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

15 Status of this Memo

16 This document is an approved Printer Working Group (PWG) DRAFT STANDARD. The
17 previous version (981023) passed PWG Last Call announced October 23, 1998 and closed
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19 **Abstract**

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

23 Hold-Job
24 Release-Job
25 Restart-Job

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

27 Pause-Printer
28 Resume-Printer
29 Purge-Jobs

30

31

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49 **1 Summary of Set 1 and Operation-Id Assignments**

50 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

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

54 **2 Job Operations**

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

59 **2.1 Hold-Job**

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

63 **2.1.1 "job-hold-until" (type3 keyword | name(MAX)) operation attribute**

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

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

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

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

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

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

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

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

94 The IPP object MUST accept or reject the request based on the job's current state, transition the
 95 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'

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

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

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

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

113 2.2 Release-Job

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

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

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

122 The IPP object MUST accept or reject the request based on the job's current state, transition the
 123 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'

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

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

133 **2.3 Restart-Job**

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

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

143 **2.3.1 "job-hold-until" (type3 keyword | name(MAX)) operation attribute**

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

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

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

155 The IPP object MUST accept or reject the request based on the job's current state, transition the
 156 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.

157

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

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

165 **3 The Job History concept and additional "job-state-reasons"**

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

169 **3.1 The "job history" concept**

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

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

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

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

187 **3.2 Add a new 'job-restartable' value to the "job-state-reasons" attribute**

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

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

196

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

204

205 **4 Printer operations**

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

208 any****>

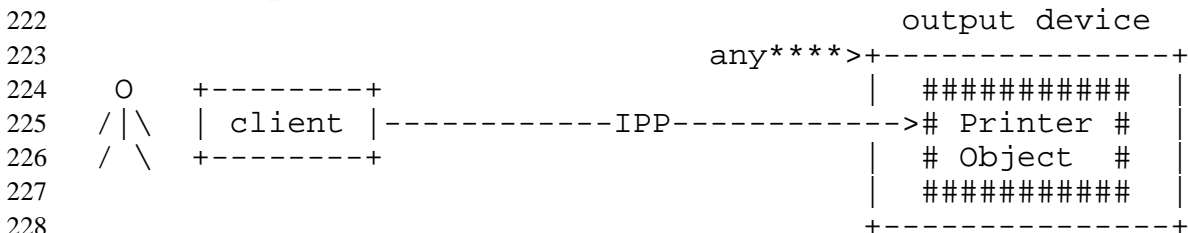
209 indicating an additional source of job submission using IPP or any other job submission protocol
 210 that passes to the device but does NOT pass through the IPP Printer object in question.

211 Legend:

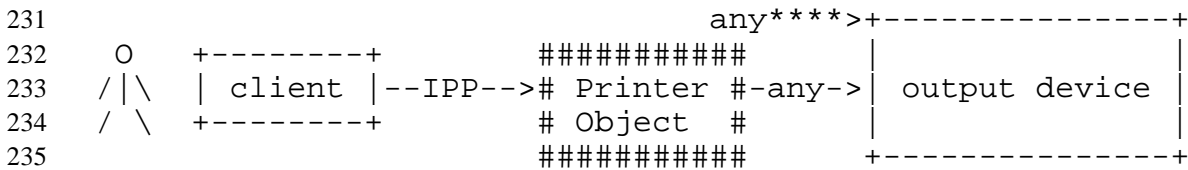
212 ##### indicates a Printer object which is
 213 either embedded in an output device or is
 214 hosted in a server. The Printer object
 215 might or might not be capable of queuing/spooling.

216 any indicates any network protocol or direct
 217 connect, including IPP

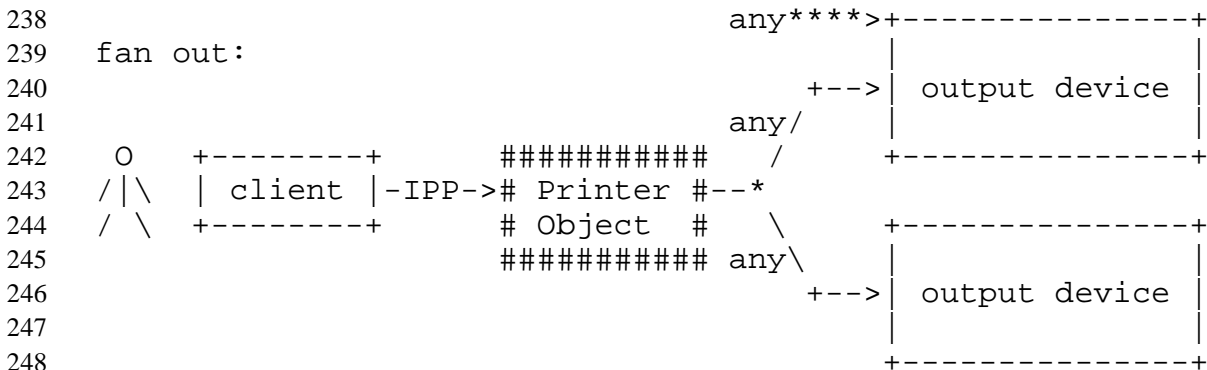
218 embedded printer:



230 hosted printer:



238 fan out:



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

250 Group 1: Operation Attributes

251 Natural Language and Character Set:

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

254

255 Target:

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

258

259 Requesting User Name:

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

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

263 Group 1: Operation Attributes

264 Status Message:

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

268

269 Natural Language and Character Set:

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

272

273 Group 2: Unsupported Attributes

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

277

278

279 **4.1 Pause-Printer**

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

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

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

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

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

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

309 The IPP Printer MUST accept the request in any state, transition the Printer to the indicated new
 310 "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'

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

314 **4.1.1 Add a new 'moving-to-paused' value to the "printer-state-reasons" attribute**

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

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

321 **4.2 Resume-Printer**

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

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

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

332 The IPP Printer MUST accept the request in any state, transition the Printer object to the
 333 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.

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

337 **4.3 Purge-Jobs**

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

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

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

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

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

354 **5 Security Considerations**

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

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

364 **6 References**

365 [ipp-mod]

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

368 [ipp-pro]

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

371