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9 **Internet Printing Protocol (IPP):**  
10 **Job and Printer Set Operations**

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22 Abstract

23 This document specifies 3 additional OPTIONAL operations for use with the Internet Printing  
24 Protocol/1.0 (IPP) [RFC2565, RFC2566], and IPP/1.1 [RFC2911, RFC2910]. The end user, operator,  
25 and administrator Set-Job-Attributes and Set-Printer-Attributes operations are used to modify IPP Job  
26 objects and Printer objects, respectively. The third administrator Get-Printer-Supported-Values  
27 operation returns values that the IPP Printer will accept for setting its "xxx-supported" attributes.

28 Three out-of-band values are defined for use with these operations: 'delete-attribute', 'admin-define',  
29 and 'not-settable', along with a 'client-error-attributes-not-settable' status code.

30 Two operation attributes: "printer-message-from-operator" (text) and "job-message-from-operator"  
31 (text) are defined to set the corresponding IPP/1.1 Printer and Job Description attributes with the same  
32 names.

33 Nine Printer Description attributes are defined:

34 printer-settable-attributes-supported (1setOf type2 keyword)  
35 job-settable-attributes-supported (1setOf type2 keyword)  
36 document-format-varying-attributes (1setOf type2 keyword)  
37 printer-message-time (integer(MIN:MAX))  
38 printer-message-date-time (dateTime)

39 printer-xri-supported (1setOf collection)  
40 xri-uri-scheme-supported (1setOf uriScheme)  
41 xri-authentication-supported (1setOf type2 keyword)  
42 xri-security-supported (1setOf type2 keyword)  
43  
44

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122

## 122 **1 Introduction**

123 This document is an OPTIONAL extension to IPP/1.0 [RFC2565, RFC2566] and IPP/1.1 [RFC2911,  
124 RFC2910]. For a description of the base IPP documents see section 18.

125 The Internet Printing Protocol (IPP) is an application level protocol that can be used for distributed  
126 printing using Internet tools and technologies. IPP version 1.1 [RFC2911, RFC2910] focuses on end  
127 user functionality with a few administrative operations included. This document defines additional  
128 OPTIONAL end user, operator, and administrator Set-Job-Attributes and Set-Printer-Attributes  
129 operations used to modify IPP Job objects and Printer objects, respectively. It also defines a third Get-  
130 Printer-Supported-Values administrator operation that returns values that the IPP Printer will accept for  
131 setting its "xxx-supported" attributes. The Get-Printer-Supported-Values operation MUST be  
132 supported, if the implementation supports setting any "xxx-supported" Printer attributes using the Set-  
133 Printer-Attributes operation.

134 Three out-of-band values are defined for use with these three operations: 'delete-attribute' for deleting  
135 Job attributes with the Set-Job-Attributes request, 'not-settable' for use in either the Set-Job-Attributes  
136 or Set-Printer-Attributes responses, and 'admin-define' for use in the Get-Printer-Supported-Values  
137 response.

138 Two operation attributes: "printer-message-from-operator" (text) and "job-message-from-operator"  
139 (text) are defined to set the corresponding IPP/1.1 Printer and Job Description attributes with the same  
140 names. These operation attributes may be used with any operation that affect the Printer or Job object  
141 for which an operation might want to indicate a message. For the Set-Job-Attributes and Set-Printer-  
142 Attributes operations, the client MUST explicitly set them, rather than using these operation attributes.

143 A Printer implementation can make the value of some attributes dependent on the document-format,  
144 e.g. "resolution-supported".

## 145 **2 Terminology**

146 This section defines terminology used throughout this document.

### 147 **2.1 Conformance Terminology**

148 Capitalized terms, such as MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, MAY,  
149 NEED NOT, and OPTIONAL, have special meaning relating to conformance as defined in RFC 2119  
150 [RFC2119] and [RFC2911] section 12.1. If an implementation supports the extension defined in this  
151 document, then these terms apply; otherwise, they do not. These terms define conformance to *this*  
152 *document only*; they do not affect conformance to other documents, unless explicitly stated otherwise.

## 153 2.2 Other terminology

154 This document uses terms such as Job object (or Job), IPP Printer object (or Printer), "operation",  
155 "request", response", "attributes", "keywords", and "support". These terms have special meaning and  
156 are defined in the model terminology [RFC2911] section 12.2. The following additional terms are  
157 introduced in this document:

158 READ-ONLY: used in an attribute definition document to indicate that the attribute MUST NOT be  
159 settable using an IPP protocol Set operation. In other words, the attribute is not settable by  
160 definition.

161 not-settable: an implementation does not support setting an attribute (whether or not the attribute's  
162 definition is READ-ONLY).

## 163 3 Requirements and Use Cases

164 The following requirements and usage are intended to be met by the specification in this document.

- 165 1. The end-user and the operator need a way to modify a Job that is in the 'pending' or 'pending-held'  
166 state.

167 Usage: The end-user discovers that he/she forgot to include a print instruction, such as "finishings"  
168 = 'staple' after submitting a job. Rather than canceling the job and resubmitting it to the same IPP  
169 Printer, the end-user is able to modify the job on the IPP Printer.

170 The operator needs to modify a job because it is requesting a particular kind of media for which  
171 there is no more, but the policy is to print the job on a comparable medium.

- 172 2. The system administrator needs a way to re-configure or change the policy of the IPP Printer  
173 remotely.

174 Usage: The system administrator is adding additional named media to the supported media list  
175 (setting 'name' values to the "media-supported" Printer attribute).

176 The system administrator is reducing the capability of the IPP Printer by removing one of the  
177 operations from the supported operations list, such as Cancel-Job, because the policy is to run the  
178 IPP Printer like a public facsimile machine. After having removed Cancel-Job from the list of  
179 supported operations, an administrative client needs to be able to display to an administrator that  
180 the implementation is capable of being reconfigured to support Cancel-Job once again.

181 The system administrator is remotely configuring the IPP Printer after installing it, and so is  
182 replacing the Printer Description attributes that have the out-of-band 'no-value' value (see  
183 [RFC2911] section 4.1) with the proper values.

184 The operator is changing the media loaded in the input tray and so is replacing the "media-ready"  
185 Job Template Printer attribute value with the proper values

## 186 4 Definition of the Set operations

187 The Set-Printer-Attributes operation (as are all Printer operations) are directed at Printer objects. A  
 188 client **MUST** always supply the "printer-uri" operation attribute in order to identify the correct target of  
 189 the operation. These descriptions assume all of the common semantics of IPP/1.1 Model and Semantics  
 190 document [RFC2911] section 3.1.

191 The Set-Job-Attributes operation (as are all Job operations) are directed at Job objects. A client **MUST**  
 192 always supply some means of identifying the Job object in order to identify the correct target of the  
 193 operation. That job identification **MAY** either be a single Job URI or a combination of a Printer URI  
 194 with a Job ID as defined in [RFC2911]. The IPP object implementation **MUST** support both forms of  
 195 identification for every job. If possible, a client **SHOULD** use the Printer URI with a Job ID rather than  
 196 a Job URI, since the 32-bit "job-id" is more readily translated to and from other print protocols that  
 197 **MAY** be serving as gateways into or out of the IPP implementation.

198 The Set Printer operations are summarized in Table 1:

199 **Table 1 - Operation-Id assignments**

Operation Name	Operation-Id	Brief description
Set-Printer-Attributes	0x0013	Sets attribute values of the target Printer object
Set-Job-Attributes	0x0014	Sets attribute values of the target Job object
Get-Printer-Supported-Values	0x0015	Gets values that are valid for setting "xxx-supported" attributes using the Set-Printer-Attributes operation

### 200 4.1 Set-Printer-Attributes Operation

201 This **OPTIONAL** operation allows a client to set the values of the attributes of a Printer object. In the  
 202 request, the client supplies the set of Printer keyword attribute names and values that are to be set. In  
 203 the response, the Printer object returns success or rejects the entire request with indications of which  
 204 attribute or attributes could not be set.

205 The Printer object validates the client-supplied attributes in the Set-Printer-Attributes request. For an  
 206 attribute to validate it **MUST** meet all of the following rules:

- 207 1. The number of attributes supplied by the client **MUST NOT** exceed the maximum number that the  
 208 Printer supports in a Set-Printer-Attributes request. A Printer **MUST** accept at least one attribute,  
 209 but **SHOULD** accept a reasonable number in a single Set-Printer-Attributes request.

210 Note: There is no way for the client to determine the maximum number of attributes that the  
 211 Printer supports in a Set-Printer-Attributes request, except to try a reasonable number.

- 212 2. The Printer **MUST** support the attribute.

- 213 3. The attribute MUST NOT be READ-ONLY, i.e., the definition of the attribute MUST NOT  
214 indicate that the attribute is READ-ONLY (see Appendix A for an indication of which IPP/1.1  
215 attributes are READ-ONLY).
- 216 4. The attribute MUST be settable in this implementation.
- 217 5. The Printer MUST support the value according to the rules defined in Appendix A, i.e., each value  
218 of each supplied "xxx" attribute MUST be validated against a value of a corresponding "xxx-  
219 supported" Printer attribute. One of those rules permits an administrator to set arbitrary 'name'  
220 values to those "xxx-supported" Printer attributes that include the 'name' attribute syntax if the  
221 implementation supports the 'admin-define' out-of-band value for that "xxx-supported" attribute  
222 (see section 16 and 8.3).
- 223 6. The attribute's values MUST NOT conflict with the values of other Printer attributes, including  
224 ones being set in this same operation.

225 If any of the supplied attributes does not validate, the Printer object MUST reject the entire operation;  
226 the Printer object MUST NOT partially set some of the supplied attributes. In other words, after the  
227 operation, all the supplied attributes MUST be set or none of them MUST be set, thus making the Set-  
228 Printer-Attributes an atomic operation.

229 The Printer MUST accept this operation when its READ-ONLY "printer-state" attribute (see  
230 RFC2911] section 4.4.11) is 'idle' or 'stopped', and SHOULD accept it when the value is 'processing'.  
231 The Printer MUST accept this operation for any of the values of the Printer object's READ-ONLY  
232 "printer-state-reasons" and "printer-is-accepting-jobs" attributes, unless explicitly defined otherwise in  
233 the definition of these attributes' values.

234 This operation MUST NOT change the value of attributes not specified in the operation unless the  
235 definition of the attribute explicitly specifies such side-effects. For example, this document explicitly  
236 specifies that when this operation sets "printer-message-from-operator", the Printer also MUST set the  
237 READ-ONLY "printer-message-time" and READ-ONLY "printer-message-date-time" attributes to the  
238 time of the operation as a side effect. In particular, if this operation changes an "xxx-default" attribute,  
239 the new value MUST be in the "xxx-supported" attribute or the request MUST contain a new value for  
240 "xxx-supported" which contains the new value for the "xxx-default". Otherwise, the Printer MUST  
241 reject the operation. In general, Printer attribute definitions that are settable will not define side-effects  
242 on other attributes that are settable, only side effects on READ-ONLY attributes, if any.

#### 243 **4.1.1 Settable and READ-ONLY Printer Description attributes**

244 If the Printer supports the Set-Printer-Attributes operation, then it SHOULD support setting of:  
245 all Job Template Default ("xxx-default") attributes  
246 all Job Template Supported ("xxx-supported") attributes  
247 all Job Template Ready ("xxx-ready") attributes  
248 that the implementation supports (see [RFC2911] section 4.2 and extensions).

249 Some Printer Description attributes (see [RFC2911] section 4.4) MUST NOT be settable, i.e., they are  
250 defined to be READ-ONLY. An attribute marked as "READ-ONLY" in the Printer Description  
251 attribute table in Appendix A is such an attribute. The Printer attributes that are not marked as "READ-  
252 ONLY" MAY be settable using the Set-Printer-Attributes operation, depending on implementation.

253 Note: From now on, all extensions that define new object attributes will indicate whether or not the  
254 attributes are READ-ONLY, by including the "READ-ONLY" adjective in their descriptions and/or  
255 explicitly stating whether they MAY be settable.

256 The current values of each "xxx-supported" Printer attribute MUST reflect the current policy for  
257 support of the corresponding "xxx" attribute. If an "xxx-supported" Printer attribute is settable in an  
258 implementation, then its value(s) MUST affect the behavior of the implementation. If an "xxx-  
259 supported" Printer attribute is defined to be READ-ONLY or is not-settable in an implementation, then  
260 its values MUST NOT be settable using the Set-Printer-Attributes operation. Consider the following  
261 example:

262 For example, if the "operations-supported" Printer Description attribute (see [RFC2911] section  
263 4.4.15) is settable in a particular implementation, then changing its value with a Set-Printer-  
264 Attributes operation MUST affect the operations that the implementation accepts or rejects. Such an  
265 implementation will need to be able to reject values for operations that it contains no code support  
266 for (see section 4.3). If the "operations-supported" Printer Description attribute is not settable in a  
267 particular implementation, then that implementation MUST reject an attempt to set it with a Set-  
268 Printer-Attributes operation, return the 'client-error-attributes-not-settable' status code (see section  
269 7.1), and return the "operations-supported" attribute with the out-of-band 'not-settable' value in the  
270 Unsupported Attributes Group.

271 As another example, consider an implementation in which the "media-default" and "media-  
272 supported" are settable. If a client supplies a Set-Printer-Attributes request that contains the "media-  
273 default" attribute with a value that is not a member of the Printer's "media-supported" attribute, the  
274 Printer MUST reject the request and return the "client-error-conflicting-attributes" status code with  
275 the "media-default" and "media-supported" attributes and their values (see [RFC2911] section 3.1.7).

276 As a third example, if a client supplies a Set-Printer-Attributes request that contains both the "media-  
277 default" and the "media-supported" attributes, but includes a value in the "media-default" that is not a  
278 member of the supplied "media-supported" attribute, the Printer MUST reject the request and return  
279 the "client-error-conflicting-attributes" status code with the "media-default" and "media-supported"  
280 attributes and their values (see [RFC2911] section 3.1.7).

281 *Access Rights:* The authenticated user (see [RFC2911] section 8.3) performing this operation must be  
282 an operator or administrator of the Printer object (see [RFC2911] Sections 1 and 8.5). Most Printer  
283 attributes will require administrator access rights to set, such as "xxx-supported", while some will  
284 require operator access rights only, such as "media-ready" and "printer-message-from-operator". Which  
285 attributes require which access rights depends on implementation and MAY depend on site policy.

## 286 4.1.2 Set-Printer-Attributes Request

287 The following sets of attributes are part of the Set-Printer-Attributes Request:

### 288 Group 1: Operation Attributes

289 Natural Language and Character Set:

290 The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911]  
291 section 3.1.4.1.

292  
293 Target:

294 The "printer-uri" (uri) operation attribute which is the target for this operation as described in  
295 [RFC2911] section 3.1.5.

296  
297 Requesting User Name:

298 The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as  
299 described in [RFC2911] section 8.3.

300  
301 "document-format" (mimeType):

302 The client OPTIONALLY supplies this attribute. The Printer object MUST support this  
303 attribute. This attribute is useful for a client to select the document-format to which the  
304 attribute modification should be applied. A Printer implementation MAY allow some  
305 attributes to have different values for each document format that it supports. See [RFC2911]  
306 section 3.2.5.1 "Get-Printer-Attributes Request".

307  
308 If the client includes this attribute, the Printer MUST change the supplied attributes for the  
309 document format specified by this attribute. If a supplied attribute is a member of the  
310 "document-format-varying-attributes" (i.e., the attribute varies by document format, see  
311 section 6.3), the Printer MUST change the supplied attribute for the document format specified  
312 by this attribute, but not for other document formats. If a supplied attribute isn't a member of  
313 the "document-format-varying-attributes" (i.e. it doesn't vary by document format), the Printer  
314 MUST change the supplied attribute for all document formats.

315  
316 If the client omits this attribute, the Printer MUST change the supplied attributes for all  
317 document formats whether or not they vary by document-format.

318  
319 If the client supplies a value for the "document-format" Operation attribute that is either  
320 'application/octet-stream' or not supported by the Printer, i.e., is not among the values of the  
321 Printer object's "document-format-supported" attribute, the Printer object MUST reject the  
322 operation and return the 'client-error-document-format-not-supported' status code. Note: the  
323 document-format 'application/octet-stream' is the union of several document-formats (see  
324 [RFC2911] section 3.2.5.1, Get-Printer-Attributes) and is not a true document-format.

### 325 Group 2: Printer Attributes

326

327 The client **MUST** supply a set of Printer attributes with one or more values (including  
328 explicitly allowed out-of-band values) as defined in [RFC2911] section 4.2 Job Template  
329 Attributes ("xxx-default", "xxx-supported", and "xxx-ready" attributes), section 4.4 Printer  
330 Description Attributes, and any attribute extensions supported by the Printer. The value(s) of  
331 each Printer attribute supplied in Group 2 replaces the value(s) of the corresponding Printer  
332 attribute on the target Printer object. For attributes that can have multiple values (1setOf), all  
333 values supplied by the client replace all values of the corresponding Printer object attribute. If  
334 a Printer object attribute had not been configured yet and so had the 'no-value' out-of-band  
335 value (see [RFC2911] section 4.1), the supplied value(s) replace the 'no-value' value.  
336

#### 337 **4.1.3 Set-Printer-Attributes Response**

338 The Printer object returns the following sets of attributes as part of the Get-Printer-Attributes  
339 Response:

##### 340 Group 1: Operation Attributes

###### 341 Status Message:

342 In addition to the **REQUIRED** status code returned in every response, the response  
343 **OPTIONALLY** includes a "status-message" (text(255)) and/or a "detailed-status-message"  
344 (text(MAX)) operation attribute as described in [RFC2911] sections 13 and 3.1.6.  
345

###### 346 Natural Language and Character Set:

347 The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911]  
348 section 3.1.4.2.  
349

##### 350 Group 2: Unsupported Attributes

351 See [RFC2911] section 3.1.7 for details on returning Unsupported Attributes.  
352

353 If some of the attributes in the operation fail to validate, the Printer **MUST** reject the  
354 operation, **MUST NOT** change any Printer attributes, and **MUST** return the indicated status  
355 code below. In this group, the Printer **MUST** also return all attributes that fail to validate.  
356 The following are the reasons that an attribute fails to validate and the value returned for the  
357 attribute, along with the indicated status code and order of detection:  
358

- 359 1. The number of attributes supplied by the client exceeds the maximum number that the  
360 Printer supports in a Set-Printer-Attributes request: return the 'client-error-request-entity-  
361 too-large' (see [RFC2911] section 13.1.4.9).
- 362 2. The Printer doesn't support the attribute: return the attribute with the "out-of-band" value  
363 'unsupported' (see [RFC2911] section 3.1.7 and [RFC2910]) and the 'client-error-  
364 attributes-or-values-not-supported' (see [RFC2911] section 13.1.4.12).

- 365 3. The attribute is either READ-ONLY (in its definition) or is not-settable in this  
366 implementation: return the attribute with the "out-of-band" value 'not-settable' (see section  
367 8.1) and the 'client-error-attributes-not-settable' status code (see section 7.1).
- 368 4. The Printer doesn't support the value: if the attribute in the operation has a single value  
369 return it. If the attribute in the operation is multi-valued, return only those values in a  
370 1setOf that are not supported. Return the 'client-error-attributes-or-values-not-supported'  
371 status code (see [RFC2911] section 13.1.4.12).
- 372 5. The values of some of the supplied attributes conflict with one another and/or other Printer  
373 attribute values not being set: if the conflicting attribute in the operation has a single value  
374 return the attribute and the value. If the attribute in the operation is multi-valued, return  
375 only the attribute and those values in a 1setOf that are conflicting with other attributes.  
376 Return the 'client-error-conflicting-attributes' status code (see [RFC2911] section  
377 13.1.4.15).

## 378 4.2 Set-Job-Attributes Operation

379 This OPTIONAL operation allows a client to set the values of the attributes of a Job object. In the  
380 request, the client supplies the set of Job keyword attribute names and values that are to be set. In the  
381 response, the IPP object returns success or rejects the entire request with indications of which attribute  
382 or attributes could not be set.

383 This operation is almost identical to the Set-Printer-Attributes operation and follows the same rules for  
384 validation (see section 4.1). The only differences are that the Set-Job-Attributes operation is directed at  
385 a Job object rather than a Printer object, there is no "document-format" operation attribute used when  
386 setting a Job object, the operation can add an attribute to the (Job) object, the 'delete-attributes' out-of-  
387 band value is permitted to remove an attribute, and the validation is the same as the Job Creation  
388 operations (Print-Job, Print-URI, and Create-Job), i.e., depends on the "xxx-supported" Printer  
389 Description attributes (see [RFC2911] section 3.1). Using the Set-Printer-Attributes operation, the  
390 administrator can set arbitrary 'name' values to those "xxx-supported" Printer attributes that include the  
391 'name' attribute syntax if the implementation supports the 'admin-define' out-of-band value for that "xxx-  
392 supported" attribute (see section 16 and 8.3). However, the Set-Job-Attributes cannot be used to add  
393 unsupported names to the Job object.

394 If a client supplies a job attribute in a Set-Job-Attributes request that the Printer supports, and the job  
395 was originally submitted without supplying that attribute, the Printer adds the attribute to the Job object.

396 If the client supplies a job attribute with the "out-of-band" value 'delete-attribute' (see section 8.2), then  
397 the Printer MUST remove the attribute and all of its values from the Job object, if present. The  
398 semantic effect of the client supplying the 'delete-attribute' value in a Set-Job-Attributes operation  
399 MUST be the same as if the attribute had not been supplied with the Job object in the Job Creation  
400 operation, i.e., the Printer applies its default attribute or behavior with lower precedence than the PDL  
401 (see the beginning of [RFC2911] section 4.2 and [RFC2911] 3.2.1.1). Any subsequent query of the Job  
402 object using Get-Job-Attributes or Get-Jobs MUST NOT return any attribute that has been deleted

403 using the 'delete-attribute' out-of-band value. However, a client can re-establish such a deleted Job  
 404 attribute with any supported value(s) using a subsequent Set-Job-Attributes operation.

405 If the client supplies an attribute in a Set-Job-Attributes request with the 'delete-attribute' value and that  
 406 attribute is not present on the Job object, the Printer ignores that supplied attribute in the request, does  
 407 not return the attribute in the Unsupported Attributes group, and returns the 'successful-ok' status code,  
 408 if there are no other problems with the request.

409 The validation of the Set-Job-Attributes request is performed by the Printer as if the job had been  
 410 submitted originally with the new attribute values (and the deleted attributes removed) and with "ipp-  
 411 attribute-fidelity" set to 'true', i.e., all modified attributes Job attributes and values MUST be supported  
 412 in combination with the Job attributes not modified. If such a Job Creation operation would have been  
 413 accepted, then the Set-Job-Attributes MUST be accepted. If such a Job Creation operation would have  
 414 been rejected, then the Set-Job-Attributes MUST be rejected and the Job MUST be unchanged. In  
 415 addition, if any of the supplied attributes are not supported, are not settable, or the values are not  
 416 supported, the Printer object MUST reject the entire operation; the Printer object MUST NOT partially  
 417 set some of the supplied attributes. In other words, after the operation, all the supplied attributes  
 418 MUST be set or none of them MUST be set, thus making the Set-Job-Attributes an atomic operation.

419 The IPP object MUST accept or reject this operations when the Job's READ-ONLY "job-state"  
 420 attribute has the values shown in Table 2. The job's current state MUST affect whether the IPP object  
 421 accepts or rejects the request. For example, in the case where the operation creates a request for  
 422 unavailable resources, the Job transitions to a new state. Table 2 shows the allowed behaviors in each  
 423 job state and the transitions.

424 **Table 2 - Job State Transition Table for the Set-Job-Attributes operation**

Current "job-state"	New "job-state"	IPP object's response status code and "action":
'pending'	'pending'	'successful-ok'
'pending'	'pending-held'	'successful-ok' - needed resources are not ready
'pending-held'	'pending-held'	'successful-ok'
'pending-held'	'pending'	'successful-ok' - needed resources are ready
'processing'	'processing'	'successful-ok' or 'client-error-not-possible' depending on implementation, including the attributes being set, whether the job has started marking media, etc.
'processing-stopped'	'processing-stopped'	'successful-ok' or 'client-error-not-possible' depending on implementation, including the attributes being set, whether the job has started marking media, etc.
'completed'	'completed'	'client-error-not-possible'
'canceled'	'canceled'	'client-error-not-possible'
'aborted'	'aborted'	'client-error-not-possible'

425

426 This operation MUST NOT change the value of attributes not specified in the operation unless the  
427 definition of the attribute explicitly specifies such side-effects. In general, Job attribute definitions that  
428 are settable will not define side-effects on other attributes that are settable, only side effects on READ-  
429 ONLY attributes, if any.

#### 430 **4.2.1 Settable and READ-ONLY Job Description attributes**

431 If the Printer supports the "job-message-from-operator" Job Description attribute (see [RFC2911]  
432 section 4.3.16) and the client explicitly supplies a new value for the "job-message-from-operator" in the  
433 Set-Job-Attributes request, then the Printer MUST set the "job-message-from-operator" Job attribute to  
434 this new value.

435 If the Printer supports the Set-Job-Attributes operation, then it SHOULD support setting of:  
436 all Job Template job ("xxx") attributes  
437 that the implementation supports (see [RFC2911] section 4.2 and extensions).

438 Some Job Description attributes (see [RFC2911] section 4.3) MUST NOT be settable, i.e., they are  
439 defined to be READ-ONLY. An attribute marked as "READ-ONLY" in the Job Description attribute  
440 table in Appendix A is such an attribute. The Job attributes not marked as "READ-ONLY" MAY be  
441 settable using the Set-Job-Attributes operation, depending on implementation.

442 Note: From now on, all extensions that define new object attributes will indicate whether or not the  
443 attributes are READ-ONLY, by including the "READ-ONLY" adjective in their descriptions and/or  
444 explicitly stating whether they MAY be settable.

445 *Access Rights:* The authenticated user (see [RFC2911] section 8.3) performing this operation must  
446 either be the job owner (as determined in the Job Creation operation) or an operator or administrator of  
447 the Printer object (see [RFC2911] Sections 1 and 8.5).

#### 448 **4.2.2 Set-Job-Attributes Request**

449 The following sets of attributes are part of the Set-Job-Attributes Request:

##### 450 Group 1: Operation Attributes

451 Natural Language and Character Set:

452 The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911]  
453 section 3.1.4.1.

454 Target:

455 Either (1) the "printer-uri" (uri) plus "job-id" (integer(1:MAX)) or (2) the "job-uri" (uri)  
456 operation attribute(s) which define the target for this operation as described in [RFC2911]  
457 section 3.1.5.  
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Requesting User Name:

The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as described in [RFC2911] section 8.3.

Group 2: Job Attributes

The client MUST supply a set of Job attributes with one or more values (including explicitly allowed out-of-band values) as defined in [RFC2911] section 4.2 Job Template Attributes ("xxx" attributes), section 4.3 Job Description Attributes, and any attribute extensions supported by the Printer. The value(s) of each Job attribute supplied in Group 2 replaces the value(s) of the corresponding Job attribute on the target Job object. For attributes that can have multiple values (1setOf), all values supplied by the client replace all values of the corresponding Job object attribute.

If the client supplies an "xxx" attribute with the 'delete-attribute' out-of-band value (see section 8.2), the Printer MUST remove the "xxx" attribute from the Job object, if present.

### 4.2.3 Set-Job-Attributes Response

The IPP object returns the following sets of attributes as part of the Set-Job-Attributes Response:

Group 1: Operation Attributes

Status Message:

In addition to the REQUIRED status code returned in every response, the response OPTIONALLY includes a "status-message" (text(255)) and/or a "detailed-status-message" (text(MAX)) operation attribute as described in [RFC2911] sections 13 and 3.1.6.

Natural Language and Character Set:

The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911] section 3.1.4.2.

Group 2: Unsupported Attributes

See [RFC2911] section 3.1.7 for details on returning Unsupported Attributes.

If some of the attributes in the operation fail to validate, the Printer MUST reject the operation, MUST NOT change any Job attributes, and MUST return the indicated status code below. In this group, the Printer MUST also return all attributes that fail to validate. The following are the reasons that an attribute fails to validate and the value returned for the attribute, along with the indicated status code and order of detection:

1. The number of attributes supplied by the client exceeds the maximum number that the Printer supports in a Set-Printer-Attributes request: return the 'client-error-request-entity-too-large' (see [RFC2911] section 13.1.4.9).

- 500           2. The Printer doesn't support the attribute: return the attribute with the 'unsupported' out-of-  
501           band attribute value (see [RFC2911] section 3.1.7 and [RFC2910]) and the 'client-error-  
502           attributes-or-values-not-supported' (see [RFC2911] section 13.1.4.12).
- 503           3. The attribute is READ-ONLY (in its definition) or is not-settable in this implementation:  
504           return the attribute with the 'not-settable' out-of-band attribute value (see section 8.1) and  
505           the 'client-error-attributes-not-settable' status code (see section 7.1).
- 506           4. The Printer doesn't support the value: if the attribute in the operation has a single value  
507           return it. If the attribute in the operation is multi-valued, return only those values in a  
508           1setOf that are not supported. Return the 'client-error-attributes-or-values-not-supported'  
509           status code (see [RFC2911] section 13.1.4.12).
- 510           5. The values of some of the supplied attributes conflict with one another and/or other Job  
511           attribute values not being set: if the conflicting attribute in the operation has a single value  
512           return the attribute and the value. If the attribute in the operation is multi-valued, return  
513           only the attribute and those values in a 1setOf that are conflicting with other attributes.  
514           Return the 'client-error-conflicting-attributes' status code (see [RFC2911] section  
515           13.1.4.15).

#### 516 **4.3 Get-Printer-Supported-Values Operation**

517           This OPTIONAL operation allows a client to request the values that the Printer allows in the Set-  
518           Printer-Attributes operation for "xxx-supported" attributes. If the Printer supports the Set-Printer-  
519           Attributes operation AND some of its "xxx-supported" Printer attributes are settable, then the Printer  
520           MUST also support this operation.

521           The Printer MUST return in the Get-Printer-Supported-Values response those, and only those, "xxx-  
522           supported" Printer attributes that it supports setting with the Set-Printer-Attributes operation.  
523           Furthermore, if a client requests the value of an attribute that is not settable or is not supported (as in  
524           the Get-Printer-Attributes response), the Unsupported Attributes Group of the response NEED NOT  
525           contain the "requested-attributes" operation attribute with any such requested (attribute keyword)  
526           values.

527           This operation has identical request/response attributes to the Get-Printer-Attributes operation in  
528           IPP/1.1 [RFC2911]. The operation also behaves identically to the Get-Printer-Attributes operation in  
529           IPP/1.1 [RFC2911] with the following exceptions:

- 530           1. The Get-Printer-Supported-Values operation supports only "xxx-supported" attributes.
- 531           2. The Get-Printer-Attributes operation returns the few "xxx-supported" attributes that are defined to  
532           be single valued, such as "page-ranges-supported" (boolean) or "pdl-override-supported" (type2  
533           keyword), as single values, while Get-Printer-Supported-Values returns the possible values that can  
534           be set as a 1setOf of the same attribute syntax type (See Appendix B: Attributes returned from Get-  
535           Printer-Supported-Values).

- 536 3. The Get-Printer-Attributes operation returns the current values of requested attributes while the  
537 Get-Printer-Supported-Values operation returns the values that are inherently supported by the  
538 implementation code, i.e., the values that an administrative client can set in a Set-Printer-Attributes  
539 request.
- 540 4. The Get-Printer-Attributes operation returns the current values of requested "xxx-supported"  
541 attributes that the Printer is configured to accept in Job Creation operations, including additional  
542 values defined by the administrator, while the Get-Printer-Supported-Values operation returns only  
543 the values of "xxx-supported" attributes that are inherently supported by the implementation and  
544 does not return any additional values defined by the administrator where the implementation  
545 supports the 'admin-define' out-of-band value.
- 546 5. The Get-Printer-Attributes never returns the 'admin-define' out-of-band attribute value, while the  
547 Get-Printer-Supported-Attributes operation does, if the implementation allows the administrator to  
548 define name values by setting that "xxx-supported" attribute with any 'name' value(s).
- 549 6. The Get-Printer-Attributes operation only requires end-user access rights, while the Get-Printer-  
550 Supported-Values requires administrator access rights.

551 *Access Rights:* The authenticated user (see [RFC2911] section 8.3) performing this operation must be  
552 an administrator of the Printer object (see [RFC2911] Sections 1 and 8.5).

#### 553 **4.3.1 Definition of the usage of the 'admin-define' out-of-band attribute value**

554 If the Set-Printer-Attributes operation allows the System Administrator to define arbitrary 'name' values  
555 for an "xxx-supported" attribute, then the Get-Printer-Supported-Values operation MUST return the  
556 'admin-define' out-of-band attribute value (see section 8.3) as one of the values of the "xxx-supported"  
557 attribute. In other words, the 'admin-define' out-of-band attribute value indicates that the Printer  
558 implementation supports clients setting arbitrary 'name' attribute syntax values for that "xxx-supported"  
559 attribute using the Set-Printer-Attributes operation as long as the attribute is defined with the 'name'  
560 attribute syntax.

561 For example, if the Get-Printer-Supported-Values operation returns several keywords as the value of  
562 the "media-supported" attribute, then the Set-Printer-Attributes operation MUST accept any of these  
563 keywords as values for the "media-supported" attribute. If the Get-Printer-Supported-Values operation  
564 returns an 'admin-define' out-of-band attribute value as one of the values of the "media-supported"  
565 attribute, then the Set-Printer-Attributes operation MUST accept any value whose attribute syntax is  
566 'name' as a value for the "media-supported" attribute (provided that the user is properly authenticated to  
567 use the Set-Printer-Attributes operation, e.g., has administrative access rights).

568 The Get-Printer-Supported-Values MAY return the 'admin-define' out-of-band attribute value for any  
569 IPP/1.1 or extension Job Template attribute if the implementation supports allowing the System  
570 Administrator to add values to the "xxx-supported" attribute using the Set-Printer-Attributes operation.  
571 In this case, the Printer MUST accept any 'name' value of the correct attribute syntax in a Set-Printer-  
572 Attributes operation that is setting that attribute. For "xxx-supported" attributes that are defined with a  
573 choice of attribute syntaxes, such as 'keyword | name', it is the 'name' attribute syntax that the System

574 Administrator can use to add new values, not the 'keyword' attribute syntax. For IPP/1.1 this  
575 requirement includes the following Job Template attributes:

576 media-supported  
577 job-hold-until-supported  
578 job-sheets-supported

579  
580 Implementations that support additional Job Template attributes that include the 'name' attribute syntax,  
581 MAY use the 'admin-define' out-of-band value with them.

582 If the 'admin-define' out-of-band attribute value is not one of the values of an "xxx-supported" attribute  
583 returned in a Get-Printer-Supported-Values response, then the Printer MUST NOT allow the Set-  
584 Printer-Attributes operation for that attribute to contain a value that is not one of the explicit 'keyword'  
585 or 'name' values returned in a Get-Printer-Supported-Values response.

586 See Appendix B: Attributes returned from Get-Printer-Supported-Values for a full list of values  
587 returned by this operation.

## 588 **5 New Operation attributes**

589 This section defines new operation attributes for use with the IPP/1.1 operations indicated. As new  
590 operations are defined they will also indicate explicitly whether these operation attributes are defined for  
591 use with them.

### 592 **5.1 printer-message-from-operator (text(127))**

593 The Printer SHOULD support this Operation attribute in following operations if it supports the  
594 corresponding "printer-message-from-operator" Printer Description attribute.

595 Pause-Printer  
596 Resume-Printer  
597 Purge-Jobs

598  
599 The client OPTIONALLY supplies this attribute in the above operations. The value of this attribute is a  
600 message from the operator about the Printer object on which the operator is performing the operation.  
601 If this operation attribute is supported, the Printer copies the value to its "printer-message-from-  
602 operator" Printer Description attribute (see [RFC2911] section 4.4.25) even if this Operation attribute is  
603 a zero-length text value or consists solely of white space.

604 If the Printer supports this operation attribute, it MUST support both a zero-length text value and the  
605 'no-value' out-of-band value (see [RFC2911] section 4.1) to indicate that the operator has sent no  
606 message. In this case, the Printer sets the value of the "printer-message-from-operator" to the zero-  
607 length value or 'no-value' out-of-band value, respectively. If the client queries the "printer-message-

608 from-operator" Printer attribute, the Printer returns the attribute with the zero-length value or the 'no-  
609 value' value, respectively.

610 In addition, the Printer automatically copies:

- 611 1. the value of its "printer-up-time" attribute (see [RFC2911] section 4.4.29) to its "printer-message-  
612 time" attribute,
- 613 2. the value of its "printer-current-time" (dateTime) attribute (see [RFC2911] section 4.4.30) to its  
614 "printer-message-date-time" attribute, if supported.

615 If the client omits this operation attribute, the Printer does not change the value of its "printer-message-  
616 from-operator", "printer-message-time" and "printer-message-date-time" Printer Description attributes.

617 The "printer-message-from-operator" operation attribute **MUST NOT** be supported as an operation  
618 attribute for the Set-Printer-Attributes operation. If the operator wants to set the Printer's "printer-  
619 message-from-operator" Printer Description attribute when issuing the Set-Printer-Attributes operation,  
620 the client supplies the "printer-message-from-operator" explicitly with its new value as one of the  
621 Printer Description attributes in Group 2 in the request. The Printer also updates its "printer-message-  
622 time" and "printer-message-date-time" Printer Description attributes. If the client does not explicitly  
623 supply the "printer-message-from-operator" with its new value in the Set-Printer-Attributes request, the  
624 Printer leaves the value of the Printer's "printer-message-from-operator" Printer Description attribute  
625 unchanged.

## 626 **5.2 job-message-from-operator (text(127))**

627 The Printer **SHOULD** support this Operation attribute in following operations if it supports the  
628 corresponding "job-message-from-operator" Job Description attribute.

629 Cancel-Job  
630 Hold-Job  
631 Release-Job  
632 Restart-Job

633  
634 The client **OPTIONALLY** supplies this attribute in the above operations. The value of this attribute is a  
635 message from the operator about the Job object on which the operator has just performed an operation.  
636 If supported, the Printer copies the value to the Job's "job-message-from-operator" Job Description  
637 attribute (see [RFC2911] section 4.3.16) (even if this Operation attribute is a zero-length text value or  
638 consists solely of white space).

639 If the Printer supports this operation attribute, it **MUST** support both a zero-length text value and the  
640 'no-value' out-of-band value (see [RFC2911] section 4.1) to indicate that the operator has sent no  
641 message. In this case, the Printer sets the value of the "job-message-from-operator" to the zero-length  
642 value or 'no-value' out-of-band value, respectively. If the client queries the "job-message-from-

643 operator" Job attribute, the IPP object returns the attribute with the zero-length value or the 'no-value'  
644 value, respectively.

645 If the client omits this attribute, the Printer does not change the value of its "job-message-from-  
646 operator" Job Description attribute.

647 Note: There are no corresponding "job-message-time" and "job-message-date-time" Job Description  
648 attributes, since the usual lifetime of a job is limited.

649 The "job-message-from-operator" operation attribute **MUST NOT** be supported as an operation  
650 attribute for the Set-Job-Attributes operation. If the operator wants to set the Job's "job-message-from-  
651 operator" Job Description attribute when issuing the Set-Job-Attributes operation, the client **MUST**  
652 supply the "job-message-from-operator" with its new value as one of the Job Description attributes in  
653 Group 2 in the request. Otherwise, the Printer leaves the value of the Job's "job-message-from-  
654 operator" Job Description attribute unchanged by not explicitly setting the attribute. If the client does  
655 not explicitly supply the "job-message-from-operator" with its new value in the Set-Job-Attributes  
656 request, the Printer leaves the value of the Job's "job-message-from-operator" Job Description attribute  
657 unchanged.

## 658 **6 New Printer Description Attributes**

659 The following new Printer Description attributes are needed to support the new operations defined in  
660 this document.

### 661 **6.1 printer-settable-attributes-supported (1setOf type2 keyword)**

662 This **REQUIRED READ-ONLY** Printer attribute identifies the Printer object attributes that are settable  
663 in this implementation, i.e., that are settable using the Set-Printer-Attributes operations (see section  
664 4.1). This attribute **MUST** be supported if the Set-Printer-Attributes operations is supported. The  
665 Printer **MUST** reject attempts to set any Printer attributes that are not one of the values of this attribute,  
666 returning the 'client-error-attributes-not-settable' status code (see section 7.1). The value of this  
667 attribute **MAY** depend on the value of the "document-format" operation attribute supplied in the Get-  
668 Printer-Attributes operation (see [RFC2911] section 3.2.5.1).

669 Standard keyword values are:

670 'none': There are no settable Printer attributes.

671 'xxx': Where 'xxx' is any of the keyword attribute names allowed by section 4.1.1

### 672 **6.2 job-settable-attributes-supported (1setOf type2 keyword)**

673 This **REQUIRED READ-ONLY** Printer attribute identifies the Job object attributes that are settable in  
674 this implementation, i.e., that are settable using the Set-Job-Attributes operation (see section 4.2). This  
675 attribute **MUST** be supported if the Set-Job-Attributes operations is supported. The Printer **MUST**

676 reject attempts to set any Job attributes that are not one of the values of this attribute, returning the  
677 'client-error-attributes-not-settable' status code (see section 7.1).

678 Standard keyword values are:

679 'none': There are no settable Job attributes.

680 'xxx': Where 'xxx' is any of the keyword attribute names allowed by section 4.2.1.

### 681 **6.3 document-format-varying-attributes (1setOf type2 keyword)**

682 This OPTIONAL READ-ONLY Printer Description attribute contains a set of attribute name  
683 keywords. This attribute SHOULD be supported by a Printer object, if the Printer object has Printer  
684 attributes whose value vary depending on document format (see [RFC2911] Get-Printer-Attributes  
685 operation). This attribute specifies which attribute values can vary by document-format. If an  
686 attribute's name "xxx" is a member of this attribute and the value of attribute "xxx" is changed with the  
687 Set-Printer-Attributes operation that included the "document-format" operation attribute, then the  
688 Printer MUST change the value for the specified document format and no other document formats (see  
689 section 4.1.2). If an attribute's name "xxx" is not a member of this attribute and the value of attribute  
690 "xxx" is changed with the Set-Printer-Attributes operation, then the attribute is changed for all  
691 document formats (whether or not the client supplied the "document-format" operation attribute).

### 692 **6.4 printer-message-time (integer(MIN:MAX))**

693 This OPTIONAL READ-ONLY Printer Description attribute contains the time that the Printer's  
694 "printer-message-from-operator" was changed by the operator using any operation where the client  
695 supplied the "printer-message-from-operator" operation attribute (see section 5.1) or was explicitly set  
696 using the Set-Printer-Attributes operation (see section 4.1). This attribute allows the users to know  
697 when the "printer-message-from-operator" attribute was last set.

698 The Printer sets the value of this attribute by copying the value of the Printer's "printer-up-time"  
699 attribute (see [RFC2911] section 4.3.14). If the Printer resets its "printer-up-time" attribute to 1 on  
700 power-up, then it MUST change the value of the "printer-message-time" to 0 or a negative number as  
701 specified in [RFC2911] section 4.3.14.

702 Note: This attribute helps users better understand the context for the "printer-message-from-operator"  
703 message.

### 704 **6.5 printer-message-date-time (dateTime)**

705 This OPTIONAL READ-ONLY Printer Description attribute contains the date and time that the  
706 Printer's "printer-message-from-operator" was changed by the operator using any operation where the  
707 client supplied the "printer-message-from-operator" operation attribute (see section 5.1) or was  
708 explicitly set using the Set-Printer-Attributes operation (see section 4.1). This attribute allows the users  
709 to know when the "printer-message-from-operator" attribute was last set.

710 This attribute **MUST** be supported if the Printer supports both the "printer-message-time" and the  
 711 "printer-current-time" (dateTime) attributes (see [RFC2911] section 4.4.30).

712 Note: This attribute helps users better understand the context for the "printer-message-from-operator"  
 713 message.

## 714 **6.6 printer-xri-supported (1setOf collection)**

715 This OPTIONAL Printer Description attribute is a multi-valued attribute where each value has the  
 716 'collection' attribute syntax (see [ipp-coll]) containing member attributes with the same semantics as the  
 717 following IPP/1.1 READ-ONLY Printer Description attributes, except for cardinality:

718 printer-uri-supported (1setOf uri) - see [RFC2911] section 4.4.1  
 719 uri-authentication-supported (1setOf type2 keyword) - see [RFC2911] section 4.4.2  
 720 uri-security-supported (1setOf type2 keyword) - see [RFC2911] section 4.4.3

721  
 722 When setting the "printer-xri-supported" attribute with a Set-Printer-Attributes request, the Printer  
 723 **MUST** also set these three IPP/1.1 READ-ONLY Printer Description attributes as a defined side effect.  
 724 Thus, this collection attribute provides the means to set these three IPP/1.1 READ-ONLY attributes  
 725 atomically so that they are never left in a partially inconsistent state.

726 An IPP Printer **MUST NOT** provide any other way using IPP to set these three IPP/1.1 READ-ONLY  
 727 Printer Description attributes, since they are READ-ONLY and **MUST** have consistent values at all  
 728 times. Note: The "printer-xri-supported" (1setOf collection) attribute can be put into a directory  
 729 schema that requires a single text string value, such as could be used with SLPv2  
 730 [RFC2608],[RFC2609] or LDAPv3 [RFC2251], [RFC2252], [RFC2926], by using suitable delimiting  
 731 characters to separate member attributes of the collection and/or terminating collection values.

732 The member attributes of the "printer-xri-supported" (1setOf collection) are given in Table 3.

733 **Table 3 - Member attributes of "printer-xri-supported" (1setOf collection)**

Member attribute	client <b>MUST</b> supply	Printer <b>MUST</b> support
xri-uri (uri)	yes	yes
xri-authentication (1setOf type2 keyword)	yes	yes
xri-security (1setOf type2 keyword)	yes	yes

734  
 735 Each collection value **MUST** contain a single unique value for the "xri-uri" member attribute. However,  
 736 the other two member attributes are multi-valued, so that a single URI can support more than one  
 737 authentication scheme and/or more than one security scheme. Other than the uniqueness and the  
 738 cardinality requirements, the semantics of these three member attributes is given in [RFC2911] sections  
 739 4.4.1, 4.4.2, and 4.4.3, respectively.

740 A client can query the current values using the Get-Printer-Attributes operation by supplying either:

- 741 1. the three IPP/1.1 attribute names: "printer-uri-supported", "uri-authentication-supported", "uri-  
742 security-supported" and getting back the parallel values OR
- 743 2. the single attribute name: "printer-xri-supported" and getting back the 1setOf collection which  
744 contains the same information semantically, but in a different form.

745 A client can query what member attribute values can be set by supplying the three attribute names: "xri-  
746 uri-scheme-supported", "xri-authentication-supported", and "xri-security-supported" in a Get-Printer-  
747 Supported-Values request and getting back the uriScheme and type2 keyword values that can be set.  
748 Since the "printer-xri-supported", "uri-authentication-supported", and "uri-security-supported"  
749 attributes are READ-ONLY, they are not queriable with the Get-Printer-Supported-Values operation  
750 (see section 4.3). See Table 16.

751 When performing a Set-Printer-Attributes operation, if there are multiple values for the "xri-  
752 authentication" and/or "xri-security" member attributes, the Printer MUST set the corresponding three  
753 READ-ONLY attributes with all possible combinations of values. For example, setting the "printer-xri-  
754 supported" with the following two collection values where the first URI has both 'basic' and 'digest'  
755 authentication:

```
756 "printer-xri-supported" =
757     { "xri-uri" = ipp://abc.com/p1
758       "xri-authentication" = basic
759       "xri-security" = tls
760     },
761     { "xri-uri" = ipp://abc.com/p2
762       "xri-authentication" = digest
763       "xri-security" = tls
764     },
765     { "xri-uri" = ipp://abc.com/p3
766       "xri-authentication" = none
767       "xri-security" = none
768     }
769
```

770 would cause the Printer to set the three corresponding IPP/1.1 READ-ONLY attributes, each with three  
771 parallel values as follows:

```
772 "printer-uri-supported" = { ipp://abc.com/p1, ipp://abc.com/p2,
773                             ipp://abc.com/p3 }
774 "uri-authentication-supported" = { basic, digest, none }
775 "uri-security-supported" = { tls, tls, none }
776
```

## 777 6.7 xri-uri-scheme-supported (1setOf uriScheme)

778 This OPTIONAL READ-ONLY Printer Description attribute identifies the URI schemes that the  
779 implementation supports for use in the "printer-uri-supported" (1setOf uri) Printer Description attribute  
780 (see [RFC2911] section 4.4.1) and the "xri-uri" member attribute of the "printer-xri-supported" (1setOf  
781 collection) Printer Description attribute (see section 6.6).

782 A Printer MUST support this attribute if it supports setting the "printer-xri-supported" (1setOf  
783 collection) with the Set-Printer-Attributes operation.

#### 784 **6.8 xri-authentication-supported (1setOf type2 keyword)**

785 This OPTIONAL READ-ONLY Printer Description attribute identifies the Client Authentication  
786 mechanisms that the implementation supports for use in the "uri-authentication-supported" (1setOf  
787 type2 keyword) Printer Description attribute (see [RFC2911] section 4.4.2) and the "xri-authentication"  
788 member attribute of the "printer-xri-supported" (1setOf collection) Printer Description attribute (see  
789 section 6.6).

790 A Printer MUST support this attribute if it supports setting the "printer-xri-supported" (1setOf  
791 collection) with the Set-Printer-Attributes operation.

#### 792 **6.9 xri-security-supported (1setOf type2 keyword)**

793 This OPTIONAL READ-ONLY Printer Description attribute identifies the URI schemes that the  
794 implementation supports for use in the "uri-security-supported" (1setOf type2 keyword) Printer  
795 Description attribute (see [RFC2911] section 4.4.3) and the "xri-security" member attribute of the  
796 "printer-xri-supported" (1setOf collection) Printer Description attribute (see section 6.6).

797 A Printer MUST support this attribute if it supports setting the "printer-xri-supported" (1setOf  
798 collection) with the Set-Printer-Attributes operation.

## 799 **7 Additional status codes**

800 This section defines new status codes used by the operations defined in this document.

### 801 **7.1 client-error-attributes-not-settable (0x0413)**

802 The Set-Printer-Attributes or Set-Job-Attributes operation failed because one or more of the specified  
803 attributes cannot be set either because the attribute is defined to be READ-ONLY or the attribute is not  
804 settable in this implementation (see sections 4.1.3 and 4.2.3), the Printer MUST return this error code  
805 and the attribute keyword name(s) and the 'not-settable' out-of-band value (see section 8.1) in the  
806 Unsupported Attributes Group(see [RFC2911] section 3.1.7) for all of the attributes that could not be  
807 set. When the Printer returns this status, it MUST NOT change any of the attributes supplied in the  
808 operation.

## 809 **8 Additional out-of-band values**

810 This section defines additional out-of-band values. As with all out-of-band values, a client or a Printer  
811 MUST NOT use an out-of-band value unless the definition of the attribute in an operation request  
812 and/or response explicitly allows such usage. See the beginning of [RFC2911] section 4.1.

### 813 **8.1 'not-settable' out-of-band value**

814 The 'not-settable' out-of-band attribute value is returned by the IPP Printer in the Unsupported  
815 Attributes group of a response to indicate that the attribute supplied by the client in the request is  
816 READ-ONLY by definition or is not settable in this implementation.

817 The 'not-settable' out-of-band attribute value is defined for use with the Set-Job-Attributes and Set-  
818 Printer-Attributes response only. If a future additional "set" operation allows the 'not-settable' out-of-  
819 band value, its definition document MUST indicate such use explicitly, including with which attributes.

820 An IPP object MUST support the 'not-settable' out-of-band value in a Set-Job-Attributes or Set-Printer-  
821 Attributes request if it supports those operations. A client MUST NOT supply the 'not-settable' out-of-  
822 band value in any request. An IPP object MUST NOT support the 'not-settable' out-of-band value in  
823 other operations, unless the operations' definition document explicitly defines such usage. If a Printer  
824 receives this out-of-band value in any operation request, the Printer MUST either (1) reject the entire  
825 request and return the 'client-error-bad-request' status code or (2) ignore the attribute and return it with  
826 the 'unsupported' out-of-band value.

827 See sections 4.1.3 and 4.2.3 in this document for an example definition of the usage of the 'not-settable'  
828 out-of-band value in the Set-Printer-Attributes and Set-Job-Attributes responses.

#### 829 **8.1.1 Encoding of the 'not-settable' out-of-band attribute value**

830 The encoding of the 'not-settable' out-of-band value is 0x15 (see [RFC2910]). The value-length MUST  
831 be 0 and the value empty.

### 832 **8.2 'delete-attribute' out-of-band value**

833 The 'delete-attribute' out-of-band attribute value is supplied by the client in a request to indicate that the  
834 Printer is to remove the supplied attribute and all of its values from the target object, if present.

835 The 'delete-attribute' out-of-band attribute value is defined for use with the Set-Job-Attributes request  
836 only. If a future additional "set" operation allows the 'delete-attribute' out-of-band value, its definition  
837 document MUST indicate such use explicitly, including with which attributes.

838 An IPP Printer MUST support the 'delete-attribute' out-of-band value if it supports the Set-Job-  
839 Attributes operation. A client MUST NOT supply and an IPP object MUST NOT support the 'delete-  
840 attribute' out-of-band value in other operations, unless the operations' definition document explicitly  
841 defines such usage. For example, the 'delete-attribute' out-of-band value MUST NOT be used in the

842 Set-Printer-Attributes operation, where the absence of an attribute from an IPP object indicates that the  
843 attribute is not supported. If a Printer receives this out-of-band value in other operation requests, the  
844 Printer MUST either (1) reject the entire request and return the 'client-error-bad-request' status code or  
845 (2) ignore the attribute and return it with the 'unsupported' out-of-band value.

846 See section 4.2 in this document for the definition of the usage of the 'delete-attribute' out-of-band value  
847 in the Set-Job-Attributes request.

### 848 **8.2.1 Encoding of the 'delete-attribute' out-of-band value**

849 The encoding of the 'delete-attribute' out-of-band value is 0x16 (see [RFC2910]). The value-length  
850 MUST be 0 and the value empty.

### 851 **8.3 'admin-define' out-of-band attribute value**

852 Section 4.3 defines the Get-Printer-Supported-Values response to contain the values of an "xxx-  
853 supported" attribute that are supported by the implementation before any additional value are defined by  
854 the administrator. The 'admin-define' out-of-band attribute value is returned as an additional value of an  
855 "xxx-supported" attribute in a Get-Printer-Supported-Values response to indicate that the  
856 implementation supports allowing an administrator to define additional arbitrary 'name' values for that  
857 "xxx-supported" attribute.

858 For example, if the "media-supported" (1setOf (type3 keyword | name)) attribute contains this value,  
859 then the Printer MUST permit an administrator to add new media names to the Printer's "media-  
860 supported" attribute. In order for an administrator to add new values to a Printer's "xxx-supported"  
861 attribute, the client supplies the existing and new values in a Set-Printer-Attributes request for that  
862 attribute. The client MUST supply any such administratively defined values in the Set-Printer-  
863 Attributes request using the 'name' attribute syntax.

864 The 'admin-define' out-of-band attribute value is defined for use with the Get-Printer-Supported-Values  
865 response only. A Printer MUST NOT return the 'admin-define' out-of-band value in a Get-Printer-  
866 Attributes response, since such a response indicates what an end-user client can supply in a Job Creation  
867 operation. If a future additional "get" operation allows the 'admin-define' out-of-band value, its  
868 definition document MUST indicate such use explicitly, including with which attributes.

869 An IPP Printer MUST support the 'admin-define' out-of-band value, if it supports a client setting  
870 arbitrary 'name' values of an "xxx-supported" Printer attribute using the Set-Printer-Attributes  
871 operation. A client MUST NOT supply the 'admin-define' out-of-band value in any request. An IPP  
872 object MUST NOT support the 'admin-define' out-of-band value in other operations, unless the  
873 operations' definition document explicitly defines such usage. If a Printer receives this out-of-band  
874 value in any operation request, the Printer MUST either (1) reject the entire request and return the  
875 'client-error-bad-request' status code or (2) ignore the attribute and return it with the 'unsupported' out-  
876 of-band value.

877 This document defines that the 'admin-define' out-of-band value MUST be used only with "xxx-  
 878 supported" attributes that are defined to include the 'name' attribute syntax. This out-of-band value is  
 879 not intended to be used with "xxx-supported" attributes of other attribute syntaxes, such as 'uri', even  
 880 though the administrator defines arbitrary values for such attributes. If other documents extend the use  
 881 of the 'admin-define' out-of-band value to other attribute syntaxes, such a document MUST define such  
 882 use explicitly, including with which attributes.

883 See section 4.3 in this document for an example definition of the usage of the 'admin-define' out-of-band  
 884 attribute value in any "xxx-supported" attribute returned in a Get-Printer-Supported-Values response  
 885 that is defined to include the 'name' attribute syntax.

### 886 **8.3.1 Encoding of the 'admin-define' out-of-band attribute value**

887 The encoding of the 'admin-define' out-of-band attribute value is 0x17 (see [RFC2910]). The value-  
 888 length MUST be 0 and the value empty.

## 889 **9 New Values for Existing Printer Description Attributes**

890 This section contains those attributes for which additional values are added.

### 891 **9.1 operations-supported (1setOf type2 enum)**

892 The following "operation-id" values are added in order to support the new operations defined in this  
 893 document:

894 **Table 4 – Operation-id assignments**

Value	Operation Name
0x0013	Set-Printer-Attributes
0x0014	Set-Job-Attributes
0x0015	Get-Printer-Supported-Values

## 895 **10 Conformance Requirements**

896 This section specifies the conformance requirements for clients and IPP objects.

897 Both the Set-Job-Attributes and the Set-Printer-Attributes operations defined in the document are  
 898 OPTIONAL for an IPP object to support. Either one MAY be supported without the other or both  
 899 MAY be supported. However, if the Set-Printer-Attributes operation is supported, then the Get-  
 900 Printer-Supported-Values operation MUST be supported if any "xxx-supported" attributes are settable.  
 901 Otherwise, the Get-Printer-Supported-Values operation is OPTIONAL for an IPP Printer to support.

902 If the Set-Printer-Attributes operation is supported, then the Printer MUST support the following  
903 additional items:

- 904 1. the Get-Printer-Supported-Values operation (see section 5), if any "xxx-supported" attributes  
905 are settable.
- 906 2. the "printer-settable-attributes-supported" Printer Description attribute (see section 6.1)
- 907 3. the 'not-settable' out-of-band value in responses (see section 8.1)
- 908 4. the 'client-error-not-settable' status code (see section 7.1)
- 909 5. If "printer-message-from-operator" Printer Description attribute is supported (see [RFC2911]  
910 section 4.4.25), then it MUST be settable.
- 911 6. the Get-Printer-Supported-Values operation (see section 4.3), if any "xxx-supported" attributes  
912 are settable.
- 913 7. If a client can set a value with the 'name' attribute syntax for one or more "xxx-supported"  
914 attributes, then the 'admin-define' out-of-band attribute value (see section 8.3) MUST be  
915 supported in the Get-Printer-Supported-Values response for each such settable attribute (see  
916 section 4.3)

917 If the Set-Job-Attributes operation is supported, then the Printer MUST support the following  
918 additional items:

- 919 1. the "job-settable-attributes-supported" Printer Description attribute (see section 6.2)
- 920 2. the 'not-settable' out-of-band value in responses (see section 8.1)
- 921 3. the 'delete-attribute' out-of-band value in requests (see section 8.2)
- 922 4. the 'client-error-not-settable' status code (see section 7.1)
- 923 5. If the "job-message-from-operator" Printer Description attribute is supported (see [RFC2911]  
924 4.3.16), then it MUST be settable.

925 It is OPTIONAL for the Printer object to support the "printer-message-time" (integer) and "printer-  
926 message-date-time" (dateTime) Printer Description attributes. If both the "printer-message-time"  
927 (integer) and the "printer-current-time" (dateTime) (see [RFC2911] section 4.4.30) attributes are  
928 supported, then the "printer-message-date-time" (dateTime) Printer Description attribute MUST be  
929 supported.

930 As with all out-of-band values, a client or a Printer MUST NOT use an out-of-band value unless the  
931 definition document for the attribute in an operation request and/or response explicitly allows such  
932 usage.

## 933 11 IANA Considerations

934 This section contains registration information for IANA to add to the various IPP Registries according  
 935 to the procedures defined in RFC 2911 [RFC2911] section 6.

936  
 937 *Note to RFC Editors: Replace RFC NNNN below with the RFC number for this document, so that it*  
 938 *accurately reflects the content of the information for the IANA Registry.*

### 939 11.1 Operation Registrations

940 The following table lists all of the operations defined in this document. These are to be registered  
 941 according to the procedures defined in RFC 2911 [RFC2911] section 6.4.

942	Operations:	Ref.	Section:
943	Set-Printer-Attributes	RFC NNNN	4.1
944	Set-Job-Attributes	RFC NNNN	4.2
945	Get-Printer-Supported-Values	RFC NNNN	4.3
946			

947  
 948 The resulting operation registrations will be published in the  
 949 <ftp://ftp.iana.org/in-notes/iana/assignments/ipp/operations/>  
 950 area.

### 951 11.2 Additional Enum Attribute Value Registrations for the “operations-supported” Printer 952 Attribute

953 The following table lists all the new enum attribute values defined in this document as additional type2  
 954 enum values for use with the “operations-supported” Printer Description attribute. These are to be  
 955 registered according to the procedures defined in RFC 2911 [RFC 2911] section 6.1.

956	Enum Attribute Values:	Value	Ref.	Section:
957	Set-Printer-Attributes	0x0013	RFC NNNN	4
958	Set-Job-Attributes	0x0014	RFC NNNN	4
959	Get-Printer-Supported-Values	0x0015	RFC NNNN	4
960				

961  
 962 The resulting enum attribute value registrations will be published in the  
 963 <ftp://ftp.iana.org/in-notes/iana/assignments/ipp/attribute-values/operations-supported/>  
 964 area.

### 965 11.3 Attribute Registrations

966 The following table lists all of the attributes defined in this document. These are to be registered  
 967 according to the procedures in RFC 2911 [RFC2911] section 6.2.

968	Operation attributes:	Ref.	Section:
969	printer-message-from-operator (text(127))	RFC NNNN	5.1
970	job-message-from-operator (text(127))	RFC NNNN	5.2
971			

972

	Ref.	Section:
973 Printer Description attributes:		
974 printer-settable-attributes-supported (1setOf type2 keyword)		
975	RFC NNNN	6.1
976 job-settable-attributes-supported (1setOf type2 keyword)		
977	RFC NNNN	6.2
978 document-format-varying-attributes (1setOf type2 keyword)		
979	RFC NNNN	6.3
980 printer-message-time (integer(MIN:MAX))	RFC NNNN	6.4
981 printer-message-date-time (dateTime)	RFC NNNN	6.5
982 printer-xri-supported (1setOf collection)	RFC NNNN	6.6
983 xri-uri-scheme-supported (1setOf uriScheme)	RFC NNNN	6.7
984 xri-authentication-supported (1setOf type2 keyword)		6.8
985 xri-security-supported (1setOf type2 keyword)	RFC NNNN	6.9

986  
 987 The resulting attribute registrations will be published in the  
 988 <ftp://ftp.iana.org/in-notes/iana/assignments/ipp/attributes/>  
 989 area.  
 990

#### 991 **11.4 Status code Registrations**

992 The following table lists the status code defined in this document. This is to be registered according to  
 993 the procedures in RFC 2911 [RFC2911] section 6.6.

	Ref.	Section:
994 Status codes:		
995 client-error-attributes-not-settable (0x0413)	RFC NNNN	7.1

996  
 997  
 998 The resulting status code registration will be published in the  
 999 <ftp://ftp.iana.org/in-notes/iana/assignments/ipp/status-codes/>  
 000 area.  
 001

#### 002 **11.5 Out-of-band Attribute Value Registrations**

003 The following table lists all of the out-of-band attribute values defined in this document. These are to  
 004 be registered according to the procedures in RFC 2911 [RFC2911] section 6.7.

	Ref.	Section:
005 Out-of-band Attribute Values:		
006 'not-settable' out-of-band value	RFC NNNN	8.1
007 'delete-attribute' out-of-band value	RFC NNNN	8.2
008 'admin-define' out-of-band attribute value	RFC NNNN	8.3

009  
 010  
 011 The resulting out-of-band attribute value registrations will be published in the  
 012 [ftp.iana.org/in-notes/iana/assignments/ipp/out-of-band-attribute-value-tags/](ftp://ftp.iana.org/in-notes/iana/assignments/ipp/out-of-band-attribute-value-tags/)  
 013 area.

## 014 **12 Internationalization Considerations**

015 This document has the same localization considerations as the [RFC2911].

## 016 **13 Security Considerations**

017 The IPP Model and Semantics document [RFC2911 section 8] discusses high level security  
018 requirements (Client Authentication, Server Authentication and Operation Privacy). Client  
019 Authentication is the mechanism by which the client proves its identity to the server in a secure manner.  
020 Server Authentication is the mechanism by which the server proves its identity to the client in a secure  
021 manner. Operation Privacy is defined as a mechanism for protecting operations from eavesdropping.

022 In addition, the introduction of the Set-Printer-Attributes and Set-Job-Attributes operations creates  
023 another security threat, since the client is able to modify the Printer and Job attributes stored in the  
024 Printer. Such modifications could lead to denial of service.

025 A malicious user could alter the policy established by the system administrator and stored in the Printer  
026 attributes. Such alteration could either grant access to more resources or deny access to resources that  
027 the system administrator has established. For example, the malicious user could remove all of the  
028 document-format values from the "document-format-supported" Printer attribute so that the Printer  
029 would refuse to accept all jobs.

030 The general remedy for such malicious user actions against Printer attributes is to have strong Client  
031 Authentication coupled with Printer access control to limit the users who have System Administrator or  
032 Operator privileges.

033 A malicious user could modify the Job Template attributes of another user's Job, such as the "copies"  
034 attribute. For example, setting the number of copies to a large number.

035 The general remedy for such malicious user actions against another user's job is to have strong Client  
036 Authentication coupled with Printer access control to limit the users who have System Administrator or  
037 Operator privileges who can modify any job and, in addition, store the Client Authentication with each  
038 Job so that only the job owner End User can modify his/her own job.

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077 IPP Mailing List: [ipp@pwg.org](mailto:ipp@pwg.org)

078

079 To subscribe to the ipp mailing list, send the following email:

- 080 1) send it to [majordomo@pwg.org](mailto:majordomo@pwg.org)  
081 2) leave the subject line blank  
082 3) put the following two lines in the message body:  
083 subscribe ipp  
084 end

085

086 Implementers of this specification document are encouraged to join the IPP Mailing List in order to  
087 participate in any discussions of clarification issues and review of registration proposals for additional  
088 attributes and values. In order to reduce spam the mailing list rejects mail from non-subscribers, so you  
089 must subscribe to the mailing list in order to send a question or comment to the mailing list.

090 **15 References**

091 **15.1 Normative References**

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122

## 122 **16 Appendix A: Allowed Values for Set-Printer-Attributes and Set-Job-** 123 **Attributes requests**

124 This appendix is a normative part of this document and contains a table of all IPP/1.1 attributes. Each  
 125 row contains:

- 126 – an attribute and
- 127
- 128 – the values allowed in the Set-Printer-Attributes or Set-Job-Attributes request for the attribute.  
 129 The entry in each cell is the name (first few words) of each item below 1, 2, 3, 4a-g, and 5.
- 130

131 The allowed values include the following cases:

- 132 1. READ-ONLY: the Set-Printer-Attributes or Set-Job-Attributes operation MUST NOT change this  
 133 attribute and MUST reject the entire operation (see section 7.1).
- 134 2. Any of "xxx-supported": the Set-Printer-Attributes or Set-Job-Attributes operation accepts values  
 135 that are allowed according to the IPP/1.1 rules for validating the value(s) of an "xxx" Printer or Job  
 136 attribute against the value(s) of the corresponding "xxx-supported" Printer attribute. Table 5  
 137 summarizes those validation rules depending on each attribute syntax and value of an "xxx"  
 138 attribute supplied in the request and that of the corresponding "xxx-supported" Printer attribute.  
 139 The "xxx-supported" attribute syntax type and value(s) are obtained from a Get-Printer-Supported-  
 140 Values response (see the tables in this Appendix).

141 **Table 5 - Validation rules for 'Any of "xxx-supported" '**

Type of "xxx" value to be set	Type of "xxx-supported" value	Validates if:
integer	rangeOfInteger	each value is in one of the "xxx-supported" ranges
uri	uriScheme	each uri scheme matches one of the "xxx-supported" schemes
any	boolean	if the boolean "xxx-supported" is 'true'
any	same type	each value matches an "xxx-supported" value of the same type

142

143 For additional non-normative explanatory information see section 3.1.2.3 of the "Internet Printing  
 144 Protocol/1.1: Implementer's Guide" [ipp-iig]).

- 145 3. From Get-Printer-Supported-Values: the Set-Printer-Attributes operation accepts values that are  
 146 allowed according to the IPP/1.1 rules for validating the value(s) of an "xxx" Printer attribute  
 147 against the value(s) of the corresponding "xxx-supported" Printer attribute. Table 6 summarizes  
 148 those validation rules depending on each attribute syntax and value of an "xxx" attribute supplied in  
 149 the request and that of the corresponding "xxx-supported" Printer attribute. The "xxx-supported"

150 attribute syntax type and attribute value(s) are obtained from a Get-Printer-Supported-Values  
 151 response (see Appendix B: Attributes returned from Get-Printer-Supported-Values below).

152 **Table 6 - Validation rules for 'From Get-Printer-Supported-Values'**

Type of "xxx" value to be set	Type of "xxx-supported" value	Validates if:
integer	rangeOfInteger	each 'integer' value is in one of the "xxx-supported" ranges
uri	uriScheme	the uri scheme of each value matches one of the "xxx-supported" schemes
any	boolean	if the boolean "xxx-supported" is 'true'
name	'admin-define' out-of-band value	any 'name' value matches
any	same type	each value matches an "xxx-supported" value of the same type

153

154 For additional non-normative explanatory information see section 3.1.2.3 of the "Internet Printing  
 155 Protocol/1.1: Implementer's Guide" [ipp-iig]).

- 156 4. Any value of the proper attribute syntax: the Set-Printer-Attributes or Set-Job-Attributes operation  
 157 accepts any value of the specified attribute syntax. The attribute syntaxes supported are  
 158 enumerated below.
- 159 a. Any text(127)
  - 160 b. Any name(127)
  - 161 c. Any uri
  - 162 d. Any boolean
  - 163 e. Any positive integer
  - 164 f. Any dateTime
  - 165 g. 1setOf any uri
- 166 5. Combination of 'Any of "xxx-supported"' or 'Any name'.

168 If a Printer implementation doesn't want to allow setting values indicated in this Appendix as "any xxx",  
 169 it can make the value be not-settable.

170

**Table 7 - Values allowed for Job Template Attributes in the Set-Job-Attributes Operation**

Job Template Attributes	Values allowed for Set
job-priority (integer(1:100))	Any of "xxx-supported"
job-hold-until (type3 keyword   name (MAX))	Any of "xxx-supported"
job-sheets (type3 keyword   name(MAX))	Any of "xxx-supported"
multiple-document-handling (type2 keyword)	Any of "xxx-supported"
copies (integer(1:MAX))	Any of "xxx-supported"
finishings (1setOf type2 enum)	Any of "xxx-supported"
page-ranges (1setOf rangeOfInteger (1:MAX))	Any of "xxx-supported"
sides (type2 keyword)	Any of "xxx-supported"
number-up (integer(1:MAX))	Any of "xxx-supported"
orientation-requested (type2 enum)	Any of "xxx-supported"
media (type3 keyword   name(MAX))	Any of "xxx-supported"
printer-resolution (resolution)	Any of "xxx-supported"
print-quality (type2 enum)	Any of "xxx-supported"

171

172

**Table 8 - Values allowed for Job Description Attributes in the Set-Job-Attributes Operation**

Job Description Attributes	Values allowed for Set
job-uri (uri)	READ-ONLY
job-id (integer(1:MAX))	READ-ONLY
job-printer-uri (uri)	READ-ONLY
job-more-info (uri)	READ-ONLY
job-name (name(MAX))	Any name(MAX)
job-originating-user-name (name(MAX))	READ-ONLY
job-state (type1 enum)	READ-ONLY
job-state-reasons (1setOf type2 keyword)	READ-ONLY
job-state-message (text(MAX))	READ-ONLY
job-detailed-status-messages (1setOf text(MAX))	READ-ONLY
job-document-access-errors (1setOf text(MAX))	READ-ONLY
number-of-documents (integer(0:MAX))	READ-ONLY
output-device-assigned (name(127))	READ-ONLY
time-at-creation (integer(MIN:MAX))	READ-ONLY
time-at-processing (integer(MIN:MAX))	READ-ONLY
time-at-completed (integer(MIN:MAX))	READ-ONLY
job-printer-up-time (integer(1:MAX))	READ-ONLY
date-time-at-creation (dateTime)	READ-ONLY
date-time-at-processing (dateTime)	READ-ONLY
date-time-at-completed (dateTime)	READ-ONLY
number-of-intervening-jobs (integer(0:MAX))	READ-ONLY
job-message-from-operator (text(127))	Any text(127)
job-k-octets (integer(0:MAX))	READ-ONLY
job-impressions (integer(0:MAX))	READ-ONLY
job-media-sheets (integer(0:MAX))	READ-ONLY
job-k-octets-processed (integer(0:MAX))	READ-ONLY
job-impressions-completed (integer(0:MAX))	READ-ONLY
job-media-sheets-completed (integer(0:MAX))	READ-ONLY
attributes-charset (charset)	READ-ONLY
attributes-natural-language (naturalLanguage)	READ-ONLY

173

174  
175**Table 9 - Values allowed for Printer Job Template Attributes in the Set-Printer-Attributes Operation**

Printer Job Template Attributes	Values allowed for Set
job-priority-default (integer(1:100))	Any of "xxx-supported"
job-hold-until-default (type3 keyword   name (MAX))	Any of "xxx-supported"
job-sheets-default (type3 keyword   name(MAX))	Any of "xxx-supported"
multiple-document-handling-default (type2 keyword)	Any of "xxx-supported"
copies-default (integer(1:MAX))	Any of "xxx-supported"
finishings-default (1setOf type2 enum)	Any of "xxx-supported"
sides-default (type2 keyword)	Any of "xxx-supported"
number-up-default (integer(1:MAX))	Any of "xxx-supported"
orientation-requested-default (type2 enum)	Any of "xxx-supported"
media-default (type3 keyword   name(MAX))	Any of "xxx-supported"
printer-resolution-default (resolution)	Any of "xxx-supported"
print-quality-default (type2 enum)	Any of "xxx-supported"
job-priority-supported (integer(1:100))	From Get-Printer-Supported-Values
job-hold-until-supported (1setOf(type3 keyword   name (MAX)))	From Get-Printer-Supported-Values
job-sheets-supported (1setOf(type3 keyword   name(MAX)))	From Get-Printer-Supported-Values
multiple-document-handling-supported (1setOf type2 keyword)	From Get-Printer-Supported-Values
copies-supported (rangeOfInteger(1:MAX))	From Get-Printer-Supported-Values
finishings-supported (1setOf type2 enum)	From Get-Printer-Supported-Values
page-ranges-supported (boolean)	From Get-Printer-Supported-Values
sides-supported (1setOf type2 keyword)	From Get-Printer-Supported-Values
number-up-supported (1setOf (integer(1:MAX)   rangeOfInteger(1:MAX)))	From Get-Printer-Supported-Values
orientation-requested-supported (1setOf type2 enum)	From Get-Printer-Supported-Values
media-supported (1setOf (type3 keyword   name(MAX)))	From Get-Printer-Supported-Values
printer-resolution-supported (1setOf resolution)	From Get-Printer-Supported-Values
print-quality-supported (1setOf type2 enum)	From Get-Printer-Supported-Values
media-ready (type3 keyword   name(MAX))	From Get-Printer-Supported-Values

176  
177  
178**Table 10 - Values allowed for Printer Description Attributes in the Set-Printer-Attributes Operation**

Printer Description Attributes	Values allowed for Set
printer-uri-supported (1setOf uri)	READ-ONLY
uri-authentication-supported (1setOf type2 keyword)	READ-ONLY
uri-security-supported (1setOf type2 keyword)	READ-ONLY
printer-xri-supported (1setOf collection) member attributes:	
xri-uri (uri)	any uriScheme of "xri-uri-scheme-supported" from Get-Printer-Attributes
xri-authentication (1setOf type2 keyword)	any keyword of "xri-authentication-supported" from Get-Printer-Attributes
xri-security (1setOf type2 keyword)	any keyword of "xri-security-supported" from Get-Printer-Attributes
xri-uri-scheme-supported (1setOf uriScheme)	READ-ONLY
xri-authentication-supported (1setOf type2 keyword)	READ-ONLY
xri-security-supported (1setOf type2 keyword)	READ-ONLY
printer-name (name(127))	Any name(127)
printer-location (text(127))	Any text(127)
printer-info (text(127))	Any text(127)
printer-more-info (uri)	Any uri
printer-driver-installer (uri)	Any uri
printer-make-and-model (text(127))	Any text(127)
printer-more-info-manufacturer (uri)	Any uri
printer-state (type1 enum)	READ-ONLY
printer-state-reasons (1setOf type2 keyword)	READ-ONLY
printer-state-message (text(MAX))	READ-ONLY
ipp-versions-supported (1setOf type2 keyword)	From Get-Printer-Supported-Values
operations-supported (1setOf type2 enum)	From Get-Printer-Supported-Values
multiple-document-jobs-supported (boolean)	From Get-Printer-Supported-Values
charset-configured (charset)	Any of "xxx-supported", use "charset-supported"
charset-supported (1setOf charset)	From Get-Printer-Supported-Values
natural-language-configured (naturalLanguage)	Any of "xxx-supported", use "generated-natural-language-supported"

Printer Description Attributes	Values allowed for Set
generated-natural-language-supported (1setOf naturalLanguage)	From Get-Printer-Supported-Values
document-format-default (mimeMediaType)	Any of "xxx-supported"
document-format-supported (1setOf mimeMediaType)	From Get-Printer-Supported-Values
printer-is-accepting-jobs (boolean)	READ-ONLY
queued-job-count (integer(0:MAX))	READ-ONLY
printer-message-from-operator (text(127))	Any text(127)
color-supported (boolean)	From Get-Printer-Supported-Values
reference-uri-schemes-supported (1setOf uriScheme)	From Get-Printer-Supported-Values
pdl-override-supported (type2 keyword)	From Get-Printer-Supported-Values
printer-up-time (integer(1:MAX))	READ-ONLY
printer-current-time (dateTime)	Any dateTime **
multiple-operation-time-out (integer(1:MAX))	any positive integer
compression-supported (1setOf type3 keyword)	From Get-Printer-Supported-Values
job-k-octets-supported (rangeOfInteger(0:MAX))	From Get-Printer-Supported-Values
job-impressions-supported (rangeOfInteger(0:MAX))	From Get-Printer-Supported-Values
job-media-sheets-supported (rangeOfInteger(0:MAX))	From Get-Printer-Supported-Values
pages-per-minute (integer(0:MAX))	READ-ONLY
pages-per-minute-color (integer(0:MAX))	READ-ONLY
printer-settable-attributes-supported (1setOf type2 keyword)	From Get-Printer-Supported-Values
job-settable-attributes-supported (1setOf type2 keyword)	From Get-Printer-Supported-Values
document-format-varying-attributes (1setOf type2 keyword)	READ-ONLY
printer-message-time (integer(MIN:MAX))	READ-ONLY
printer-message-date-time(dateTime)	READ-ONLY

179

180

181

\*\* - The "printer-current-time" (dateTime) attribute is settable in order to allow an administrator to correct an incorrect dateTime or time zone.

182

## 17 Appendix B: Attributes returned from Get-Printer-Supported-Values

183

184

This Appendix is a normative part of this document and lists all the attributes that are possible for an implementation to return in a Get-Printer-Supported-Values response, i.e., all the "xxx-supported"

185 attributes that can be supplied in a Set-Printer-Attributes request. READ-ONLY attributes MUST  
 186 NOT be returned in a Get-Printer-Supported-Values response and are indicated in the tables as "READ-  
 187 ONLY - MUST NOT be returned."

188 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be a  
 189 single integer value in the range specified by the value returned by the Get-Printer-Supported-Values  
 190 operation.

191 **Table 11 - Printer Job Template Attributes returned from Get-Printer-Supported-Values**

Printer Job Template Attributes	Values Returned
job-priority-supported (integer(1:100))	rangeOfInteger(1:100)

192 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be a  
 193 single rangeOfInteger value whose bounds do not exceed those of the range specified by the value  
 194 returned by the Get-Printer-Supported-Values operation.  
 195

196 **Table 12 - Printer Job Template Attributes returned from Get-Printer-Supported-Values**

Printer Job Template Attributes	Values Returned
copies-supported (rangeOfInteger(1:MAX))	rangeOfInteger(1:MAX)

197  
 198 The following table has the same criteria as the last, but is for Printer Description attributes.

199 **Table 13 - Printer Description Attributes returned from Get-Printer-Supported-Values**

Printer Description Attributes	Values allowed for Set
job-k-octets-supported (rangeOfInteger(0:MAX))	rangeOfInteger(0:MAX)
job-impressions-supported (rangeOfInteger(0:MAX))	rangeOfInteger(0:MAX)
job-media-sheets-supported (rangeOfInteger(0:MAX))	rangeOfInteger(0:MAX)

200 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be one or  
 201 more integers and rangeOfInteger values, such that the integer values described by these integers and  
 202 rangeOfInteger is the same as or a subset of the integers described by the integers and rangeOf Integer  
 203 of value returned by the Get-Printer-Supported-Values operation.  
 204

205 **Table 14 - Printer Job Template Attributes returned from Get-Printer-Supported-Values**

Printer Job Template Attributes	Values Returned
number-up-supported (1setOf (integer(1:MAX)   rangeOfInteger(1:MAX)))	1setOf (integer(1:MAX)   rangeOfInteger(1:MAX))

206

207 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be one or  
 208 more values, where each such value matches a value returned by the Get-Printer-Supported-Values  
 209 operation. A keyword, enum, boolean, charset, naturalLanguage, uriScheme, mimeType or  
 210 resolution value matches if it is equal. For Job Template attributes with the attribute syntax 'type3  
 211 keyword | name', any 'name' attribute syntax value matches the 'admin-define' out-of-band value, if the  
 212 implementation allows the administrator to set any name values for the attribute.

213 **Table 15 - Printer Job Template Attributes returned from Get-Printer-Supported-Values**

Printer Job Template Attributes	Values Returned
job-hold-until-supported (1setOf(type3 keyword   name (MAX)))	1setOf (type3 keyword   'admin-define')
job-sheets-supported (1setOf(type3 keyword   name(MAX)))	1setOf (type3 keyword   'admin-define')
multiple-document-handling-supported (1setOf type2 keyword)	1setOf type2 keyword
finishings-supported (1setOf type2 enum)	1setOf type2 enum
page-ranges-supported (boolean)	1setOf boolean **
sides-supported (1setOf type2 keyword)	1setOf type2 keyword
orientation-requested-supported (1setOf type2 enum)	1setOf type2 enum
media-supported (1setOf (type3 keyword   name(MAX)))	1setOf (type3 keyword   'admin-define')
printer-resolution-supported (1setOf resolution)	1setOf resolution
print-quality-supported (1setOf type2 enum)	1setOf type2 enum

214 \*\* Note: the Get-Printer-Supported-Values returns a '1setOf boolean' so that all possible values are  
 215 indicated, while Get-Printer-Attributes returns only a single 'boolean' value.

216 The following table has the same criteria as the last, but is for Printer Description attributes.

217

**Table 16 - Printer Description Attributes returned from Get-Printer-Supported-Values**

Printer Description Attributes	Values allowed for Set
printer-uri-supported (1setOf uri)	READ-ONLY - MUST NOT be returned
uri-authentication-supported (1setOf type2 keyword)	READ-ONLY - MUST NOT be returned
uri-security-supported (1setOf type2 keyword)	READ-ONLY - MUST NOT be returned
printer-xri-supported (1setOf collection)	MUST NOT be returned; see next three attributes returned with Get-Printer-Attributes:
xri-uri-scheme-supported (1setOf uriScheme)	READ-ONLY - MUST NOT be returned
xri-authentication-supported (1setOf type2 keyword)	READ-ONLY - MUST NOT be returned
xri-security-supported (1setOf type2 keyword)	READ-ONLY - MUST NOT be returned
ipp-versions-supported (1setOf type2 keyword)	1setOf type2 keyword
operations-supported (1setOf type2 enum)	1setOf type2 keyword
multiple-document-jobs-supported (boolean)	1setOf boolean **
charset-supported (1setOf charset)	1setOf charset
generated-natural-language-supported (1setOf naturalLanguage)	1setOf naturalLanguage
document-format-supported (1setOf mimeType)	1setOf mimeType
color-supported (boolean)	1setOf boolean **
reference-uri-schemes-supported (1setOf uriScheme)	1setOf uriScheme
pdl-override-supported (type2 keyword)	1setOf type2 keyword **
compression-supported (1setOf type3 keyword)	1setOf type3 keyword
printer-settable-attributes-supported (1setOf type2 keyword)	1setOf type2 keyword
job-settable-attributes-supported (1setOf type2 keyword)	1setOf type2 keyword

218

\*\* Note: the Get-Printer-Supported-Values returns a '1setOf X' so that all possible values are indicated, while Get-Printer-Attributes returns only a single 'X' value.

219

220

## 18 Appendix C: Description of the Base IPP Documents

221

The base set of IPP documents includes:

222

Design Goals for an Internet Printing Protocol [RFC2567]

223

Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]

224

Internet Printing Protocol/1.1: Model and Semantics [RFC2911]

225

Internet Printing Protocol/1.1: Encoding and Transport [RFC2910]

226

Internet Printing Protocol/1.1: Implementer's Guide [IPP-IIG]

227 Mapping between LPD and IPP Protocols [RFC2569]

228

229 The "Design Goals for an Internet Printing Protocol" document takes a broad look at distributed  
230 printing functionality, and it enumerates real-life scenarios that help to clarify the features that need to  
231 be included in a printing protocol for the Internet. It identifies requirements for three types of users:  
232 end users, operators, and administrators. It calls out a subset of end user requirements that are satisfied  
233 in IPP/1.0 [RFC2566, RFC2565]. A few OPTIONAL operator operations have been added to IPP/1.1  
234 [RFC2911, RFC2910].

235 The "Rationale for the Structure and Model and Protocol for the Internet Printing Protocol" document  
236 describes IPP from a high level view, defines a roadmap for the various documents that form the suite of  
237 IPP specification documents, and gives background and rationale for the IETF IPP working group's  
238 major decisions.

239 The "Internet Printing Protocol/1.1: Model and Semantics" document describes a simplified model with  
240 abstract objects, their attributes, and their operations. The model introduces a Printer and a Job. The  
241 Job supports multiple documents per Job. The model document also addresses how security,  
242 internationalization, and directory issues are addressed.

243 The "Internet Printing Protocol/1.1: Encoding and Transport" document is a formal mapping of the  
244 abstract operations and attributes defined in the model document onto HTTP/1.1 [RFC2616]. It also  
245 defines the encoding rules for a new Internet MIME media type called "application/ipp". This document  
246 also defines the rules for transporting over HTTP a message body whose Content-Type is  
247 "application/ipp". This document defines the 'ipp' scheme for identifying IPP printers and jobs.

248 The "Internet Printing Protocol/1.1: Implementer's Guide" document gives insight and advice to  
249 implementers of IPP clients and IPP objects. It is intended to help them understand IPP/1.1 and some  
250 of the considerations that may assist them in the design of their client and/or IPP object  
251 implementations. For example, a typical order of processing requests is given, including error checking.  
252 Motivation for some of the specification decisions is also included.

253 The "Mapping between LPD and IPP Protocols" document gives some advice to implementers of  
254 gateways between IPP and LPD (Line Printer Daemon) implementations.

## 255 **19 Appendix D: Full Copyright Statement**

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