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13 Internet Printing Protocol/1.0: Additional Optional Operations - Set 1

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15 Status of this Memo

16 This document is a Printer Working Group (PWG) DRAFT. The previous version (980920) was
17 posted to the IPP mailing list for comment on 9/20/98 and reviewed at the September 30, 1998
18 PWG meeting in Savannah. This version contains the changes agreed to at that meeting and need
19 to be reviewed by the participants on the mailing list using the Last Call PWG procedures.

20 **Abstract**

21 This document specifies six OPTIONAL operations for use with the Internet Printing
22 Protocol/1.0 (IPP) [ipp-mod, ipp-pro]. The defined Set 1 operations are 3 Job object operations
23 that end-users may perform on their jobs and operators/administrators may perform on any job:

24 Hold-Job

25 Release-Job

26 Restart-Job

27 and 3 Printer object operations that operators/administrators may perform on a Printer object:

28 Pause-Printer

29 Resume-Printer

30 Purge-Jobs

31

32

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50 1 Summary of Set 1 and Operation-Id Assignments

51 The Set 1 operations are summarized in the following table:

Operation Name	Operation-Id	Brief description
Hold-Job	0x000C	Holds a pending job so that it cannot be scheduled for processing
Release-Job	0x000D	Allows a previously held job to be scheduled for processing
Restart-Job	0x000E	Restarts a job as the same job on the same Printer object
	0x000F	Reserved for the future.
Pause-Printer	0x0010	Stops the device(s) as soon as possible from processing jobs
Resume-Printer	0x0011	Resumes the device(s) processing jobs
Purge-Jobs	0x0012	Removes all jobs from the Printer regardless of job state

52 All of the operations in Set 1 are OPTIONAL for an IPP object to support. Unless the
 53 specification of an OPTIONAL operation requires support of another OPTIONAL operation,
 54 conforming implementations may support any combination of these operations.

55 2 Job Operations

56 The job operations in Set 1 are for use by end users on their jobs and by operators and
 57 administrators on any jobs. The operation attributes in requests and responses for the job
 58 operations are the same as the standard Cancel-Job operation (see [model] 3.3.3). Additional
 59 operation attributes are specified that the client MAY supply in a request.

60 2.1 Hold-Job

61 This operation allows a client to hold a pending job in the queue so that it is not eligible for
 62 scheduling. If the Hold-Job operation is supported, then the Release-Job operation MUST be
 63 supported, and vice-versa.

64 2.1.1 "job-hold-until" (type3 keyword | name(MAX)) operation attribute

65 The client OPTIONALLY supplies this attribute. The IPP object MUST support this operation
 66 attribute in a Hold-Job request, if it supports the "job-hold-until" Job template attribute in create
 67 operations. See [ipp-mod] section 4.2.2. Otherwise, the IPP object NEED NOT support the
 68 "job-hold-until" operation attribute in a Hold-Job request. If supplied and supported as specified
 69 in the Printer's "job-hold-until-supported" attribute, the IPP object copies the attribute to the Job

70 object, replacing the job's previous "job-hold-until" attribute, if present, and makes the job a
 71 candidate for scheduling during the supplied named time period.

72 As with all operations, if the client supplies the "job-hold-until" (or any OPTIONAL) Operation
 73 attribute that is unknown or unsupported or the value is unsupported, the IPP object MUST
 74 accept and perform the operation, ignoring the unknown or unsupported operation attribute and
 75 returning the ignored or unsupported attributes and/or values in Group 2 Unsupported Attributes
 76 (see [ipp-mod] sections 3.3.3.2 and 16.3.6).

77 If the client (1) supplies a value that specifies a time period that has already started or the 'no-
 78 hold' value [ipp-mod 4.2.2] (meaning don't hold the job) and (2) the IPP object supports the "job-
 79 hold-until" operation attribute and there are no other reasons to hold the job, the IPP object
 80 MUST accept the operation and make the job be a candidate for processing immediately (see
 81 [ipp-mod] Section 4.2.2).

82 The following new keyword value is defined for use with the "job-hold-until" Job Template
 83 attribute in job create operations and the "job-hold-until" operation attribute in Hold-Job and
 84 Restart-Job operations:

85 'indefinite': - the job is held indefinitely, until a client performs a Release-Job or Restart-
 86 Job operation

87 If the client does not supply a "job-hold-until" operation attribute in the request, the IPP object
 88 MUST populate the job object with a "job-hold-until" attribute with the 'indefinite' value (if IPP
 89 object supports the "job-hold-until" attribute) and hold the job indefinitely, until a client performs
 90 a Release-Job or Restart-Job operation.

91 The IPP object SHOULD support the "job-hold-until" Job Template attribute for use in job create
 92 operations with at least the 'indefinite' value, if it supports the Hold-Job operation. Otherwise, a
 93 client cannot create a job and hold it immediately (without picking some supported time period
 94 in the future).

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

Current "job-state"	New "job-state"	IPP object's response status code and action:
'pending'	'pending-held'	'successful-ok' See Note 1
'pending'	'pending'	'successful-ok' See Note 2
'pending-held'	'pending-held'	'successful-ok' See Note 1
'pending-held'	'pending'	'successful-ok' See Note 2
'processing'	'processing'	'client-error-not-possible'
'processing-stopped'	'processing-stopped'	'client-error-not-possible'
'completed'	'completed'	'client-error-not-possible'

'canceled'	'canceled'	'client-error-not-possible'
'aborted'	'aborted'	'client-error-not-possible'

97 Note 1: If the OPTIONAL "job-state-reasons" attribute is supported and if the implementation
 98 supports multiple reasons for a job to be in the 'pending-held' state, the IPP object MUST add the
 99 'job-hold-until-specified' value to the job's "job-state-reasons" attribute.

100 Note 2: If the IPP object supports the "job-hold-until" operation attribute, but the specified time
 101 period has already started (or is the 'no-hold' value) and there are no other reasons to hold the job,
 102 the IPP object MUST make the job be a candidate for processing immediately (see [ipp-mod]
 103 Section 4.2.2) by putting the job in the 'pending' state.

104 Note: In order to keep the Hold-Job operation simple, such a request is rejected when the job is
 105 in the 'processing' or 'processing-stopped' states. If an operation is needed to hold jobs while in
 106 these states, it will be added as an additional operation, rather than overloading the Hold-Job
 107 operation. Then it is clear to clients by querying the Printer object's "operations-supported" [ipp-
 108 mod 4.4.13] and the Job object's "job-state" [ipp-mod 4.3.7] attributes which operations are
 109 possible.

110 *Access Rights:* The requesting user must either be the submitter of the job or an operator or
 111 administrator of the Printer object (see [ipp-mod] Section 1). Otherwise, the IPP object MUST
 112 reject the operation and return: 'client-error-forbidden', 'client-error-not-authenticated', or 'client-
 113 error-not-authorized' as appropriate.

114 **2.2 Release-Job**

115 This operation allows a client to release a previously held job so that it is again eligible for
 116 scheduling. This operation removes the "job-hold-until" job attribute, if present, from the job
 117 object that had been supplied in the create or most recent Hold-Job or Restart-Job operation and
 118 remove its effect on the job.

119 If the Hold-Job operation is supported, then the Release-Job operation MUST be supported, and
 120 vice-versa.

121 If the OPTIONAL "job-state-reasons" attribute is supported, the IPP object MUST remove the
 122 'job-hold-until-specified' value from the job's "job-state-reasons" attribute, if present.

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

Current "job-state"	New "job-state"	IPP object's response status code and action:
'pending'	'pending'	'successful-ok' No effect on the job.
'pending-held'	'pending-held'	'successful-ok' See Note 1
'pending-held'	'pending'	'successful-ok'
'processing'	'processing'	'successful-ok' No effect on the job.
'processing-stopped'	'processing-stopped'	'successful-ok' No effect on the job.

'completed'	'completed'	'client-error-not-possible'
'canceled'	'canceled'	'client-error-not-possible'
'aborted'	'aborted'	'client-error-not-possible'

125 Note 1: If there are other reasons to keep the job in the 'pending-held' state, such as 'resources-
 126 are-not-ready', the job remains in the 'pending-held' state. Thus the 'pending-held' state is not just
 127 for jobs that have the 'job-hold-until' applied to them, but are for any reason to keep the job from
 128 being a candidate for scheduling and processing, such as 'resources-are-not-ready'. See the "job-
 129 hold-until" attribute ([ipp-mod] Section 4.2.2).

130 *Access Rights:* The requesting user must either be the submitter of the job or an operator or
 131 administrator of the Printer object. Otherwise, the IPP object MUST reject the operation and
 132 return: 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as
 133 appropriate.

134 **2.3 Restart-Job**

135 This operation allows a client to restart a job that is retained in the queue after processing has
 136 completed. As an implementation option, a job in the 'processing' and/or 'processing-stopped'
 137 states MAY be restarted.

138 The job is moved to the 'pending' job state and restarts at the beginning on the same IPP Printer
 139 object with the same attribute values. The Job Description attributes that accumulate job
 140 progress, such as "job-impressions-completed", "job-media-sheets-completed", and "job-k-
 141 octets-processed", MUST be reset to 0 so that they give an accurate record of the job from its
 142 restart point. The job object MUST continue to use the same "job-uri" and "job-id" attribute
 143 values.

144 **2.3.1 "job-hold-until" (type3 keyword | name(MAX)) operation attribute**

145 The client OPTIONALLY supplies this attribute. The IPP object MUST support this operation
 146 attribute in a Restart-Job request, if it supports the "job-hold-until" Job template attribute in
 147 create operations. See [ipp-mod] section 4.2.2. Otherwise, the IPP object NEED NOT support
 148 the "job-hold-until" operation attribute in a Restart-Job request. If supplied and supported, the
 149 IPP object copies the attribute to the Job object, replacing the job's previous "job-hold-until"
 150 attribute, if present, and makes the job a candidate for scheduling during the supplied named time
 151 period.

152 See Section 2.1.1 for the common semantics of the "job-hold-until" operation attribute for the
 153 Hold-Job operation and Restart-Job operation.

154 Note: In the future an OPTIONAL Modify-Job operation may be specified that allows the client
 155 to modify other attributes before releasing the restarted job.

156 The IPP object MUST accept or reject the request based on the job's current state, transition the
 157 job (or new job, depending on implementation) to the indicated new state as follows:

Current "job-state"	New "job-state"	IPP object's response status code and action:
'pending'	'pending'	'client-error-not-possible'.
'pending-held'	'pending-held'	'client-error-not-possible'.
'processing'	'pending'	OPTION 1: 'successful-ok' - job is started over. See Note 1.
'processing'	'processing'	OPTION 2: 'client-error-not-possible'.
'processing-stopped'	'pending'	OPTION 1: 'successful-ok' - job is started over. See Note 1
'processing-stopped'	'processing-stopped'	OPTION 2: 'client-error-not-possible'.
'completed'	'pending'	'successful-ok' - job is started over.
'canceled'	'pending'	'successful-ok' - job is started over.
'aborted'	'pending'	'successful-ok' - job is started over.

158

159 Note 1: For OPTION 1, the IPP object SHOULD indicate to clients that a Restart-Job operation
 160 is possible while the job is in the 'processing' and/or 'processing-stopped' states, by populating the
 161 job's "job-state-reasons" attribute with the 'job-restartable' value.

162 *Access Rights:* The requesting user must either be the submitter of the job or an operator or
 163 administrator of the Printer object. Otherwise, the IPP object MUST reject the operation and
 164 return: 'client-error-forbidden', 'client-error-not-authenticated', or 'client-error-not-authorized' as
 165 appropriate.

166 **3 The Job History concept and additional "job-state-reasons"**

167 This section explains the so-called Printer object's "job-history" that contains the recently
 168 completed, canceled, and aborted jobs. This section also specifies the 'job-restartable' value of
 169 the "job-state-reasons" Job Description attribute for use with the Restart-Job operations.

170 **3.1 The "job history" concept**

171 When a job is completed, canceled, or aborted, the IPP Printer object MAY retain the job with its
 172 document data in a restartable condition using the Restart-Job operation for an implementation-
 173 defined time period which may be zero seconds. If the IPP object supports the "job-state-
 174 reasons" attribute and the Restart-Job operation, then it SHOULD indicate that such jobs are
 175 restartable by adding the 'job-restartable' value to the job's "job-state-reasons" attribute (see
 176 Section 3.2) during that implementation-defined time period.

177 After the implementation-defined restartable time period expires, the Printer object deletes the
 178 document data for the job and the job becomes part of the "job history". The Print object MAY
 179 also delete any number of the job attributes. Since the job is no longer restartable, the Printer

180 object MUST remove the 'job-restartable' value from the job's "job-state-reasons" attribute, if
181 supported. Clients are able to query jobs in the Printer object's "job history" using Get-Job-
182 Attributes and Get-Jobs operations.

183 Subsequently, the IPP Printer removes jobs from its "job history" in an implementation-defined
184 manner, such as after a fixed time period (which MAY be zero seconds) or when the number of
185 jobs exceeds a fixed number. Thereupon, the job can no longer be queried using the Get-Job-
186 Attributes and Get-Jobs operations and the IPP object returns the 'client-error-not-found' or
187 'client-error-gone' as appropriate.

188 **3.2 Add a new 'job-restartable' value to the "job-state-reasons" attribute**

189 The following new keyword value is specified for use with the "job-state-reasons" Job
190 Description attribute and the Restart-Job operation (see Section 2.3):

191 'job-restartable' - This job is currently able to be restarted using the Restart-Job operation.
192 With which job states this value is used depends on implementation, i.e., OPTION 1 vs.
193 OPTION 2 in the job state transition table in Section 2.3. Whenever the IPP object will
194 reject a Restart-Job operation for the job with the 'client-error-not-possible' error status
195 code because the job is not restartable, the IPP object MUST remove this value from the
196 job's "job-state-reasons" attribute.

197

198 For example, after a job is completed (job state is 'completed', 'aborted', or 'canceled), the
199 implementation MAY retain the job in a restartable condition for an implementation-
200 defined time period. When that time elapses, an implementation MAY delete the
201 document data, but MAY retain some or all of the job attributes as a "job history" for an
202 additional implementation-defined time period. During this second time period, the
203 implementation removes the 'job-restartable' value from the job's "job-state-reasons"
204 attribute, since the job can no longer be restarted.

205

206 **4 Printer operations**

207 The printer operations in Set 1 are for use by operators and administrators of each Printer object.
 208 The following figure is copied from [ipp-mod] with the addition of the following arrow:

209 any****>

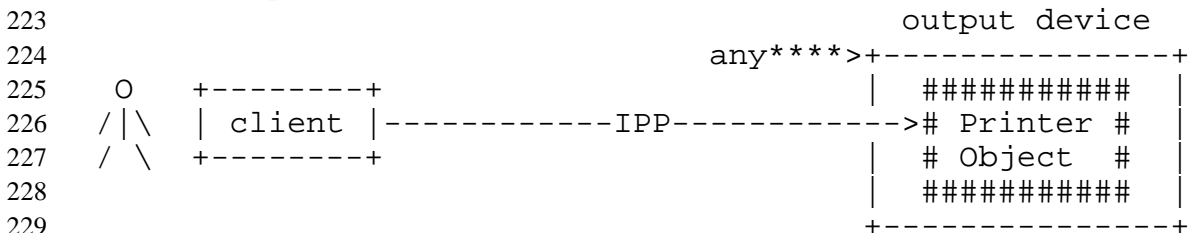
210 indicating an additional source of job submission using IPP or any other job submission protocol
 211 that passes to the device but does NOT pass through the IPP Printer object in question.

212 Legend:

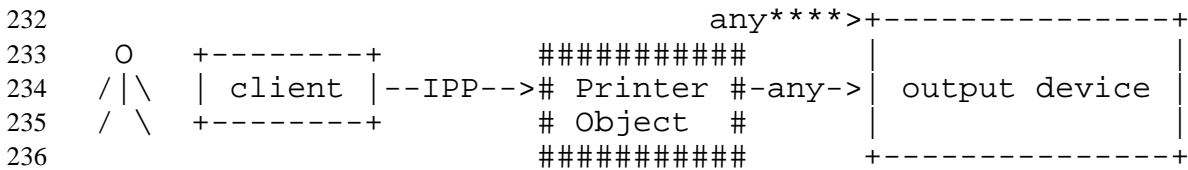
213
 214 ##### indicates a Printer object which is
 215 either embedded in an output device or is
 216 hosted in a server. The Printer object
 217 might or might not be capable of queuing/spooling.

218
 219 any indicates any network protocol or direct
 220 connect, including IPP

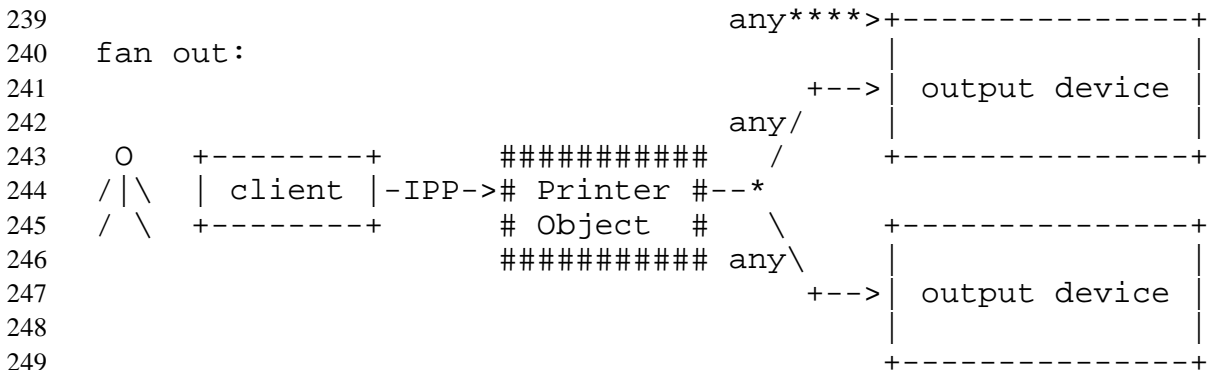
221
 222 embedded printer:



230
 231 hosted printer:



237
 238
 239 fan out:



250 The operation attributes for the Printer operation requests are as follows:-

251 Group 1: Operation Attributes

252 Natural Language and Character Set:

253 The "attributes-charset" and "attributes-natural-language" attributes as described in
254 section 3.1.4.1 of [ipp-mod].

255

256 Target:

257 The "printer-uri" (uri) operation attribute which is the target for this operation as
258 described in section 3.1.5 of [ipp-mod].

259

260 Requesting User Name:

261 The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client
262 as described in section 8.3 of [ipp-mod].

263 The operation attributes for the Printer operation responses are as follows:

264 Group 1: Operation Attributes

265 Status Message:

266 In addition to the REQUIRED status code returned in every response, the response
267 OPTIONALLY includes a "status-message" (text) operation attribute as described in
268 section 3.1.6 of [ipp-mod].

269

270 Natural Language and Character Set:

271 The "attributes-charset" and "attributes-natural-language" attributes as described in
272 section 3.1.4.2 of [ipp-mod].

273

274 Group 2: Unsupported Attributes

275 This is a set of Operation attributes supplied by the client (in the request) that are not
276 supported by the Printer object or that conflict with one another (see sections 3.2.1.2 and
277 16).

278

279

280 **4.1 Pause-Printer**

281 This operation allows a client to stop the Printer object from scheduling jobs on all its devices.
282 Depending on implementation, the Pause-Printer operation MAY also stop the Printer from
283 processing the current job or jobs. Any job that is currently being printed is either stopped as
284 soon as the implementation permits or is completed, depending on implementation. The Printer
285 object MUST still accept create operations to create new jobs, but MUST prevent any jobs from
286 entering the 'processing' state.

287 If the Pause-Printer operation is supported, then the Resume-Printer operation MUST be
 288 supported, and vice-versa.

289 The IPP Printer stops the current job(s) on its device(s) that were in the 'processing' or
 290 'processing-stopped' states as soon as the implementation permits. If the implementation
 291 supports the "printer-state-reasons" attribute and the devices will take appreciable time to stop,
 292 the IPP Printer adds the 'moving-to-paused' value to the Printer object's "printer-state-reasons"
 293 attribute. When the device(s) have all stopped, the IPP Printer transitions the Printer object to the
 294 'stopped' state, removes the 'moving-to-paused' value, if present, and adds the 'paused' value to
 295 the Printer object's "printer-state-reasons" attribute.

296 When the current job(s) complete that were in the 'processing' state, the IPP Printer transitions
 297 them to the 'completed' state. When the current job(s) stop in mid processing that were in the
 298 'processing' state, the IPP Printer transitions them to the 'processing-stopped' state and, if the
 299 "job-state-reasons" attribute is supported, adds the 'printer-stopped' value to the job's "job-state-
 300 reasons" attribute.

301 Note: for any jobs that are 'pending' or 'pending-held', the 'printer-stopped' value of the jobs'
 302 "job-state-reasons" attribute also applies. However, the IPP Printer NEED NOT update those
 303 job's "job-state-reasons" attributes and only need return the 'printer-stopped' value when those
 304 jobs are queried (so-called "lazy evaluation").

305 Whether the Pause-Printer operation affects jobs that were submitted to the device from other
 306 sources than the IPP Printer object (see the any***> arrow in the figure above) in the same
 307 way that the Pause-Printer operation affects jobs that were submitted to the IPP Printer object
 308 using IPP, depends on implementation, i.e., on whether the IPP protocol is being used as a
 309 universal management protocol or just to manage IPP jobs, respectively.

310 The IPP Printer MUST accept the request in any state, transition the Printer to the indicated new
 311 "printer-state" before returning as follows:

Current "printer-state"	New "printer-state"	"printer-state-reasons"	IPP Printer's response status code and action:
'idle'	'stopped'	'paused'	'successful-ok'
'processing'	'processing'	'moving-to-paused'	OPTION 1: 'successful-ok'; Later, when all output has stopped, the "printer-state" becomes 'stopped', and the 'paused' value replaces the 'moving-to-paused' value in the "printer-state-reasons" attribute
'processing'	'stopped'	'paused'	OPTION 2: 'successful-ok'; all output stopped immediately
'stopped'	'stopped'	'paused'	'successful-ok'

312 *Access Rights:* The requesting user must be an operator or administrator of the Printer object.
 313 Otherwise, the IPP Printer MUST reject the operation and return: 'client-error-forbidden', 'client-
 314 error-not-authenticated', or 'client-error-not-authorized' as appropriate.

315 **4.1.1 Add a new 'moving-to-paused' value to the "printer-state-reasons" attribute**

316 The following new keyword value is specified for use with the "printer-state-reasons" Printer
 317 Description attribute:

318 'moving-to-paused': The Printer object's operator or administrator has paused the Printer
 319 object using the Pause-Printer operation or other means, but it has not yet stopped
 320 producing output. When all the devices stop producing output, the Printer object MUST
 321 replace this value with the 'paused' value.

322 **4.2 Resume-Printer**

323 This operation allows a client to resume the Printer object scheduling jobs on all its devices. If
 324 the Printer object supports the "printer-state-reasons" attribute, it MUST remove the 'paused' and
 325 'moving-to-paused' values from the Printer object's "printer-state-reasons" attribute, if present. If
 326 there are no other reasons to keep a device paused (such as media-jam), the IPP Printer
 327 transitions itself to the 'processing' or 'idle' states, depending on whether there are jobs to be
 328 processed or not, respectively, and the device(s) resume processing jobs.

329 If the Pause-Printer operation is supported, then the Resume-Printer operation MUST be
 330 supported, and vice-versa.

331 The IPP Printer removes the 'printer-stopped' value from any job's "job-state-reasons" attributes
 332 contained in that Printer.

333 The IPP Printer MUST accept the request in any state, transition the Printer object to the
 334 indicated new state as follows:

Current "printer-state"	New "printer-state"	IPP Printer's response status code and action:
'idle'	'idle'	'successful-ok'
'processing'	'processing'	'successful-ok'
'stopped'	'processing'	'successful-ok'; when there are jobs to be processed
'stopped'	'idle'	'successful-ok'; when there are no jobs to be processed.

335 *Access Rights:* The requesting user must be an operator or administrator of the Printer object.
 336 Otherwise, the IPP Printer MUST reject the operation and return: 'client-error-forbidden', 'client-
 337 error-not-authenticated', or 'client-error-not-authorized' as appropriate.

338 **4.3 Purge-Jobs**

339 This operation allows a client to remove all jobs from an IPP Printer object, regardless of their
340 job states, including jobs in the Printer object's "job-history" (see Section 3.1). After a Purge-
341 Jobs operation has been performed, a Printer object **MUST** return no jobs in subsequent Get-Job-
342 Attributes and Get-Jobs responses (until new jobs are submitted).

343 Whether the Purge-Jobs (and Get-Jobs) operation affects jobs that were submitted to the device
344 from other sources than the IPP Printer object (see the any***> arrow in the figure in Section
345 4) in the same way that the Purge-Jobs operation affects jobs that were submitted to the IPP
346 Printer object using IPP, depends on implementation, i.e., on whether the IPP protocol is being
347 used as a universal management protocol or just to manage IPP jobs, respectively.

348 Note: if an operator wants to cancel all jobs without clearing out the job history, the operator
349 uses the Cancel-Job operation on each job instead of using the Purge-Job operation.

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

352 *Access Rights:* The requesting user must be an operator or administrator of the Printer object.
353 Otherwise, the IPP object **MUST** reject the operation and return: client-error-forbidden, client-
354 error-not-authenticated, and client-error-not-authorized as appropriate.

355 **5 Security Considerations**

356 For the job operations in Set 1 (Section 2), the requesting user must either be the submitter of the
357 job or an operator or administrator of the Printer object (see [ipp-mod] Section 1). Otherwise,
358 the IPP object **MUST** reject the operation and return: 'client-error-forbidden', 'client-error-not-
359 authenticated', or 'client-error-not-authorized' as appropriate. See [ipp-mod] Section 8.3 on the
360 two ways that the client **MUST** specify the user who is performing each IPP operation.

361 For the printer operations in Set 1 (Section 4), the requesting user must be an operator or
362 administrator of the Printer object (see [ipp-mod] Section 1). The means for authorizing an
363 operator or administrator of the Printer object are not specified in either [ipp-mod] or this
364 document.

365 **6 References**

366 [ipp-mod]

367 Isaacson, S., deBry, R., Hastings, T., Herriot, R., Powell, P., "Internet Printing
368 Protocol/1.0: Model and Semantics" draft-ietf-ipp-mod-10.txt, June, 1998.

369 [ipp-pro]

370 Herriot, R., Butler, S., Moore, P., Tuner, R., "Internet Printing Protocol/1.0: Encoding
371 and Transport", draft-ietf-ipp-pro-06.txt, June, 1998.

372