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## 11 Internet Printing Protocol (IPP): Job and Printer Set Operations

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### 23 Abstract

24 This document specifies 3 additional OPTIONAL operations for use with the Internet Printing Protocol/1.0  
25 (IPP) [RFC2565, RFC2566], IPP/1.1 [ipp-mod, ipp-pro], and future versions. The first is the Set-Printer-  
26 Attributes operation that operators/administrators may perform on a Printer object to change Printer  
27 attribute values. The second is the Set-Job-Attributes operation that end-users may perform on their jobs  
28 and operators/administrators may perform on any job, depending on circumstances. The operation changes  
29 the Job attribute values. The third is the Get-Printer-Supported-Values operation that  
30 operators/administrators may perform on a Printer object in order to determine acceptable values for setting  
31 "xxx-supported" attributes using the Set-Printer-Attributes operation.

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

34 Two operation attributes: "printer-message-from-operator" (text) and "job-message-from-operator" (text)  
35 are defined to set the corresponding IPP/1.1 Printer and Job Description attributes with the same names. A  
36 new out-of-band value 'any-value' is added which may be used with any attribute syntax if an attribute  
37 definition allows. The 'any-value' value used with the 'name' attribute syntax can be (one of) the values of

38 "xxx-supported" attributes whose attribute syntaxes include both 'keyword' and 'name'. The 'any-value'  
39 value with the 'name' attribute syntax matches any name supplied by the client during validation.

40 New Printer Description attributes are defined:

41 printer-settable-attributes-supported (1setOf type2 keyword)

42 job-settable-attributes-supported (1setOf type2 keyword)

43 document-format-varying-attributes (1setOf type2 keyword)

44 printer-message-time (integer(MIN:MAX))

45 printer-message-date-time (dateTime)

46 A new status code is defined: 'client-error-attributes-not-settable'.

47 A 'delete-attribute' out-of-band attribute value is defined for use by the client in the Set-Job-Attributes  
48 request to indicate explicitly that the Printer is to remove the specified attribute from the Job object.

49 Finally, the 'not-settable' out-of-band attribute value is defined for returning in the Set-Printer-Attributes  
50 and Set-Job-Attributes operation responses.

51 The scope of IPP is characterized in RFC2526 "Design Goals for an Internet Printing Protocol". It is not  
52 the intent of this document to revise or clarify this scope or conjecture as to the degree of industry adoption  
53 or trends related to IPP within printing systems. It is the intent of this document to extend the original set  
54 of operations - in a similar fashion to the Set1 extensions which referred to IPP/1.0 and were later  
55 incorporated into IPP/1.1.

56 The full set of IPP documents includes:

- 57 Design Goals for an Internet Printing Protocol [RFC2567]
- 58 Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
- 59 Internet Printing Protocol/1.1: Model and Semantics (this document)
- 60 Internet Printing Protocol/1.1: Encoding and Transport [IPP-PRO]
- 61 Internet Printing Protocol/1.1: Implementer's Guide [IPP-IIG]
- 62 Mapping between LPD and IPP Protocols [RFC2569]

63

64 The "Design Goals for an Internet Printing Protocol" document takes a broad look at distributed printing  
65 functionality, and it enumerates real-life scenarios that help to clarify the features that need to be included  
66 in a printing protocol for the Internet. It identifies requirements for three types of users: end users,  
67 operators, and administrators. It calls out a subset of end user requirements that are satisfied in IPP/1.0. A  
68 few OPTIONAL operator operations have been added to IPP/1.1.

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

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

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

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

85

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## 151 **1 Introduction**

152 The Internet Printing Protocol (IPP) is an application level protocol that can be used for distributed printing  
153 using Internet tools and technologies. IPP version 1.1 [ipp-mod, ipp-pro] focuses on end user functionality  
154 with a few administrative operations included. This document defines additional OPTIONAL end user,  
155 operator, and administrator Set-Job-Attributes and Set-Printer-Attributes operations used to modify IPP Job  
156 objects and Printer objects. It also defines a third Get-Printer-Supported-Values operation that returns  
157 values that the IPP Printer will accept for setting its "xxx-supported" attributes. The Get-Printer-Supported-  
158 Values operation MUST be supported, if the Set-Printer-Attributes operation is supported.

159 This document is an extension to IPP/1.0 [RFC2565, RFC2566] and IPP/1.1 [ipp-mod, ipp-pro], and future  
160 versions.

## 161 **2 Terminology**

162 This section defines terminology used throughout this document.

### 163 **2.1 Conformance Terminology**

164 Capitalized terms, such as MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, MAY, NEED  
165 NOT, and OPTIONAL, have special meaning relating to conformance. These terms are defined in [ipp-  
166 mod] section 12.1 on conformance terminology, most of which is taken from RFC 2119 [RFC2119].

167 The following specialization of these terms apply to this document:

168     **REQUIRED:** if an implementation supports the extensions described in this document, it MUST  
169     support a REQUIRED feature.

170     **OPTIONAL:** if an implementation supports the extensions described in this document, it MAY support  
171     an OPTIONAL feature.

### 172 **2.2 Other terminology**

173 This document uses terms such as Job object (or Job), IPP Printer object (or Printer), "operation", "request",  
174 "response", "attributes", "keywords", and "support". These terms have special meaning and are defined in  
175 the model terminology [ipp-mod] section 12.2. The following additional terms are introduced in this  
176 document:

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

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

### 181 3 Requirements and Use Cases

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

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

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

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

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

190 Usage: The system administrator is adding additional media to the supported media list.

191 The system administrator is reducing the capability of the IPP Printer by removing one of the operations  
192 from the supported operations list, such as Cancel-Job, because the policy is to run the IPP Printer like a  
193 public facsimile machine.

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

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

### 199 4 Definition of the Set operations

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

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

211 The Set Printer operations are summarized in Table 1:

212

**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

213

**4.1 Set-Printer-Attributes Operation**

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This OPTIONAL operation allows a client to set the values of the attributes of a Printer object. In the request, the client supplies the set of Printer attribute name keywords and values that are to be set. In the response, the Printer object returns success or rejects the entire request with indications of which attribute or attributes could not be set.

218

219

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

220

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225

1. The number of attributes supplied by the client MUST NOT exceed the maximum number that the Printer supports in a Set-Printer-Attributes request. A Printer MUST accept at least one attribute, but SHOULD accept a reasonable number in a single Set-Printer-Attributes request. If a Printer supports setting the three "parallel" Printer Description attributes ("printer-uri-supported", "uri-authentication-supported", and "uri-security-supported" (see [ipp-mod] sections 4.4.1 through 4.4.3), then the Printer MUST accept at least three attributes in a Set-Printer-Attributes request.

226

227

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

228

2. The Printer MUST support the attribute.

229

230

231

3. The attribute MUST NOT be READ-ONLY, i.e., the definition of the attribute MUST NOT indicate that the attribute is READ-ONLY (see Appendix A for an indication of which IPP/1.1 attributes are READ-ONLY).

232

4. The attribute MUST be settable in this implementation.

233

5. The Printer MUST support the value according to the rules defined in Appendix A.

234

235

6. The attribute's values MUST NOT conflict with other Printer attribute, including ones being set in this same operation.

236

237

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239

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



240 The Printer MUST accept this operation when its READ-ONLY "printer-state" attribute (see [ipp-mod]  
241 section 4.4.11) is 'idle' or 'stopped', and SHOULD accept it when the value is 'processing'. The Printer  
242 MUST accept this operation for any of the values of the Printer object's READ-ONLY "printer-state-  
243 reasons" and "printer-is-accepting-jobs" attributes, unless explicitly defined otherwise in the definition of  
244 these attributes' values.

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

#### 254 4.1.1 Settable and READ-ONLY Printer Description attributes

255 If the Printer supports the Set-Printer-Attributes operation, then it SHOULD support setting of:

- 256 all Job Template Default ("xxx-default") attributes
- 257 all Job Template Supported ("xxx-supported") attributes
- 258 all Job Template Ready ("xxx-ready") attributes

259 that the implementation supports (see [ipp-mod] section 4.2 and extensions).

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

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

267 If "xxx-supported" Printer Description attribute are settable, then they MUST affect the behavior of the  
268 implementation. If they are READ-ONLY then they reflect the implementation and cannot be changed  
269 explicitly using the Set-Printer-Attributes operation. Consider the following example:

270 For example, if the "operations-supported" Printer Description attribute (see [ipp-mod] section  
271 4.4.15) is settable in a particular implementation, then changing its value with a Set-Printer-  
272 Attributes operation MUST affect the operations that the implementation accepts or rejects. Such  
273 an implementation will need to be able to reject values for operations that it contains no code  
274 support for (see section 5). If the "operations-supported" Printer Description attribute is not settable  
275 in a particular implementation, then that implementation MUST reject an attempt to set it with a  
276 Set-Printer-Attributes operation, return the 'client-error-attributes-not-settable' status code (see

277 section 7.1), and return the "operations-supported" attribute with the out-of-band 'not-settable' value  
278 in the Unsupported Attributes Group.

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

#### 284 **4.1.2 Set-Printer-Attributes Request**

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

##### 286 Group 1: Operation Attributes

###### 287 Natural Language and Character Set:

288 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]  
289 section 3.1.4.1.

###### 290 Target:

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

###### 293 Requesting User Name:

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

###### 296 "document-format" (mimeMediaType):

297 The client OPTIONALLY supplies this attribute. The Printer object MUST support this attribute.  
298 This attribute is useful for a client to select the document-format to which the attribute modification  
299 should be applied. A Printer implementation MAY allow some attributes to have different values  
300 for each document format that it supports. See [ipp-mod] section 3.2.5.1 "Get-Printer-Attributes  
301 Request".

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

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

311

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

#### 324 Group 2: Printer Attributes

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

### 335 4.1.3 Set-Printer-Attributes Response

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

#### 337 Group 1: Operation Attributes

##### 338 Status Message:

339 In addition to the REQUIRED status code returned in every response, the response OPTIONALLY  
340 includes a "status-message" (text(255)) and/or a "detailed-status-message" (text(MAX)) operation  
341 attribute as described in [ipp-mod] sections 13 and 3.1.6.  
342

##### 343 Natural Language and Character Set:

344 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]  
345 section 3.1.4.2.  
346

#### 347 Group 2: Unsupported Attributes

348 See [ipp-mod] section 3.1.7 for details on returning Unsupported Attributes.  
349

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

- 355 1. The number of attributes supplied by the client exceeds the maximum number that the  
356 Printer supports in a Set-Printer-Attributes request: return the 'client-error-request-entity-  
357 too-large' (see [ipp-mod] section 13.1.4.9).
- 358 2. The Printer doesn't support the attribute: return the attribute with the "out-of-band" value  
359 'unsupported' (see [ipp-mod] section 3.1.7 and [ipp-pro]) and the 'client-error-attributes-or-  
360 values-not-supported' (see [ipp-mod] section 13.1.4.12).
- 361 3. The attribute is either READ-ONLY (in its definition) or is not-settable in this  
362 implementation: return the attribute with the "out-of-band" value 'not-settable' (see section  
363 8.1) and the 'client-error-attributes-not-settable' status code (see section 7.1).
- 364 4. The Printer doesn't support the value: if the attribute in the operation has a single value  
365 return it. If the attribute in the operation is multi-valued, return only those values in a 1setOf  
366 that are not supported. Return the 'client-error-attributes-or-values-not-supported' status  
367 code (see [ipp-mod] section 13.1.4.12).
- 368 5. The values of some of the supplied attributes conflict with one another and/or other Printer  
369 attribute values not being set: if the conflicting attribute in the operation has a single value  
370 return the attribute and the value. If the attribute in the operation is multi-valued, return only  
371 the attribute and those values in a 1setOf that are conflicting with other attributes. Return  
372 the 'client-error-conflicting-attributes' status code (see [ipp-mod] section 13.1.4.15).

## 373 4.2 Set-Job-Attributes Operation

374 This OPTIONAL operation allows a client to set the values of the attributes of a Job object. In the request,  
375 the client supplies the set of Job attribute name keywords and values that are to be set. In the response, the  
376 IPP object returns success or rejects the entire request with indications of which attribute or attributes could  
377 not be set.

378 This operation is almost identical to the Set-Printer-Attributes operation (see section 4.1). The only  
379 differences are that the Set-Job-Attributes operation is directed at a Job object rather than a Printer object,  
380 there is no "document-format" operation attribute used when setting a Job object, the operation can add an  
381 attribute to the (Job) object, the 'delete-attributes' out-of-band value is permitted to remove an attribute, and  
382 the validation is the same as the Job Creation operations (Print-Job, Print-URI, and Create-Job), i.e.,  
383 depends on the "xxx-supported" Printer Description attributes (see [ipp-mod] section 3.1).

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

386 If the client supplies a job attribute with the "out-of-band" value 'delete-attribute' (see section 8.2), then the  
387 Printer MUST remove the attribute and all of its values from the Job object, if present. The semantic effect  
388 of the client supplying the 'delete-attribute' value in a Set-Job-Attributes operation MUST be the same as if  
389 the attribute had not been supplied with the Job object in the Job Creation operation, i.e., the Printer applies  
390 its default attribute or behavior with lower precedence than the PDL (see the beginning of [ipp-mod] section

391 4.2 and [ipp-mod] 3.2.1.1). Any subsequent query of the Job object using Get-Job-Attributes or Get-Jobs  
 392 MUST NOT return any attribute that has been deleted using the 'delete-attribute' out-of-band value.  
 393 However, a client can re-establish such a deleted Job attribute with any supported value(s) using a  
 394 subsequent Set-Job-Attributes operation.

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

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

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

413

**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'

414

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

#### 419 **4.2.1 Settable and READ-ONLY Job Description attributes**

420 If the Printer supports the "job-message-from-operator" Job Description attribute (see [ipp-mod] section  
421 4.3.16) and the client explicitly supplies a new value for the "job-message-from-operator" in the Set-Job-  
422 Attributes request, then the Printer MUST set the "job-message-from-operator" Job attribute to this new  
423 value.

424 If the Printer supports the Set-Job-Attributes operation, then it SHOULD support setting of:

425 all Job Template job ("xxx") attributes

426 that the implementation supports (see [ipp-mod] section 4.2 and extensions).

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

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

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

#### 437 **4.2.2 Set-Job-Attributes Request**

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

439 Group 1: Operation Attributes

440 Natural Language and Character Set:

441 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]  
442 section 3.1.4.1.

443

444 Target:

445 Either (1) the "printer-uri" (uri) plus "job-id" (integer(1:MAX)) or (2) the "job-uri" (uri) operation  
446 attribute(s) which define the target for this operation as described in [ipp-mod] section 3.1.5.

447

448 Requesting User Name:

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

451

452 Group 2: Job Attributes

453 The client MUST supply a set of Job attributes with one or more values (including explicitly  
454 allowed out-of-band values) as defined in [ipp-mod] section 4.2 Job Template Attributes ("xxx"  
455 attributes), section 4.3 Job Description Attributes, and any attribute extensions supported by the  
456 Printer. The value(s) of each Job attribute supplied in Group 2 replaces the value(s) of the  
457 corresponding Job attribute on the target Job object. For attributes that can have multiple values  
458 (1setOf), all values supplied by the client replace all values of the corresponding Job object  
459 attribute.

460

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

463

#### 464 **4.2.3 Set-Job-Attributes Response**

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

466 Group 1: Operation Attributes

467 Status Message:

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

471

472 Natural Language and Character Set:

473 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]  
474 section 3.1.4.2.

475

476 Group 2: Unsupported Attributes

477 See [ipp-mod] section 3.1.7 for details on returning Unsupported Attributes.

478

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

484

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

- 487           2. The Printer doesn't support the attribute: return the attribute with the "out-of-band" value  
488 'unsupported' (see [ipp-mod] section 3.1.7 and [ipp-pro]) and the 'client-error-attributes-or-  
489 values-not-supported' (see [ipp-mod] section 13.1.4.12).
- 490           3. The attribute is READ-ONLY (in its definition) or is not-settable in this implementation:  
491 return the attribute with the "out-of-band" value 'not-settable' (see section 8.1) and the  
492 'client-error-attributes-not-settable' status code (see section 7.1).
- 493           4. The Printer doesn't support the value: if the attribute in the operation has a single value  
494 return it. If the attribute in the operation is multi-valued, return only those values in a 1setOf  
495 that are not supported. Return the 'client-error-attributes-or-values-not-supported' status  
496 code (see [ipp-mod] section 13.1.4.12).
- 497           5. The values of some of the supplied attributes conflict with one another and/or other Job  
498 attribute values not being set: if the conflicting attribute in the operation has a single value  
499 return the attribute and the value. If the attribute in the operation is multi-valued, return only  
500 the attribute and those values in a 1setOf that are conflicting with other attributes. Return  
501 the 'client-error-conflicting-attributes' status code (see [ipp-mod] section 13.1.4.15).

### 502 **4.3 Get-Printer-Supported-Values Operation**

503 This OPTIONAL operation allows a client to request the values that the Printer allows in the Set-Printer-  
504 Attributes operation for "xxx-supported" attributes. If the Printer supports the Set-Printer-Attributes  
505 operation AND some of its "xxx-supported" Printer attributes are settable, then the Printer MUST also  
506 support this operation. This operation has identical request/response attributes to the Get-Printer-Attributes  
507 operation in IPP/1.1 [ipp-mod]. The operation also behaves identically to the Get-Printer-Attributes  
508 operation in IPP/1.1 [ipp-mod] with the following exceptions:

- 509           1. The Get-Printer-Supported-Values operation supports only "xxx-supported" attributes.
- 510           2. The Get-Printer-Attributes operation returns the current value of specified attributes while the Get-  
511 Printer-Supported-Values operation returns values that permit a client to determine what values of  
512 "xxx-supported" attributes the Printer supports in the Set-Printer-Attributes operation.
- 513           3. The Get-Printer-Supported-Values operation does not return any 'name' attribute syntax values for  
514 any "xxx-supported" attributes. Instead, if the Set-Printer-Attributes operation will accept (any)  
515 name value for an "xxx-supported" attribute, then the Get-Printer-Supported-Values operation  
516 MUST return the 'any-value' out-of-band attribute value with the 'name' attribute syntax (see section  
517 8.3) as one of the values of the "xxx-supported" attribute. In other words, the 'any-value' out-of-  
518 band attribute value used in combination with the 'name' attribute syntax indicates that the Printer  
519 implementation supports clients setting 'name' attribute syntax values for "xxx-supported" attributes  
520 that are defined with the 'name' attribute syntax.

521 For example, if the Get-Printer-Supported-Values operation returns several keywords as the value of the  
522 "media-supported" attribute, then the Set-Printer-Attributes operation MUST accept any of these keywords



523 as values for the "media-supported" attribute. If the Get-Printer-Supported-Values operation returns an  
524 'any-value' out-of-band attribute value with the 'name' attribute syntax as one of the values of the "media-  
525 supported" attribute, then the Set-Printer-Attributes operation **MUST** accept any value whose attribute  
526 syntax is 'name' as values for the "media-supported" attribute.

527 The Get-Printer-Supported-Values **MAY** return the 'any-value' out-of-band attribute value in combination  
528 with the 'name' attribute syntax for any of the following IPP/1.1 attributes in which case the Printer **MUST**  
529 accept any 'name' value in a Set-Printer-Attributes operation that is setting that attribute:

530       media-supported  
531       job-hold-until-supported  
532       job-sheets-supported

533 If the 'any-value' out-of-band attribute value in combination with the 'name' attribute syntax is not one of the  
534 values of an "xxx-supported" attribute returned in a Get-Printer-Supported-Values response, then the  
535 Printer **MUST NOT** allow the Set-Printer-Attributes operation for that attribute to contain a value whose  
536 attribute syntax is 'name'.

537 See Appendix B for a full list of values returned by this operation.

## 538 **5 New Operation attributes**

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

### 542 **5.1 "printer-message-from-operator" (text(127))**

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

545       Pause-Printer  
546       Resume-Printer  
547       Purge-Jobs

548 The client **OPTIONALLY** supplies this attribute in the above operations. The value of this attribute is a  
549 message from the operator about the Printer object on which the operator is performing the operation. If  
550 this operation attribute is supported, the Printer copies the value to its "printer-message-from-operator"  
551 Printer Description attribute (see [ipp-mod] section 4.4.25) even if this Operation attribute is a zero-length  
552 text value or consists solely of white space.

553 If the Printer supports this operation attribute, it **MUST** support both a zero-length text value and the 'no-  
554 value' out-of-band value (see [ipp-mod] section 4.1) to indicate that the operator has sent no message. In  
555 this case, the Printer sets the value of the "printer-message-from-operator" to the zero-length value or 'no-

556 value' out-of-band value, respectively. If the client queries the "printer-message-from-operator" Printer  
557 attribute, the Printer returns the attribute with the zero-length value or the 'no-value' value, respectively.

558 In addition, the Printer automatically copies:

- 559 1. the value of its "printer-up-time" attribute (see [ipp-mod] section 4.4.29) to its "printer-message-  
560 time" attribute,
- 561 2. the value of its printer-current-time" (dateTime) attribute (see [ipp-mod] section 4.4.30) to its  
562 "printer-message-date-time" attribute, if supported.

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

565 The "printer-message-from-operator" operation attribute MUST NOT be supported as an operation attribute  
566 for the Set-Printer-Attributes operation. If the operator wants to set the Printer's "printer-message-from-  
567 operator" Printer Description attribute when issuing the Set-Printer-Attributes operation, the client supplies  
568 the "printer-message-from-operator" explicitly with its new value as one of the Printer Description  
569 attributes in Group 2 in the request. The Printer also updates its "printer-message-time" and "printer-  
570 message-date-time" Printer Description attributes. If the client does not explicitly supply the "printer-  
571 message-from-operator" with its new value in the Set-Printer-Attributes request, the Printer leaves the value  
572 of the Printer's "printer-message-from-operator" Printer Description attribute unchanged.

## 573 **5.2 "job-message-from-operator" (text(127))**

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

576 Cancel-Job  
577 Hold-Job  
578 Release-Job  
579 Restart-Job

580 The client OPTIONALLY supplies this attribute in the above operations. The value of this attribute is a  
581 message from the operator about the Job object on which the operator has just performed an operation. If  
582 supported, the Printer copies the value to the Job's "job-message-from-operator" Job Description attribute  
583 (see [ipp-mod] section 4.3.16) (even if this Operation attribute is a zero-length text value or consists solely  
584 of white space).

585 If the Printer supports this operation attribute, it MUST support both a zero-length text value and the 'no-  
586 value' out-of-band value (see [ipp-mod] section 4.1) to indicate that the operator has sent no message. In  
587 this case, the Printer sets the value of the "job-message-from-operator" to the zero-length value or 'no-value'  
588 out-of-band value, respectively. If the client queries the "job-message-from-operator" Job attribute, the IPP  
589 object returns the attribute with the zero-length value or the 'no-value' value, respectively.

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

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

594 The "job-message-from-operator" operation attribute **MUST NOT** be supported as an operation attribute for  
595 the Set-Job-Attributes operation. If the operator wants to set the Job's "job-message-from-operator" Job  
596 Description attribute when issuing the Set-Job-Attributes operation, the client **MUST** supply the "job-  
597 message-from-operator" with its new value as one of the Job Description attributes in Group 2 in the  
598 request. Otherwise, the Printer leaves the value of the Job's "job-message-from-operator" Job Description  
599 attribute unchanged by not explicitly setting the attribute. If the client does not explicitly supply the "job-  
600 message-from-operator" with its new value in the Set-Job-Attributes request, the Printer leaves the value of  
601 the Job's "job-message-from-operator" Job Description attribute unchanged.

## 602 **6 New Printer Description Attributes**

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

### 605 **6.1 printer-settable-attributes-supported (1setOf type2 keyword)**

606 This **REQUIRED READ-ONLY** Printer attribute identifies the Printer object attributes that are settable in  
607 this implementation, i.e., that are settable using the Set-Printer-Attributes operations (see section 4.1). This  
608 attribute **MUST** be supported if the Set-Printer-Attributes operations is supported. The Printer **MUST**  
609 reject attempts to set any Printer attributes that are not one of the values of this attribute, returning the  
610 'client-error-attributes-not-settable' status code (see section 7.1). The value of this attribute **MAY** depend  
611 on the value of the "document-format" operation attribute supplied in the Get-Printer-Attributes operation  
612 (see [ipp-mod] section 3.2.5.1).

613 Standard keyword values are:

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

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

### 616 **6.2 job-settable-attributes-supported (1setOf type2 keyword)**

617 This **REQUIRED READ-ONLY** Printer attribute identifies the Job object attributes that are settable in this  
618 implementation, i.e., that are settable using the Set-Job-Attributes operation (see section 4.2). This attribute  
619 **MUST** be supported if the Set-Job-Attributes operations is supported. The Printer **MUST** reject attempts to  
620 set any Job attributes that are not one of the values of this attribute, returning the 'client-error-attributes-not-  
621 settable' status code (see section 7.1).

622 Standard keyword values are:

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

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

### 625 **6.3 document-format-varying-attributes (1setOf type2 keyword)**

626 This OPTIONAL READ-ONLY Printer Description attribute contains a set of attribute name keywords.  
627 This attribute SHOULD be supported by a Printer object, if the Printer object has Printer attributes whose  
628 value vary depending on document format (see [ipp-mod] Get-Printer-Attributes operation). This attribute  
629 specifies which attribute values can vary by document-format. If an attribute's name "xxx" is a member of  
630 this attribute and the value of attribute "xxx" is changed with the Set-Printer-Attributes operation that  
631 included the "document-format" operation attribute, then the Printer MUST change the value for the  
632 specified document format and no other document formats (see section 4.1.2). If an attribute's name "xxx"  
633 is not a member of this attribute and the value of attribute "xxx" is changed with the Set-Printer-Attributes  
634 operation, then the attribute is changed for all document formats (whether or not the client supplied the  
635 "document-format" operation attribute).

### 636 **6.4 printer-message-time (integer(MIN:MAX))**

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

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

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

### 648 **6.5 printer-message-date-time (dateTime)**

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

654 This attribute MUST be supported if the Printer supports both the "printer-message-time" and the "printer-  
655 current-time" (dateTime) attributes (see [ipp-mod] section 4.4.30).

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

## 658 **7 Additional status codes**

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

### 660 **7.1 'client-error-attributes-not-settable' (0x0413)**

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

## 667 **8 Additional out-of-band values**

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

### 671 **8.1 'not-settable' out-of-band value**

672 The 'not-settable' out-of-band value is used by the IPP Printer in the Unsupported Attributes group of a Set-  
673 Job-Attributes or Set-Printer-Attributes response to indicate that an attribute (supplied by the client) is  
674 READ-ONLY by definition or is not settable in this implementation (see sections 4.1.3 and 4.2.3).

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

#### 677 **8.1.1 Encoding of the 'not-settable' out-of-band attribute value**

678 The encoding of the 'not-settable' out-of-band value is 0x15 (see [ipp-pro]).

### 679 **8.2 'delete-attribute' out-of-band value**

680 The 'delete-attribute' out-of-band value is supplied by the client in the Set-Job-Attributes request to indicate  
681 that the Printer is to remove the supplied attribute and all of its values from the Job object, if present (see  
682 section 4.2).

683 The 'delete-attribute' out-of-band value is defined for use with the Set-Job-Attributes only. Clients MUST  
684 NOT supply and IPP objects MUST NOT support the 'delete-attribute' out-of-band value in other  
685 operations, such as the Set-Printer-Attributes operation, where the absence of an attribute from an IPP  
686 object indicates that the attribute is not supported. If a Printer receives this out-of-band value in other  
687 operations, the Printer MUST reject the entire request and return the 'client-error-bad-request' status code  
688 and not process any of the other supplied attributes.

689 See section 4.2 in this document for an example definition of the usage of the 'delete-attribute' out-of-band  
690 value in the Set-Job-Attributes request.

### 691 **8.2.1 Encoding of the 'delete-attribute' out-of-band value**

692 The encoding of the 'delete-attribute' out-of-band value is 0x16 (see [ipp-pro]).

### 693 **8.3 'any-value' out-of-band attribute value**

694 The 'any-value' out-of-band attribute value MAY be used in combination with an attribute syntax to  
695 represent "any" attribute value of that attribute syntax.

696 See section 4.3 in this document for an example definition of the usage of the 'any-value' out-of-band  
697 attribute value with the 'name' attribute syntax in any "xxx-supported" attribute returned in a Get-Printer-  
698 Supported-Values response.

699

### 700 **8.3.1 Encoding of the 'any-value' out-of-band attribute value**

701 The encoding of the 'any-value' out-of-band attribute value is 0x17 (see [ipp-pro]). This out-of-band value  
702 REQUIRES a non-zero length and an attribute value which identifies an attribute syntax type. The attribute  
703 value is either (1) a one-octet attribute syntax tag as defined in [ipp-pro] (value length = 1) or (2) a 0x7F  
704 code followed by a 4-octets of an extended attribute syntax type code as allocated in [ipp-pro] (value length  
705 = 5).

706 **ISSUE 01 - Ok to define the 'any-value' out-of-band value to have an actual value, consisting of the**  
707 **attribute syntax code?**

## 708 **9 Conformance Requirements**

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

710 Both the Set-Job-Attributes and the Set-Printer-Attributes operations defined in the document are  
711 OPTIONAL for an IPP object to support. Either one MAY be supported without the other or both MAY be  
712 supported. However, if the Set-Printer-Attributes operation is supported, then the Get-Printer-Supported-

713 Values operation **MUST** be supported if any "xxx-supported" attributes are settable. Otherwise, the Get-  
714 Printer-Supported-Values operation is **OPTIONAL** for an IPP Printer to support.

715 If the Set-Printer-Attributes operation is supported, then the Printer **MUST** support the following additional  
716 items:

- 717 1. the Get-Printer-Supported-Values operation (see section 5), if any "xxx-supported" attributes are  
718 settable.
- 719 2. the "printer-settable-attributes-supported" Printer Description attribute (see section 6.1)
- 720 3. the 'not-settable' out-of-band value in responses (see section 8.1)
- 721 4. the 'client-error-not-settable' status code (see section 7.1)
- 722 5. If "printer-message-from-operator" Printer Description attribute is supported (see [ipp-mod]  
723 section 4.4.25), then it **MUST** be settable.
- 724 6. the Get-Printer-Supported-Values operation (see section 4.3), if any "xxx-supported" attributes  
725 are settable.
- 726 7. If a client can set a value with the 'name' attribute syntax for one or more "xxx-supported"  
727 attributes, then the 'any-value' out-of-band attribute value (see section 8.3) **MUST** be supported  
728 in the Get-Printer-Supported-Values response with the 'name' attribute syntax for each such  
729 settable attribute (see section 4.3)

730 If the Set-Job-Attributes operation is supported, then the Printer **MUST** support the following additional  
731 items:

- 732 1. the "job-settable-attributes-supported" Printer Description attribute (see section 6.2)
- 733 2. the 'not-settable' out-of-band value in responses (see section 8.1)
- 734 3. the 'delete-attribute' out-of-band value in requests (see section 8.2)
- 735 4. the 'client-error-not-settable' status code (see section 7.1)
- 736 5. If the "job-message-from-operator" Printer Description attribute is supported (see [ipp-mod]  
737 4.3.16), then it **MUST** be settable.

738 It is **OPTIONAL** for the Printer object to support the "printer-message-time" (integer) and "printer-  
739 message-date-time" (dateTime) Printer Description attributes. If both the "printer-message-time" (integer)  
740 and the "printer-current-time" (dateTime) (see [ipp-mod] section 4.4.30) attributes are supported, then the  
741 "printer-message-date-time" (dateTime) Printer Description attribute **MUST** be supported.

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

744 **10 IANA Considerations**

745 Since this document is intended to be a standards track document, there is no need to also register the  
746 operations, attributes, status codes, and out-of-band values defined here-in with IANA according to the  
747 procedures in RFC 2566 [rfc2566] section 6. However, other registration proposals may site the out-of-  
748 band attribute values or the status codes defined in this document.

749 **11 Internationalization Considerations**

750 This document has the same localization considerations as the [ipp-mod].

751 **12 Security Considerations**

752 The IPP Model and Semantics document [ipp-mod section 8] discusses high level security requirements  
753 (Client Authentication, Server Authentication and Operation Privacy). Client Authentication is the  
754 mechanism by which the client proves its identity to the server in a secure manner. Server Authentication is  
755 the mechanism by which the server proves its identity to the client in a secure manner. Operation Privacy is  
756 defined as a mechanism for protecting operations from eavesdropping.

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

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

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

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

770 **13 The general remedy for such malicious user actions against another user's job is to have strong**  
771 **Client Authentication coupled with Printer access control to limit the users who have System**  
772 **Administrator or Operator privileges who can modify any job and, in addition, store the Client**  
773 **Authentication with each Job so that only the job owner End User can modify his/her own**  
774 **job.Author's Addresses**

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## 811 **14 References**

812 [ipp-mod]

813 R. deBry, T. Hastings, R. Herriot, S. Isaacson, P. Powell, "Internet Printing Protocol/1.0: Model and  
814 Semantics", <draft-ietf-ipp-model-v11-06.txt>, March 1, 2000.

815 [ipp-pro]

816 Herriot, R., Butler, S., Moore, P., Tuner, R., "Internet Printing Protocol/1.1: Encoding and  
817 Transport", draft-ietf-ipp-protocol-v11-05.txt, March 1, 2000.

818 [ipp-set2]

819 Kugler, C, Hastings, T., Lewis, H., "Internet Printing Protocol/1.1: Job and Printer Administrative  
820 Operations", <draft-ietf-ipp-ops-set2-01.txt>, December 8, 1999.

821 [RFC2565]

822 Herriot, R., Butler, S., Moore, P., Tuner, R., "Internet Printing Protocol/1.0: Encoding and  
823 Transport", RFC 2565, April 1999.

824 [RFC2566]

825 R. deBry, T. Hastings, R. Herriot, S. Isaacson, P. Powell, "Internet Printing Protocol/1.0: Model and  
826 Semantics", RFC 2566, April 1999.

## 827 **15 Change History**

828 This section summarizes the changes. Each sub-section is in reverse chronological order. Adding or  
829 removing ISSUES that don't change the document are not listed here.

### 830 **15.1 Changes to the January 30, 2000 version to make the March 1, 2000 version**

831 The following changes to the January 30, 2000 version to make the March 1, 2000 version as a result of the  
832 IPP WG telecons and mailing list discussion:

- 833 1. Clarified that this extension may be used with any IPP version, including 1.0, 1.1, and future versions.
- 834 2. Added "READ-ONLY" and "not-settable" terms to the terminology section. READ-ONLY is by  
835 definition, and "not-settable" is by implementation.
- 836 3. Assigned the "operation-id" values 0x0013, 0x0014, and 0x0015, respectively, for the Set-Printer-  
837 Attributes, Set-Job-Attributes, and Get-Printer-Supported-Values operations.
- 838 4. Clarified that the Set-Printer-Attributes operation while a Printer SHOULD accept a reasonable number  
839 of attribute, the Printer need only support setting one attribute in a request, unless it supports setting the  
840 three "parallel" attributes, ("printer-uri-supported", "uri-authentication-supported", and "uri-security-  
841 supported" (see [ipp-mod] sections 4.4.1 through 4.4.3), in which case it MUST support setting at least  
842 three attributes in a single request.
- 843 5. Clarified that for the Set-Printer-Attributes operation the Printer MUST validate all of the supplied  
844 attributes in combination with each other, as well as with all of the existing attribute of the Printer  
845 object Set-Printer-Attributes.

- 846 6. Changed the requirements for accepting the Set-Printer-Attributes operation when the Printer is in the  
847 'stopped' state from MUST to SHOULD, since some implementations may not be able to accept  
848 requests when stopped.
- 849 7. Clarified that setting certain Printer attributes with Set-Printer-Attributes MAY require more access  
850 rights than other attributes, i.e., System Administrator rights to set policy and only Operator rights to set  
851 the configuration attributes to reflect the current hardware setup.
- 852 8. Clarified the order of error checking and what is returned in each case in the Set-Printer-Attributes  
853 response.
- 854 9. Changed the 'default' out-of-band value to 'delete-attribute' out-of-band value so that the effect is to  
855 actually remove the Job attribute entirely in the Set-Job-Attribute operation.
- 856 10. Clarified that removing a Job attribute that is not present is not an error.
- 857 11. Clarified the validation of the Set-Job-Attributes request and what is returned for each error.
- 858 12. Changed the 'any-name' out-of-band attribute value to a more general 'any-value' out-of-band attribute  
859 value which in combination with an attribute syntax represents any value of that attribute syntax. The  
860 'any-value' value can be used with the 'name' attribute syntax in a Get-Printer-Supported-Values  
861 response to indicate whether or not a Set-Printer-Attributes will accept any name to be set for particular  
862 "xxx-supported" (1setOf name | ...) Printer attributes.
- 863 13. Clarified that "printer-message-from-operator" and "job-message-from-operator" both REQUIRE that  
864 the Printer accept zero-length messages and the 'no-value' out-of-band value is synonymous with  
865 removing any value from these Printer attributes.
- 866 14. Clarified that the Get-Printer-Supported-Values is REQUIRED only if the Set-Printer-Attributes  
867 operation will accept setting some "xxx-supported" Printer attributes.
- 868 15. Changed the IANA Considerations to indicate that the operations, attributes, status codes, and out-of-  
869 band-values won't be registered and published by IANA, since this document is intended to be standards  
870 track.
- 871 16. Added security considerations for denial of service and sabotage because of the Set operations.

## 872 **15.2 Changes to the January 20, 2000 version to make the January 30, 2000 version**

873 The following changes to the January 20, 2000 version to make the January 30, 2000 version as a result of  
874 the IPP WG telecons and mailing list discussion:

- 875 1. Deleted the "document-format-varying-scope" operation attribute from the Set-Printer-Attributes  
876 operation and made whether or not the "document-format" operation was present determine whether  
877 one or all document formats are affected, respectively.

- 878 2. Renamed the Get-Reset-Printer-Attributes operation to Get-Printer-Supported-Values, so that it only  
879 returns "xxx-supported" values. Relegate obtaining reset values to another operation to be paired with  
880 the Reset-Printer operation in the Set2 [ipp-set2] document.
- 881 3. Added "-supported" to the names of the "printer-settable-attributes" and "job-settable-attributes" Printer  
882 Description attributes, so that they could be returned in Get-Printer-Supported-Values and could be set  
883 by Set-Printer-Attributes.
- 884 4. Deleted "authentication-methods-supported" (1setOf type2 keyword) and "security-methods-supported"  
885 (1setOf type2 keyword) and clarified that "uri-authentication-supported" (1setOf type2 keyword) and  
886 "uri-security-supported" (1setOf type2 keyword) can return multiple keywords of the same value in a  
887 Get-Printer-Supported-Values operation.

### 888 **15.3 Changes to the January 4, 2000 version to make the January 20, 2000 version**

889 The following changes to the January 4, 2000 version to make the January 4, 2000 version as a result of the  
890 IPP WG telecons and mailing list discussion:

- 891 1. Replaced the "factory-settings" operation attribute proposed to be added to the Get-Printer-Attributes  
892 operation with the Get-Reset-Printer-Attributes operation which returns the reset values and the possible  
893 "xxx-supported" values.
- 894 2. Added the out-of-band 'any-name' value to be used with "xxx-supported" attributes with attribute syntax  
895 'type3 keyword | name' to indicate that any name will be accepted in a Job Creation operation for  
896 configurations that support such a concept.
- 897 3. Added authentication-methods-supported (1setOf type2 keyword) and security-methods-supported  
898 (1setOf type2 keyword) Printer Description attributes so that clients can discover the possible values for  
899 use in Set-Printer-Attributes to set "uri-authentication-supported" and "uri-security-supported"  
900 attributes, since the Reset-Printer operation doesn't change them.
- 901 4. Added validation rules that the Printer MUST use to validate a Set-Printer-Attributes request.
- 902 5. Clarified that the Set-Printer-Attributes operation MUST NOT have any side effects on other attributes,  
903 unless explicitly specified in this document.
- 904 6. Moved the specification of the attributes that MUST be READ-ONLY to Appendix A.
- 905 7. Added the "document-format-varying-attributes" (1setOf type2 keyword)
- 906 8. Added the REQUIRED "document-format-varying-scope" operation attribute to Set-Printer-Attributes  
907 in order to control whether one or all document formats are affected for those attributes that vary by  
908 document format.
- 909 9. Clarified that the Printer returns the 'client-error-attributes-not-settable' status code in a Set-Printer-  
910 Attributes response whether the attribute is READ-ONLY, the attribute is not supported, or the value is  
911 not supported.

- 912 10. Added the out-of-band 'default' value for use with Set-Job-Attributes and Job Creation operations.
- 913 11. Deleted the "printer-message-operation" Printer Description attribute.
- 914 12. Made the "Get-Reset-Printer-Attributes" operation, along with the "authentication-methods-supported"  
915 and the "security-methods-supported" Printer Description attributes REQUIRED, if the Set-Printer-  
916 Attributes operation is supported.
- 917 13. Made the 'not-settable' out-of-band value and the 'client-error-not-settable' status code REQUIRED, if  
918 the Set-Printer-Attributes operation is supported.
- 919 14. Made the 'default' out-of-band value REQUIRED, if the Set-Job-Attributes operation is supported.
- 920 15. Removed the requirement that "xxx-supported" Printer Description attributes that contain only one  
921 value be read-only.

#### 922 **15.4 Changes to the December 8, 1999 version to make the January 4, 2000 version**

923 The following changes to the December 8, 1999 version to make the January 4, 2000 version as a result of  
924 the IPP WG telecons and mailing list discussion:

- 925 1. Removed the Set operations and related items from the Set2 specification [ipp-set2] to create this Set  
926 specification.
- 927 2. Added that an attribute that can only be set to one fixed value SHOULD NOT be included in the  
928 "printer-settable-attributes" or "job-settable-attributes" attributes.
- 929 3. Indicated that the encoding of the 'not-settable' out-of-band value is TBD.
- 930 4. Added that Set-Job-Attributes operation adds an attribute to the Job object if it wasn't already there
- 931 5. Added the conformance section to make it easy to understand the conformance requirements.

#### 932 **16 Appendix A: Allowed Values for Set-Printer-Attributes**

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

935 An attribute and

936

937 The values allowed in the Set-Printer-Attributes operation for the attribute. The entry in each cell is  
938 the name (first few words) of each item below 1, 2, 3, 4a-g, and 5.

939 The allowed values include the following cases:

- 940 1. READ-ONLY: the Set-Printer-Attributes operation MUST NOT change this attribute

- 941 2. Any of "xxx-supported": the Set-Printer-Attributes operation accepts values that are allowed  
 942 according to the IPP/1.1 rules for the "xxx-supported" attribute (see section 3.1.2.3 of the "Internet  
 943 Printing Protocol/1.1: Implementer's Guide" [ipp-iig]). The 'xxx-supported' attribute value is  
 944 obtained from a 'Get-Printer-Attributes' response.
- 945 3. From Get-Printer-Supported-Values: the Set-Printer-Attributes operation accepts values that are  
 946 allowed according to the IPP/1.1 rules for the "xxx-supported" attribute (see section 3.1.2.3 of the  
 947 "Internet Printing Protocol/1.1: Implementer's Guide" [ipp-iig]). The "xxx-supported" attribute value  
 948 is obtained from a Get-Printer-Supported-Values response (see Appendix B: Attributes returned  
 949 from Get-Printer-Supported-Values below).
- 950 4. Any value of the proper attribute syntax: the Set-Printer-Attributes accepts any value of the  
 951 specified attribute syntax. The attribute syntaxes supported are enumerated below.
- 952 a. Any text(127)  
 953 b. Any name(127)  
 954 c. Any uri  
 955 d. Any boolean  
 956 e. Any positive integer  
 957 f. Any dateTime  
 958 g. 1setOf any uri
- 959 5. Combination of 'Any of "xxx-supported"' or 'Any name'.

960 If a Printer implementation doesn't want to allow setting values indicated in this Appendix as "any xxx", it  
 961 can make the value be read-only. For example, for a monochrome printer the attribute "color-supported" is  
 962 "false" and MUST be read-only. Otherwise an administrator could set it to "true" because the value can  
 963 have "any boolean" according to the rules in Table 6 below.

964 **Table 3 - 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"

965

966

**Table 4 - 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

967

968

**Table 5 - 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"

Printer Job Template Attributes	Values allowed for Set
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

969

970

**Table 6 - Values allowed for Printer Description Attributes in the Set-Printer-Attributes Operation**

Printer Description Attributes	Values allowed for Set
printer-uri-supported (1setOf uri)	From Get-Printer-Supported-Values
uri-authentication-supported (1setOf type2 keyword)	From Get-Printer-Supported-Values
uri-security-supported (1setOf type2 keyword)	From Get-Printer-Supported-Values
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



Printer Description Attributes	Values allowed for Set
multiple-document-jobs-supported (boolean)	From Get-Printer-Supported-Values
charset-configured (charset)	Any of "xxx-supported"
charset-supported (1setOf charset)	From Get-Printer-Supported-Values
natural-language-configured (naturalLanguage)	Any of "xxx-supported", use generated-natural-language-supported
generated-natural-language-supported (1setOf naturalLanguage)	From Get-Printer-Supported-Values
document-format-default (mimeType)	Any of "xxx-supported"
document-format-supported (1setOf mimeType)	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

971

972 **17 Appendix B: Attributes returned from Get-Printer-Supported-Values**

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

975 **Table 7 - 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)

976

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

980 **Table 8 - Printer Job Template Attributes returned from Get-Printer-Supported-Values**

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

981

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

983 **Table 9 - 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)

984

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

989 **Table 10 - 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))

990

991 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be one or  
 992 more values, where each such value matches a value returned by the Get-Printer-Supported-Values  
 993 operation. A keyword, enum, boolean, charset, naturalLanguage, uriScheme, mimeType or resolution  
 994 value matches if it is equal. A name matches the 'any-name' out-of-band value.

995 **Table 11 - 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   any name)
job-sheets-supported (1setOf(type3 keyword   name(MAX)))	1setOf(type3 keyword   any name)
multiple-document-handling-supported (1setOf type2 keyword)	1setOf type2 keyword

Printer Job Template Attributes	Values Returned
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   any name)
printer-resolution-supported (1setOf resolution)	1setOf resolution
print-quality-supported (1setOf type2 enum)	1setOf type2 enum

996

997 The following table has the same criteria as the last, but is for Printer Description attributes. Note that the  
 998 first two attributes in the table below follow the rules for allowed values in the Set-Printer-Attributes, but  
 999 unlike other attributes, there can be more than one occurrence of each value because the i-th value of these  
 1000 attributes specifies the authentication or security for the i-th printer in "printer-uri-supported".

1001

**Table 12 - Printer Description Attributes returned from Get-Printer-Supported-Values**

Printer Description Attributes	Values allowed for Set
uri-authentication-supported (1setOf type2 keyword)	1setOf type2 keyword
uri-security-supported (1setOf type2 keyword)	1setOf type2 keyword
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
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

1002

1003 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be a single  
 1004 value that matches one of the values returned by the Get-Printer-Supported-Values operation. A keyword,  
 1005 enum, boolean, charset, naturalLanguage, uriScheme, mimeType or resolution value matches if it is  
 1006 equal. A name matches the 'any-name' out-of-band value.

1007

1008

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

Printer Description Attributes	Values allowed for Set
--------------------------------	------------------------

Printer Description Attributes	Values allowed for Set
pdl-override-supported (type2 keyword)	1 setOf type2 keyword

1009

1010 For the following attributes, the Set-Printer-Attributes operation MUST NOT return a value. The IPP  
1011 Model document [ipp-mod] document specifies the allowed values.

1012

1013 **Table 14 - Printer Description Attributes returned from Get-Printer-Supported-Values**

Printer Description Attributes	Values allowed for Set
printer-uri-supported (1setOf uri)	any uri

1014

## 1015 **18 Appendix C: Full Copyright Statement**

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