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

14 Status of this Memo

15 This document is a Printer Working Group (PWG) DRAFT. The previous version (980727) was  
16 posted to the IPP mailing list for comment on 7/29/98 and reviewed at the August, 19-20, 1998  
17 PWG meeting in Toronto. This version contains the changes agreed to at that meeting, and the  
18 IPP telecons on 9/2/98 and 9/9/98 and need to be reviewed by the participants on the mailing list.

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 attributes 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. In addition, the IPP  
 59 object MUST return the "job-state" [ipp-mod 4.3.7] attribute and, if supported, the "job-state-  
 60 reasons" [ipp-mod 4.3.8] attribute in the response as Group 3 Job Attributes in order to indicate  
 61 the effect of the operation on the job object.

### 62 **2.1 Hold-Job**

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

#### 66 **~~4.1.12.1.1~~ "job-hold-until" (type3 keyword | name(MAX)) operation attribute**

67 The client OPTIONALLY supplies this attribute. The IPP object MUST support this operation  
 68 attribute in a Hold-Job request, if it supports the "job-hold-until" Job template attribute in create  
 69 operations. See [ipp-mod] section 4.2.2. Otherwise, the IPP object NEED NOT support the

70 "job-hold-until" operation attribute in a Hold-Job request. If supplied and supported, the IPP  
 71 object copies the attribute to the Job object, replacing the job's previous "job-hold-until"  
 72 attribute, if present, and makes the job a candidate for scheduling during the supplied named time  
 73 period.

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

79 If the client supplies the 'no-hold' value [ipp-mod 4.2.2] (meaning don't hold the job) and the IPP  
 80 object supports the "job-hold-until" operation attribute, the IPP object MUST reject the operation  
 81 and return the 'client-error-bad-syntax' error status code.

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

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

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

## 111 2.2 Release-Job

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

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

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

120 The IPP object MUST accept or reject the request based on the job's current state, transition the  
 121 job to the indicated new state, and return the indicated new "job-state" attribute and status code  
 122 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'

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

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

132 **2.3 Restart-Job**

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

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

142 **2.3.1 "job-hold-until" (type3 keyword | name(MAX)) operation attribute**

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

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

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

154 The IPP object MUST accept or reject the request based on the job's current state, transition the  
 155 job (or new job, depending on implementation) to the indicated new state, and return the  
 156 indicated new "job-state" attribute and status code as follows:

Current "job-state"	New "job-state"	IPP object's response status code and action:
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'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 Error! Reference source not found.**) 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\*\*\*\*>

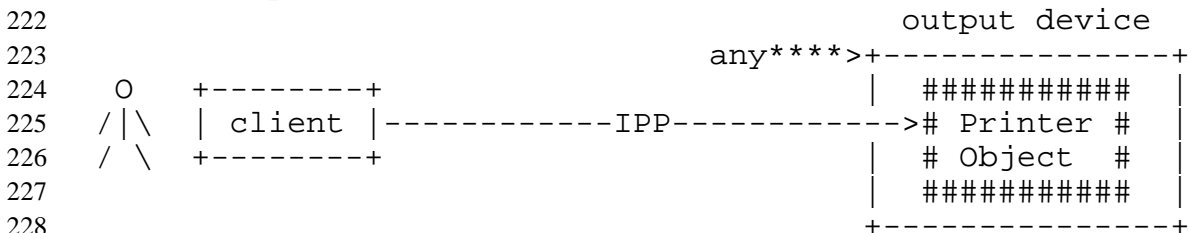
209 indicating an additional source of job submission using IPP or any other job submission protocol  
 210 that passes to the device but does NOT pass through the IPP Printer object in question.

211 Legend:

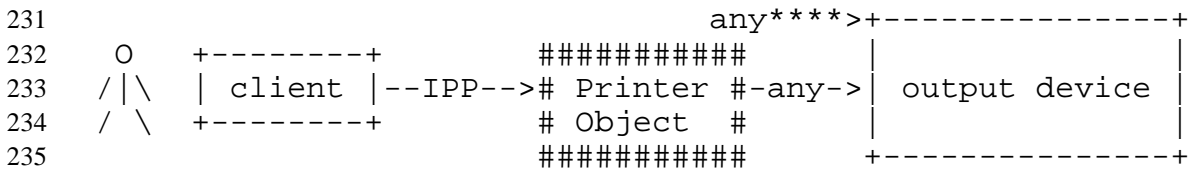
212 ##### indicates a Printer object which is  
 213 either embedded in an output device or is  
 214 hosted in a server. The Printer object  
 215 might or might not be capable of queuing/spooling.

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

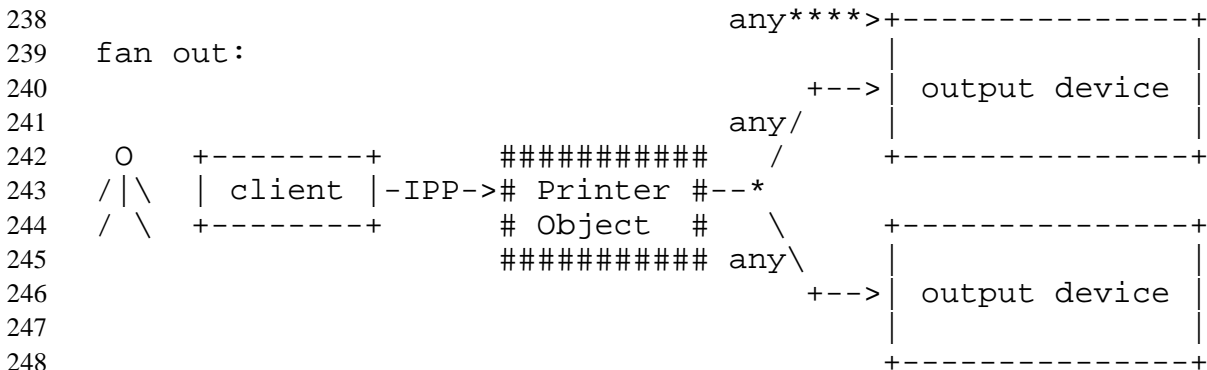
218 embedded printer:



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 Group 3: Printer Object Attributes

279 Printer state information:

280 The Printer object MUST return the "printer-state" [ipp-mod 4.4.10] and, if supported, the  
281 "printer-state-reasons" [ipp-mod 4.4.11] attributes in order to indicate the effect of the  
282 operation on the Printer object.

283 **4.1 Pause-Printer**

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

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

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

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

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

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

313 The IPP Printer MUST accept the request in any state, transition the Printer to the indicated new  
 314 "printer-state" before returning, and return the indicated "printer-state", "printer-state-reasons",  
 315 and status code as follows:

Current "printer-state"	New "printer-state" returned	"printer-state-reasons"	IPP Printer's response status code and action:
'idle'	'stopped'	'paused'	'successful-ok'
'processing'	'processing'	'moving-to-	OPTION 1: 'successful-ok';

		paused'	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'

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

319 **4.1.1 Add a new 'moving-to-paused' value to the "printer-state-reasons" attribute**

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

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

326 **4.2 Resume-Printer**

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

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

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

337 The IPP Printer MUST accept the request in any state, transition the Printer object to the  
 338 indicated new state, and return the indicated "printer-state" and status code as follows:

Current "printer-state"	New "printer-state" returned	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.

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

### 342 **4.3 Purge-Jobs**

343 This operation allows a client to remove all jobs from an IPP Printer object, regardless of their  
 344 job states, including jobs in the Printer object's "job-history" (see Section **Error! Reference**  
 345 **source not found.**). After a Purge-Jobs operation has been performed, a Printer object MUST  
 346 return no jobs in subsequent Get-Job-Attributes and Get-Jobs responses (until new jobs are  
 347 submitted).

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

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

355 The Printer object MUST accept this operation in any state and transition the Printer object to the  
 356 'idle' state.

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

## 360 **15 References**

361 [ipp-mod]

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

364 [ipp-pro]

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

367