which consists of a printer-status line
 !80 optionally followed by blank line, and a list of jobs. This format is defined by examples below. Appendix B
 !81 contain the ABNF syntax.

!82 For a printer with no jobs the response is:

!83 no entries

!86 For a printer with jobs, an example of the response is:

!87 killtree is ready and printing

!88 <u>fred: active</u>	<u>[job 123 tiger]</u>
!89 <u> 2 copies of stuff</u>	<u>602 bytes</u>
!90 <u>smith: 1st</u>	<u>[job 124 snail]</u>
!91 <u> 2 copies of resume</u>	<u>7088 bytes</u>
!92 <u> 2 copies of foo</u>	<u>10200 bytes</u>
!93 <u>fred: 2nd</u>	<u>[job 125 tiger]</u>
!94 <u> more</u>	<u>99 bytes</u>

!100

301 The column numbers of above headings and job entries are:

302			
303			
304	01	09	41
305	<hr/>		

306 Although the format of the long form is different from the format of the short form, the fields are identical to
307 the short form except for the copies and host fields which are only in the long form. For fields other than the
308 host field, see the preceding section. For the host field see the table below.

<u>LPD field</u>	<u>IPP attribute</u>	<u>special conversion details</u>
<u>host</u>	<u>job-originating-host</u>	<u>unspecified conversion: job-originating-host may be the mapper's host</u>
<u>copies</u>	<u>copies</u>	<u>the mapper shall assume the value of copies precedes the string "copies of "; otherwise, the value of copies is 1.</u>

309
310 NOTE: This specification does not define how the mapper maps the LPD Printer-name operand to the IPP
311 printer-uri parameter.

312 Same mapping as the 'Send-queue-state' (short) command. The IPP client supplies a longer list of requested
313 attributes to the Get-Jobs or Get-Attributes operations.

314 The LPD to IPP mapper should specify additional attributes than the ones listed for the 'Send-queue-state'
315 (short) command.

316 NOTE: RFC 1179 does not specify what attributes are returned in response to a 'Send-queue-state' (short)
317 command, but leaves it up to implementation.

318 **3.5 Remove jobs**

319 Command syntax: %x05 Printer-queue-name SP agent *(SP (User-name / job-number))

320 remove-jobs = %x05 printer-name SP agent *(SP (user-name / job-number)) LF

321 The agent operand is the user-name of the user initiating the 'Rremove-jobs' command.- The special user-
322 name 'root' indicates a privileged user who can remove jobs whose user-name differs from the agent.

323 The LPD to IPP mapper shall map this command to the Cancel-Job operation.

324 The mapper SHALL issue one Cancel-Job operation for each job referenced by the remove-jobs command.
325 Each job-number in the remove-jobs command references a single job. Each user-name in the remove-jobs
326 command implicitly references all jobs owned by the specified user. The active job is implicitly referenced
327 when the remove-jobs command contains neither job-numbers nor user-names. The mapper MAY use Get-
328 Job to determine the job-uri of implicitly referenced jobs.

329 The mapper SHALL not use the agent name of 'root' when end-users cancel their own jobs. Violation of
330 this rule creates a potential security violation, and it may cause the printer to issue a notification that
331 misleads a user into thinking that some other person canceled the job.

332 If the remove-jobs command is to succeed for a job J with an agent which is an end user name, then the
333 agent SHALL be the same as the user name specified with the 'P' function in the receive-a-printer-job
334 command for job J. The mapper SHALL have the same alignment between the job-originating-user and the
335 caller of the Cancel-Job command. This requirement means that a mapper either can act on behalf of
336 another user, or all jobs it submits have a job-originating-user of the mapper's user-name.

337 NOTE: This specification does not define how the mapper maps: (1) the LPD printer-name to the IPP
338 "printer-uri" or (2) the LPD job-number to the IPP "job-uri".

339 ~~There is no IPP equivalent for the LPD 'Remove jobs' command with just the Printer-queue-name operand~~
340 ~~supplied, since IPP provides no way to cancel the current job.~~

341 ~~There is no IPP equivalent for the LPD 'Remove jobs' command with a User name operand supplied, since~~
342 ~~IPP provides no way to cancel a job specified by user name.~~

343 ~~This command with the Printer-queue-name operand and one job-number operand is the same as the IPP~~
344 ~~Cancel-Job operation when the client supplies just the job URI. Multiple jobs may be canceled in IPP in a~~
345 ~~single connection with multiple Cancel-Job operations. In IPP only a privileged operator may cancel jobs~~
346 ~~belonging to another user.~~

347 ~~NOTE: This specification does not specify how the LPD to IPP mapper maps: (1) the LPD Printer-queue-~~
348 ~~name to the IPP "printer-uri" or (2) the LPD job-number to the IPP "job-uri", since the format of these URIs~~
349 ~~is opaque in the IPP protocol and is implementation-dependent.~~NOTE: This specification does not specify
350 how the mapper maps the LPD user-name to the IPP job-originating-user because the mapper may use its
351 own user-name with jobs.

352 ~~The LPD to IPP mapper shall map a Cancel-Job operation to this command.~~

353 ~~4. There are some major issues about setting the agent.~~Mapping of LPD Control File 354 Lines to IPP Parameters

355 This section describes the mapping from LPD control file lines (called 'functions') to IPP operation input
356 parameters. ~~for the~~The mapper receives the control file lines via the LPD receive-control-file sub-command.
357 ~~Print-Job, Create-Job, and Send-Document operations.~~ Each of the LPD functions following sub-sections
358 appear as sub-sections of section 7 of RFC 1179.

359 In LPD control file lines, the text operands have a maximum length of 31 or 99 while IPP input parameters
360 have a maximum of 255 characters. Therefore, no data is lost.

361 ~~ISSUE: somewhere, we need to map the LPD query format to IPP attributes.~~

362 ~~In LPD text operands have a maximum length of 31 or 99 while IPP input parameters have a maximum of~~
363 ~~255 characters. Therefore, no data is lost when mapping from LPD to IPP. However, when mapping from~~
364 ~~IPP to LPD, there may be some data loss if the IPP parameters exceed the maximum length of the LPD~~
365 ~~equivalent operands.~~

366 ~~In the following table, IPP input parameter names are indicated in double quotes (") and input parameter~~
367 ~~values are indicated in single quotes ('). Values of the IPP "document-format" attribute that could be~~
368 ~~registered, but are not currently, are indicated with "***".~~

369 ~~Where there is a one-to-one mapping, both directions are specified. Where IPP has none, the LPD-to-IPP~~
370 ~~the attribute is ignored, and in the IPP-to-LPD the LPD feature is left unspecified.~~

371 The mapper converts each supported LPD function to its corresponding IPP parameter as defined by tables
372 in the subsections that follow. These subsections group functions according to whether they are:

- 373 • required with a job,
- 374 • optional with a job
- 375 • required with each document.

376 In the tables below, each LPD value is given a name, such as ‘h’. If an IPP value uses the LPD value, then
377 the IPP value column contains the LPD name, such as ‘h’ to denote this. Otherwise, the IPP value column
378 specifies the literal value.

379 **3.6 Required Job Functions**

380 The follow LPD functions MUST be in a received LPD job. The mapper SHALL receive each of the
381 following LPD functions and SHALL include the information as a parameter with each IPP job.

<u>LPD function</u>			<u>IPP</u>	
<u>name</u>	<u>value</u>	<u>description</u>	<u>name</u>	<u>value</u>
<u>H</u>	<u>h</u>	<u>Originating Host</u>		<u>h (in security layer)</u>
<u>P</u>	<u>u</u>	<u>User identification</u>		<u>u (in security layer)</u>
		<u>none</u>	<u>best-effort</u>	<u>‘true’</u>

382 A mapper MAY sends its own host rather than the client’s host, and a mapper MAY send its own user-name
383 as user identification rather than the client user. But in any case, the values sent SHALL be compatible with
384 the Cancel-Job operation. The IPP operation MAY have no way to specify an originating host-name.

385 The mapper SHALL include best-effort=true so that it doesn’t have to determine which attributes a printer
386 supports.

387 **3.7 Optional Job Functions**

388 The follow LPD functions MAY be in a received job. If the mapper receives such an LPD function, the
389 mapper SHALL include the corresponding IPP attribute with the value converted as specified in the table
390 below. If the mapper does not receive such an LPD attribute, the mapper SHALL NOT include the
391 corresponding IPP attribute, except the ‘L’ LPD function whose absence has a special meaning as noted in
392 the table.

393

<u>LPD function</u>			<u>IPP</u>	
<u>name</u>	<u>value</u>	<u>description</u>	<u>name</u>	<u>value</u>
<u>J</u>	<u>j</u>	<u>Job name for banner page</u>	<u>job-name</u>	<u>j</u>

<u>L</u>	<u>l</u>	<u>Print banner page</u>	<u>job-sheets</u>	<u>'standard' if 'L' is present</u> <u>'none' if 'L' is present</u>
<u>M</u>	<u>m</u>	<u>Mail When Printed</u>	<u>notification-events</u> <u>notification-method</u>	<u>'job-completion'</u> <u>'mailto:/'m'@'h</u>

394 Note: 'm' is the user name and not an email address. The mapper can fabricate an email address with the
 395 source host. This email address mail fail when the 'h' is some intermediary host that doesn't know about
 396 user 'm'. But there is no better solution.

397 **3.8 Recommended Document Functions**

398 The mapper SHOULD receive one set of the following LPD functions with each document, and SHALL
 399 include the converted information as parameters with each IPP document

400

<u>LPD function</u>			<u>IPP</u>	
<u>name</u>	<u>value</u>	<u>description</u>	<u>name</u>	<u>value</u>
<u>N</u>	<u>n</u>	<u>Name of source file</u>	<u>document-name</u>	<u>n</u>
<u>U</u>	<u>fff</u>		<u>ignored</u>	

401 Note: the value 'fff' of the 'U' function is the name of the data file as transferred, e.g. "dfA123woden".

402 **3.9 Required Document-format Functions**

403 The mapper SHALL receive exactly one of the following LPD functions with each document, and SHALL
 404 include the converted information as parameters with each IPP document

405

<u>LPD function</u>			<u>IPP</u>	
<u>name</u>	<u>value</u>	<u>description</u>	<u>name</u>	<u>value</u>
<u>f</u>	<u>fff</u>	<u>Print formatted file</u>	<u>document-format</u>	<u>37 (langAutomatic)</u>
<u>l</u>	<u>fff</u>	<u>Print file leaving control</u> <u>characters</u>	<u>document-format</u>	<u>37 (langAutomatic)</u>
<u>o</u>	<u>fff</u>	<u>Print Postscript output file</u>	<u>document-format</u>	<u>6 (langPS).</u>

406 Note: In practice, the 'f' LPD function is often overloaded. It is often used with any format of document
 407 data including PostScript and PCL data.

408 Note: In practice, the 'l' LPD function is often used as a rough equivalent to the 'f' function.

409 Note: When RFC 1179 was written, no implementation supported the 'o' function; instead 'f' was used for
 410 PostScript. Windows NT now sends 'o' function for a PostScript file.

l11 Note: the value 'fff' of the 'f', 'l' and 'o' functions is the name of the data file as transferred, e.g.
l12 "dfA123woden".

l13 If the mapper receives any other lower case letter, the mapper SHALL reject the job because the document
l14 contains a format that the mapper does not support.

l15 ISSUE: should we register DVI, ditroff and troff. At least DVI and one of the troff is still used.

l16 **4. Mapping from IPP operations to LPD commands**

l17 If the IPP-to-LPD mapper receives an IPP operation, the following table summarizes the LPD command that
l18 it uses. Each section below gives the detail. Each of the following sub-sections appear as sub-sections of
l19 section 3 in the document "Internet Printing Protocol/1.0: Model and Semantics" [1].

<u>IPP operation</u>	<u>LPD command</u>
<u>Get-Operations</u>	<u>implemented by the mapper</u>
<u>Print-Job or Print-URI or</u> <u>Create-Job/Send-Document/Send-URI</u>	<u>receive-a-printer-job</u> <u>and then print-any-waiting-jobs</u>
<u>Validate-Job</u>	<u>implemented by the mapper</u>
<u>Cancel-Job</u>	<u>remove-jobs</u>
<u>Get-Attributes (printer or job) or Get-Jobs</u>	<u>send queue state (short or long)</u>

l20

l21 **4.1 Get-Operations**

l22 The mapper SHALL return a list of the operations that it supports. It SHALL support at least those
l23 operations that are mandatory according to the IPP model document [1].

l24 **4.2 Print-Job**

l25 The mapper SHALL send the following commands in the order listed below:

- l26 • receive-a-printer-job command
- l27 • receive-control-file sub-command and receive-data-file sub-command
l28 (unspecified order, see Note below)
- l29 • print-any-waiting-jobs command,
l30 except that if the mapper is sending a sequence of receive-a-printer-job commands, it MAY
l31 omit sending print-any-waiting-jobs after any receive-a printer-job command that is neither
l32 the first nor last command in this sequence

l33 Note: it is recommended that the order of the receive-control-file sub-command and the receive-data-file
l34 sub-command be configurable because either order fails for some print systems. Some print systems assume
l35 that the control file follows all data files and start printing immediately on receipt of the control file. When
l36 such a print system tries to print a data file that has not arrived, it produces an error. Other print systems

l37 assume that the control file arrives before the data files and start printing when the first data file arrives.
l38 Such a system ignores the control information, such as banner page or copies.

l39 NOTE: This specification does not define the mapping between the IPP printer-uri and the LPD printer-
l40 name.

l41 The mapper SHALL send the IPP parameters and attributes received from the operation to the LPD printer
l42 by using the LPD receive-control-file sub-command. The mapper SHALL create the job-number for use in
l43 the control file name, but the receiving printer MAY, in some circumstances, assign a different job-number
l44 to the job. The mapper SHALL create the job-uri returned in the Print-Job response.

l45 NOTE: This specification does not specify how the mapper determines the job-number or the job-uri of a job
l46 that it creates nor does it specify the relation ship between the job-uri and the job-number, both of which the
l47 mapper creates.

l48 The mapper SHALL send data received in the IPP operation to the LPD printer by using the LPD receive-
l49 data-file sub-command. The mapper SHALL specify the exact number of bytes being transmitted in the
l50 number-of-bytes field of the receive-data-file sub-command. It SHALL NOT use a value of 0 in this field.

l51 An IPP to LPD mapper SHALL send this LPD command after it has finished sending all pending 'Receive a
l52 printer job' command.

l53 If the mapper, while it is transmitting a receive-a-printer-job command or sub-command, either detects that
l54 its IPP connection has closed or receives a Cancel-Job operation, the mapper SHALL terminate the LPD
l55 job either with the abort sub-command or the remove-jobs command.

l56 ISSUE: error code conversion.

l57 **4.3 Print-URI**

l58 The mapper SHALL handle this operation in the same way as a Print-Job operation except that it SHALL
l59 obtain data referenced by the "document-uri" parameter and SHALL then treat that data as if it had been
l60 received via a Print-Job operation.

l61 **4.4 Validate-Job**

l62 The mapper SHALL perform this operation directly. Because LPD supports very few attributes, this
l63 operation doesn't have much to check.

l64 **4.5 Create-Job**

l65 The mapper SHALL handle this operation like Print-Job, except

- l66 • the mapper SHALL send the control file after it has received the last Send-Document or
l67 Send-URI operation because the control file contains all the document-name and document-
l68 format values specified in the Send-Document and Send-URI operations.
- l69 • the mapper SHALL perform one receive-data-file sub-command for each Send-Document or
l70 Send-URI operation received and in the same order received.

- l71 • the mapper SHALL send the control file either before all data files or after all data files.
 l72 (See the note in the section on Print-Job about the dilemma of sending the control file either
 l73 before or after the data files.

l74 **4.6 Send-Document**

l75 The mapper performs a receive-data-file sub-command on the received data. See the preceding section 4.5
 l76 “Create-Job” for the details.

l77 **4.7 Send-URI**

l78 The mapper SHALL obtain the data referenced by the “document-uri” parameter, and SHALL then treat
 l79 that data as if it had been received via a Send-Document operation. See the preceding section 4.6 “Send-
 l80 Document” for the details.

l81

l82 ~~An IPP to LPD mapper SHALL map the following IPP operations to this LPD command:~~

- l83 ~~• Print Job~~
- l84 ~~• Print uri~~
- l85 ~~• Create Job followed by Send Document or Send URI for each document~~

l86 ~~See the next section for the mapping of the LPD "second level commands" to IPP input parameters.~~

l87 ~~The IPP to LPD mapper shall use the long version of this command. See that command.~~

l88 **4.8 Cancel-Job**

l89 The mapper SHALL perform a remove-jobs command with the following parameters:

- l90 • the printer is the one containing the job specified by the IPP job-uri,
- l91 • the agent is the authenticated user-name of the IPP client,
- l92 • the job-number is the one corresponding to the IPP job-uri parameter.

l93 NOTE: This specification does *not* specify how the mapper maps the IPP "job-uri" to the LPD printer-name
 l94 or LPD job-number.

l95 ISSUE: does the model offer a solution for mapping jobs to printers either with a new job attribute “printer-
 l96 uri” or with all operation targets being a printer-uri.

l97 **4.9 Get-Attributes**

l98 LPD severely limits the set of attributes that the mapper is able to return in its response for this operation.

l99 When the mapper receives a Get-Attributes operation for a printer object, it SHALL support, at most, the
 500 following printer attributes:

- 501 • printer-state

- 502 • printer-state-reasons

503 When the mapper receives a Get-Attributes operation for a job object, it SHALL support, at most, the
504 following job attributes:

- 505 • number-of-intervening-jobs
506 • job-originating-user
507 • job-uri
508 • job-originating-host
509 • document-name
510 • job-k-octets
511 • copies

512 The mapper uses either the long or short form of the “send queue state” command. If it receives a request
513 for the “job-originating-host” or “copies” and supports those attribute it SHALL use the long form;
514 otherwise, it SHALL use the short form.

515 Note: the value of job-k-octets is the value in the short form, but it can be computed from the copies and file
516 size fields in the long form.

517 The mapper SHALL assume that the LPD response that it receives has the format and information specified
518 in section 3.3 “Send queue state (short)” and section 3.4 “Send queue state (long)”. The mapper SHALL
519 determine the value of each requested attribute by using the inverse of the mapping specified in the two
520 forementioned sections.

521 Note: when the mapper receives the Get-Attributes operation for a printer, it can determine the response
522 from the printer-status line without examining the rest of the LPD response. When the mapper receives the
523 Get-Attributes operation for a job and uses the LPD short form, it can determine the response from the
524 single line that pertains to the job specified by the Get-Attributes operation.

525 NOTE: For Get-Attributes of a job, this specification does *not* specify how the mapper maps the IPP “job-
526 uri” to the LPD printer-name or LPD job-number.

527 The IPP to-LPD mapper shall use this command to get what attributes it can from the LPD server.

528 **4.10 Get-Jobs**

529 The mapper SHALL perform this operation in the same way as Get-Attributes of a printer except that the
530 mapper converts the job-lines and the IPP response contains one job object for each job in the LPD
531 response..

532 **5. Mapping of IPP Parameters to LPD Control File Lines**

533 This section describes the mapping from IPP operation input parameters to LPD control file lines (called
534 ‘functions’). The mapper receives the IPP operation input parameters via the IPP operation. Each of the IPP
535 operation input parameters appear as sub-sections of section 3 and 4.2 in the IPP model document [1].

536 In the context of LPD control file lines, the text operands have a maximum length of 31 or 99 while IPP
537 input parameters have a maximum of 255 characters. Therefore, there may be some data loss if the IPP
538 parameters exceed the maximum length of the LPD equivalent operands.

539 The mapper converts each supported IPP parameter to its corresponding LPD function as defined by tables
540 in the subsections that follow. These subsections group functions according to whether they are:

- 541 • required with a job,
- 542 • optional with a job
- 543 • required with each document.

544 In the tables below, each IPP value is given a name, such as ‘h’. If an LPD value uses the IPP value, then the
545 LPD value column contains the IPP name, such as ‘h’ to denote this. Otherwise, the LPD value column
546 specifies the literal value.

547 **5.1 Required Job Functions**

548 The mapper SHALL include the following LPD functions with each job, and they SHALL have the specified
549 value. They SHALL be the first functions in the control file and they SHALL be in the order “H” and then
550 “P”.

551

<u>IPP</u>		<u>LPD function</u>		
<u>name</u>	<u>value</u>	<u>name</u>	<u>value</u>	<u>description</u>
<u>(in security layer)</u>	<u>h</u>	<u>H</u>	<u>gateway host</u>	<u>Originating Host</u>
<u>(in security layer)</u>	<u>u</u>	<u>P</u>	<u>u</u>	<u>User identification</u>

552 A mapper SHALL send its own host rather than the client’s host, because some LPD systems require that it
553 be the same as the host from which the remove-jobs command comes. A mapper MAY send its own user
554 name as user identification rather than the client user. But in any case, the values sent SHALL be compatible
555 with the LPD remove-jobs operation.

556 **5.2 Optional Job Functions**

557 The mapper MAY include the following LPD functions with each job. They SHALL have the specified value
558 if they are sent. These functions, if present, SHALL follow the require job functions, and they SHALL
559 precede the required document functions.

560

<u>IPP attribute</u>		<u>LPD function</u>		
<u>name</u>	<u>value</u>	<u>name</u>	<u>value</u>	<u>description</u>
<u>job-name</u>	<u>j</u>	<u>J</u>	<u>j</u>	<u>Job name for banner page</u>
<u>job-sheets</u>	<u>‘standard’</u>	<u>L</u>	<u>u or</u>	<u>Print banner page</u>

			<i>addr</i>	
<u>job-sheets</u>	<u>'none'</u>			<u>omit 'L' function</u>
<u>notification-events</u>	<u>'job-completion'</u>	<u>M</u>	<u>user</u>	<u>Mail When Printed</u>
<u>notification-method</u>	<u>'mailto://user@host'</u>			

561 Note: 'L' has special meaning when it is omitted. If 'M' is omitted, there is no notification. If 'J' is omitted,
 562 some undefined behavior occurs with respect to the banner page.

563 Note: the 'user' for the 'M' function comes from a substring of the notification-method's value.

564 **5.3 Required Document Functions**

565 The mapper SHALL include one set of the following LPD functions with each document, and they SHALL
 566 have the specified values. For each document, the order of the functions SHALL be 'f', 'U' and then 'N',
 567 where 'f' is replicated once for each copy.

<u>IPP attribute</u>		<u>LPD function</u>		
<u>name</u>	<u>value</u>	<u>name</u>	<u>value</u>	<u>description</u>
<u>document-format</u>	<u>'37' (langAutomatic) or</u> <u>'6' (langPS).</u>	<u>f</u>	<u>fff</u>	<u>Print formatted file</u>
<u>copies</u>	<u>c</u>			<u>replicate 'f' 'c' times</u>
<u>none</u>		<u>U</u>	<u>fff</u>	<u>Unlink data file</u>
<u>document-name</u>	<u>n</u>	<u>N</u>	<u>n</u>	<u>Name of source file</u>

569 Note: the value 'fff' of the 'f' and 'U' functions is the name of the data file as transferred, e.g.
 570 "dfA123woden".

571 Note: the mapper SHALL not send the 'o' function

572 ISSUE: should we register DVI, troff or ditroff?

573 If the mapper receives no "best-effort" or it has a value of false, then the mapper SHALL reject the job if it
 574 specifies attributes or attribute values that are not among those supported in the above tables.

575 For example, three copies of two files 'foo' and 'bar' would have the minimal control file of

576 H tiger
 577 P jones
 578 f dfA123woden
 579 f dfA123woden
 580 f dfA123woden
 581 U dfA123woden

582 [N foo](#)
583 [f dfB123woden](#)
584 [f dfB123woden](#)
585 [f dfB123woden](#)
586 [U dfB123woden](#)
587 [N bar](#)

588 6. References

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535 **8. Appendix A: ABNF Syntax for response of Send-queue-state (short)**

536 The syntax in ABNF for the response to the LPD command 'send-queue-state (long)' is:

537 status-response = empty-queue / nonempty-queue

538 empty-queue = "no-entries" LF

539 nonempty-queue = printer-status LF heading LF *(job LF)

540 printer-status = OK-status / error-status

541 OK-status = printer-name SP "ready and printing" LF

542 error-status = < implementation dependent status information >

543 heading = "Rank" 3SP "Owner" 6SP "Job" 13SP "Files" 23SP "Total Size" LF

544 _____ ; the column headings and their values below begin at the columns

545 _____ ; 1, 8, 19, 35 and 63

546 job = rank *SP owner *SP job *SP files *SP total-size "bytes"

547 _____ ; jobs are in order of oldest to newestrank = "active" / "1st" / "2nd" / "3rd" / integer "th"

548 ; job that is printing is "active"

549 ; other values show position in the queue

550 owner = <user name of person who submitted the job>

551 job = 1*3DIGIT ; job-number

552 files = <file name> *(" ," <file name>) ; truncated to 24 characters

553 total-size = < combined size in bytes of all documents.>

554 **9. Appendix B: ABNF Syntax for response of Send-queue-state (long)**

555 The syntax in ABNF for the response to the LPD command 'send-queue-state (long)' is:

556 status-response = empty-queue / nonempty-queue

557 empty-queue = "no-entries" LF

558 nonempty-queue = printer-status LF LF *(job LF)

559 printer-status = OK-status / error-status

560 OK-status = printer-name SP "ready and printing" LF

561 error-status = < implementation dependent status information >

562 job = line-1 LF line-2 LF LF

563 line-1 = owner ":" SP rank 1*SP "[job]" job SP host "]"

564 line-2 = file-name 1*SP document-size "bytes"

565 _____ ; jobs are in order of oldest to newest

566 rank = "active" / "1st" / "2nd" / "3rd" / integer "th"

567 : job that is printing is "active"

568 : other values show position in the queue

569 owner = <user name of person who submitted the job>

570 job-number = 1*3DIGIT

571 file-name = <file name> / (1*DIGIT "copies of" SP <file name> ; truncated to 24 characters

572 document-size = < size of single copy of the document.>

573

574 **10. Appendix C: Unsupported LPD functions**

575 The follow LPD functions have no IPP equivalent. The LPD-to-IPP mapper ignores them and the IPP-to-
576 LPD mapper does not send them.

LPD command

name description

C Class for banner page

I Indent Printing

S Symbolic link data

T Title for pr

U **Unlink data file**

W Width of output

- 1 troff R font
- 2 troff I font
- 3 troff B font
- 4 troff S font

577

578

579

580

The follow LPD functions specify document-formats which have no IPP equivalent, unless someone registers them. The LPD-to-IPP mapper rejects jobs that request such a document format, and the IPP-to-LPD mapper does not send them.

LPD command**name** **description**

c	Plot CIF file
d	Print DVI file
g	Plot file
k	reserved for Kerberized clients and servers
n	Print ditroff output file
p	Print file with 'pr' format
r	File to print with FORTRAN carriage control
t	Print troff output file
v	Print raster file
z	reserved for future use with the Palladium print system

581

582

ISSUE: we may move some of these to the supported list.