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11 Internet Printing Protocol (IPP)/1.1: 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], ~~and~~ IPP/1.1 [ipp-mod, ipp-pro], ~~and~~ future versions. The first is the Set-
26 Printer-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 ~~included~~ defined to set the corresponding IPP/1.1 Printer and Job Description attributes with the same
36 names. A new out-of-band value 'any-value-name' is added ~~which may be used with any attribute syntax if~~
37 ~~an attribute definition allows.~~ ~~The 'any-value' value used with the 'name' attribute syntax can be (one of)~~
38 the values of "xxx-supported" attributes whose attribute syntaxes include both 'keyword' and 'name'. The

39 'any-~~value~~name' value with the 'name' attribute syntax matches any name supplied by the client during
40 validation.

41 New Printer Description attributes are ~~added~~defined:

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

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

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

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

46 printer-message-date-time (dateTime)

47 A new status code is ~~added~~defined: 'client-error-attributes-not-settable'.

48 A '~~default~~delete-attribute' out-of-band attribute values is ~~added~~defined for use by the client in the Set-Job-
49 Attributes, Job Creation, and Validate Job requests to indicate explicitly that the Printer is to remove the
50 specified attribute from ~~apply its default value with the same semantics and precedence (lower than the~~
51 ~~document content) as if the Job attribute were not present on~~ the Job object.

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

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

59 ~~This document is intended for registration following the registration procedures of IPP/1.0 [RFC2566] and~~
60 ~~IPP/1.1 [ipp-mod].~~

61 The full set of IPP documents includes:

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

68

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

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

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

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

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

90

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156 1 Introduction

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

164 This document is ~~a registration proposal for~~ an extension to IPP/1.0 [RFC2565, RFC2566] and IPP/1.1
165 [ipp-mod, ipp-pro], ~~and future versions following the registration procedures in those documents.~~

166 2 Terminology

167 This section defines terminology used throughout this document.

168 1.1.1 Conformance Terminology

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

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

173 REQUIRED: if an implementation supports the extensions described in this document, it MUST
174 support a REQUIRED feature.

175 OPTIONAL: if an implementation supports the extensions described in this document, it MAY support
176 an OPTIONAL feature.

177 1.2.2 Other terminology

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

182 READ-ONLY: used in an attribute definition to indicate that the attribute MUST NOT be settable
183 using an IPP protocol Set operation. In other words, the attribute is not settable by definition.
184 not-settable: an implementation does not support setting an attribute (whether or not the attribute's
185 definition is READ-ONLY).

186 3 Requirements and Use Cases

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

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

189 Usage: The end-user discovers that he/she forgot to include a print instruction, such as "finishings" =
190 'staple' after submitting a job. Rather than canceling the job and resubmitting it to the same [IPP](#) Printer,
191 the end-user is able to modify the job on the [IPP](#) Printer.

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

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

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

196 The system administrator is reducing the capability of the IPP Printer by removing one of the operations
197 from the supported operations list, such as Cancel-Job, because the policy is to run the IPP Printer like a
198 public [FAXfacsimile machine](#).

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

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

204 4 Definition of the Set operations

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

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

216 The Set Printer operations are summarized in Table 1:

217

Table 1 - Operation-Id assignments

Operation Name	Operation-Id	Brief description
Set-Printer-Attributes	0x 22 <u>0013</u>	Sets attribute values of the target Printer object
Set-Job-Attributes	0x 22 <u>0014</u>	Sets attribute values of the target Job object
Get-Printer-Supported-Values	0x 22 <u>0015</u>	Gets values that are valid for setting "xxx-supported" attributes using the Set-Printer-Attributes operation

218

4.1 Set-Printer-Attributes Operation

219

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221

222

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.

223

224

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:

225

226

227

228

229

230

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.

231

232

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.

233

2. The Printer MUST support the attribute.

234

235

236

3. The attribute MUST NOT be ~~read-only~~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).

237

4. The attribute MUST be settable in this implementation.

238

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

239

240

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

241

242

243

244

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.

245 The Printer MUST accept this operation when its READ-ONLY "printer-state" attribute (see ipp-mod
246 section 4.4.11) is 'idle' or 'stopped', and SHOULD accept it when the value is 'processing'. The Printer
247 MUST accept this operation in any state, i.e., for any of the values of the Printer object's READ-ONLY
248 "printer-state", "printer-state-reasons", and "printer-is-accepting-jobs" attributes, unless explicitly defined
249 otherwise in the definition of these attributes' values.

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

259 **4.4.14.1.1 Settable and READ-ONLY Printer Description attributes**

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

- 261 all Job Template Default ("xxx-default") attributes
- 262 all Job Template Supported ("xxx-supported") attributes
- 263 all Job Template Ready ("xxx-ready") attributes

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

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

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

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

276 For example, if the "operations-supported" Printer Description attribute (see [ipp-mod] section
277 4.4.15) is settable in a particular implementation, then changing its value with a Set-Printer-
278 Attributes operation MUST affect the operations that the implementation accepts or rejects. Such
279 an implementation will need to be able to reject values for operations that it contains no code
280 support for (see section 5). If the "operations-supported" Printer Description attribute is not settable
281 in a particular implementation, then that implementation MUST reject an attempt to set it with a
282 Set-Printer-Attributes operation, and return the 'client-error-attributes-not-settable' status code (see

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

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

290 4.1.2 Set-Printer-Attributes Request

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

292 Group 1: Operation Attributes

293 Natural Language and Character Set:

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

296
297 Target:

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

300
301 Requesting User Name:

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

304
305 "document-format" (mimeMediaType):

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

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

319
320 If the client omits this attribute, the Printer MUST change the supplied attributes for all document
321 formats whether or not they vary by document-format ~~or not~~.

322

323 If the client supplies a value for the "document-format" Operation attribute that is either
324 'application/octet-stream' or not supported by the Printer, i.e., is not among the values of the Printer
325 object's "document-format-supported" attribute, the Printer object MUST reject the operation and
326 return the 'client-error-document-format-not-supported' status code. Note: the document-format
327 'application/octet-stream' is the union of several document-formats (see [ipp-mod] section 3.2.5.1,
328 Get-Printer-Attributes) and is not a true document-format.
329

330 Group 2: Printer Attributes

331 The client MUST supply a set of Printer attributes with one or more values (including explicitly
332 allowed out-of-band values) as defined in [ipp-mod] section 4.2 Job Template Attributes ("xxx-
333 default", "xxx-supported", and "xxx-ready" attributes), section 4.4 Printer Description Attributes,
334 and any attribute extensions supported by the Printer. The value(s) of each Printer attribute supplied
335 in Group 2 replaces the value(s) of the corresponding Printer attribute on the target Printer object.
336 For attributes that can have multiple values (1setOf), all values supplied by the client replace all
337 values of the corresponding Printer object attribute. If a Printer object attribute had not been
338 configured yet and so had the 'no-value' out-of-band value (see [ipp-mod] section 4.1), the supplied
339 value(s) replace the 'no-value' value.
340

341 4.1.3 Set-Printer-Attributes Response

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

343 Group 1: Operation Attributes

344 Status Message:

345 In addition to the REQUIRED status code returned in every response, the response OPTIONALLY
346 includes a "status-message" (text(255)) and/or a "detailed-status-message" (text(MAX)) operation
347 attribute as described in [ipp-mod] sections 13 and 3.1.6.
348

349 Natural Language and Character Set:

350 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]
351 section 3.1.4.2.
352

353 Group 2: Unsupported Attributes

354 See [ipp-mod] section 3.1.7 for details on returning Unsupported Attributes.
355

356 If some of the attributes in the operation fail to validate, the Printer MUST reject the operation,
357 MUST NOT change any Printer attributes, and MUST return the '~~client-error-attributes-not-~~
358 ~~settable~~indicated' status code below. In this group, the Printer MUST also return all attributes that
359 fail to validate. The following are the reasons that an attribute fails to validate and the value
360 returned for the attribute, along with the indicated status code and order of detection:

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

379 4.2 Set-Job-Attributes Operation

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

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

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

392 If the client supplies a job attribute value is with the "out-of-band" value '~~default~~delete-attribute' (see section
393 8.2), then the Printer MUST remove the attribute and all of its values from the Job object, if present.
394 ~~attribute is changed like any value, but the Printer treats a Job attribute with the 'default' value as equivalent~~
395 ~~to the attribute not being present on the Job, i.e. the Printer uses its defaulting mechanism. As when the Job~~
396 ~~attribute is not present, the Printer MUST apply such default mechanism if the document does not contain~~

397 ~~any corresponding instruction.~~ The semantic effect of the client supplying the 'delete-attribute' value in a
398 Set-Job-Attributes operation MUST be the same as if the attribute had not been supplied with the Job object
399 in the Job Creation operation, i.e., the Printer applies its default attribute or behavior with lower precedence
400 that the PDL (see the beginning of [ipp-mod] section 4.2 and [ipp-mod] 3.2.1.1). Any subsequent query of
401 the Job object using Get-Job-Attributes or Get-Jobs MUST NOT return any attribute that has been deleted
402 using the 'delete-attribute' out-of-band value. However, a client can re-establish such a deleted Job attribute
403 with any supported value(s) using a subsequent Set-Job-Attributes operation.

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

408 ~~ISSUE 01—Ok for the Printer to ignore the 'delete-attribute' out-of-band value, if the supplied attribute is~~
409 ~~not present on the Job object, rather than returning it in the Unsupported Attributes Group and returning~~
410 ~~some kind of status to indicate this?~~

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

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

425

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'

426

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

431 4.2.1 Settable and READ-ONLY Job Description attributes

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

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

437 all Job Template job ("xxx") attributes

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

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

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

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

449 4.2.2 Set-Job-Attributes Request

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

451 Group 1: Operation Attributes

452 Natural Language and Character Set:

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

455 Target:

456 Either (1) the "printer-uri" (uri) plus "job-id" (integer(1:MAX)) or (2) the "job-uri" (uri) operation
457 attribute(s) which define the target for this operation as described in [ipp-mod] section 3.1.5.
458

459 Requesting User Name:

460 The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as
461 described in [ipp-mod] section 8.3.
462

463 Group 2: Job Attributes

464 The client MUST supply a set of Job attributes with one or more values (including explicitly
465 allowed out-of-band values) as defined in [ipp-mod] section 4.2 Job Template Attributes ("xxx"
466 attributes), section 4.3 Job Description Attributes, and any attribute extensions supported by the
467 Printer. The value(s) of each Job attribute supplied in Group 2 replaces the value(s) of the
468 corresponding Job attribute on the target Job object. For attributes that can have multiple values
469 (1setOf), all values supplied by the client replace all values of the corresponding Job object
470 attribute.
471

472
473 If the client supplies an "xxx" attribute with the '~~default~~delete-attribute' out-of-band value (see
474 section 8.2), the **Printer MUST remove the "xxx" attribute from the Job object, if present**~~effect is as
475 if the "xxx" attribute had not been submitted with the job in the Job Creation operation, i.e., the
476 Printer applies its "xxx default" value if the document content contains no corresponding print
477 instruction. However, the "xxx" attribute is returned in subsequent Get-Job-Attributes and Get-Job
478 responses with the "xxx" attribute with the explicit 'default' out of band value (rather than being
479 removed from the Job object).~~
480

481 4.2.3 Set-Job-Attributes Response

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

483 Group 1: Operation Attributes

484 Status Message:

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

488

489 Natural Language and Character Set:

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

492

493 Group 2: Unsupported Attributes

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

495

496 If some of the attributes in the operation fail to validate, the Printer MUST reject the operation,
497 MUST NOT change any Job attributes, and MUST return the '~~client-error-attributes-not-~~
498 ~~settable~~'indicated status code below. In this group, the Printer MUST also return all attributes that
499 fail to validate. The following are the reasons that an attribute fails to validate and the value
500 returned for the attribute, along with the indicated status code and order of detection:

501

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 [ipp-mod] section 13.1.4.9).

502

503

504

2. The Printer doesn't support the attribute: return the attribute with the "out-of-band" value
'unsupported' (see [ipp-mod] section 3.1.7 and [ipp-pro]) and the 'client-error-attributes-or-
values-not-supported' (see [ipp-mod] section 13.1.4.12).

505

506

507

3. The attribute is ~~read-only~~READ-ONLY (in its definition) or is not-settable in this
implementation: return the attribute with the "out-of-band" value 'not-settable' (see section
8.1) and the 'client-error-attributes-not-settable' status code (see section 7.1).

508

509

510

4. The Printer doesn't support the value: if the attribute in the operation has a single value
return it. If the attribute in the operation is multi-valued, return only those values in a 1setOf
that are not supported. Return the 'client-error-attributes-or-values-not-supported' status
code (see [ipp-mod] section 13.1.4.12).

511

512

513

514

5. The values of some of the supplied attributes conflict with one another and/or other Job
attribute values not being set: if the conflicting attribute in the operation has a single value
return the attribute and the value. If the attribute in the operation is multi-valued, return only
the attribute and those values in a 1setOf that are conflicting with other attributes. Return
the 'client-error-conflicting-attributes' status code (see [ipp-mod] section 13.1.4.15).

515

516

517

518

519 4.3 Get-Printer-Supported-Values Operation

520 This OPTIONAL operation allows a client to request the values that the Printer allows in the Set-Printer-
521 Attributes operation for "xxx-supported" attributes. If the Printer supports the Set-Printer-Attributes

522 operation AND some of its "xxx-supported" Printer attributes are settable, then ~~the~~ Printer MUST also
523 support this operation. This operation has identical request-/response attributes to the Get-Printer-
524 Attributes operation in IPP/1.1 [ipp-mod]. The operation also behaves identically to the Get-Printer-
525 Attributes operation in IPP/1.1 [ipp-mod] with the following exceptions:

- 526 1. The Get-Printer-Supported-Values operation supports only "xxx-supported" attributes.
- 527 2. The Get-Printer-Attributes operation returns the current value of specified attributes ~~and while the~~
528 Get-Printer-Supported-Values operation returns values that permit a client to determine what values
529 of "xxx-supported" attributes the Printer supports in the Set-Printer-Attributes Operation.
- 530 3. The Get-Printer-Supported-Values operation does not return any 'name' attribute syntax values for
531 any "xxx-supported" attributes. Instead, if the Set-Printer-Attributes operation will accept (any)
532 name value for an "xxx-supported" attribute, then the Get-Printer-Supported-Values operation
533 MUST return the 'any-value' out-of-band attribute value with the 'name' attribute syntax (see
534 section 8.3) as one of the values of the "xxx-supported" attribute. In other words, the 'any-
535 valuename' out-of-band attribute value used in combination with the 'name' attribute syntax
536 indicates that the Printer implementation supports clients setting 'name' attribute syntax values for
537 "xxx-supported" attributes that are defined with the 'name' attribute syntax ~~as one of their attribute~~
538 syntaxes.

539 For example, if the Get-Printer-Supported-Values operation returns several keywords as the value of the
540 "media-supported" attribute, then the Set-Printer-Attributes operation MUST accept any of these keywords
541 as values for the "media-supported" attribute. If the Get-Printer-Supported-Values operation returns an
542 'any-valuename' out-of-band attribute value with the 'name' attribute syntax as one of the values -of the
543 "media-supported" attribute, then the Set-Printer-Attributes operation MUST accept any value whose
544 attribute syntax is 'name' as values for the "media-supported" attribute.

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

548 media-supported
549 job-hold-until-supported
550 job-sheets-supported

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

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

556 5 New Operation attributes

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

560 4.4.1 "printer-message-from-operator" (text(127))

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

563 Pause-Printer
564 Resume-Printer
565 Purge-Jobs

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

571 If the Printer supports this operation attribute, it MUST support both a zero-length text value and the 'no-
572 value' out-of-band value (see [ipp-mod] section 4.1) to indicate that the operator has sent no message. In
573 this case, the Printer sets the value of the "printer-message-from-operator" to the zero-length value or 'no-
574 value' out-of-band value, respectively. If the client queries the "printer-message-from-operator" Printer
575 attribute, the Printer returns the attribute with the zero-length value or the 'no-value' value, respectively.

576 In addition, the Printer automatically copies:

- 577 1. the value of its "printer-up-time" attribute (see [ipp-mod] section 4.4.29) to its "printer-message-
578 time" attribute,
- 579 2. the value of its printer-current-time" (dateTime) attribute (see [ipp-mod] section 4.4.30) to its
580 "printer-message-date-time" attribute, if supported.

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

583 The "printer-message-from-operator" operation attribute MUST NOT be supported as an operation attribute
584 for the Set-Printer-Attributes operation. If the operator wants to set the Printer's "printer-message-from-
585 operator" Printer Description attribute when issuing the Set-Printer-Attributes operation, the client supplies
586 the "printer-message-from-operator" explicitly with its new value as one of the Printer Description
587 attributes in Group 2 in the request. The Printer also updates its "printer-message-time" and "printer-
588 message-date-time" Printer Description attributes. If the client does not explicitly supply the "printer-

589 message-from-operator" with its new value in the Set-Printer-Attributes request, the Printer leaves the value
590 of the Printer's "printer-message-from-operator" Printer Description attribute unchanged.

591 **4.25.2 "job-message-from-operator" (text(127))**

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

594 Cancel-Job
595 Hold-Job
596 Release-Job
597 Restart-Job

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

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

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

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

612 The "job-message-from-operator" operation attribute MUST NOT be supported as an operation attribute for
613 the Set-Job-Attributes operation. If the operator wants to set the Job's "job-message-from-operator" Job
614 Description attribute when issuing the Set-Job-Attributes operation, the client MUST supply the "job-
615 message-from-operator" with its new value as one of the Job Description attributes in Group 2 in the
616 request. Otherwise, the Printer leaves the value of the Job's "job-message-from-operator" Job Description
617 attribute unchanged by not explicitly setting the attribute. If the client does not explicitly supply the "job-
618 message-from-operator" with its new value in the Set-Job-Attributes request, the Printer leaves the value of
619 the Job's "job-message-from-operator" Job Description attribute unchanged.

620 **6 New Printer Description Attributes**

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

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

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

Standard keyword values are:

'none': There are no settable Printer attributes.

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

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

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

Standard keyword values are:

'none': There are no settable Job attributes.

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

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

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

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

This **OPTIONAL** READ-ONLY Printer Description attribute contains the time that the Printer's "printer-message-from-operator" was changed by the operator using any operation where the client supplied the

657 "printer-message-from-operator" operation attribute (see section 5.1) or was explicitly set using the Set-
658 Printer-Attributes operation (see section 4.1). This attribute allows the users to know when the "printer-
659 message-from-operator" attribute was last set.

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

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

666 **6.5 printer-message-date-time (dateTime)**

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

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

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

676 **7 Additional status codes**

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

678 **1.17.1 'client-error-attributes-not-settable' (0x0413)**

679 ~~If~~**T**he Set-Printer-Attributes or Set-Job-Attributes operation failed because one **or more** of the specified
680 attributes cannot be set **either because the attribute is defined to be READ-ONLY or the attribute is not**
681 **settable in this implementation (see for any of the three reasons given in Unsupported Attributes group of**
682 **sections 4.1.3 and 4.2.3), the Printer MUST return this error code and ~~it MUST return~~**the attribute keyword**
683 **name(s) and the 'not-settable' out-of-band value (see section 8.1) in the Unsupported Attributes Group(see**
684 **[ipp-mod] section 3.1.7) ~~for~~ all of the attributes that could not be set. When the Printer returns this status, it**
685 **MUST NOT change any of the attributes ~~specified~~**supplied in the operation.******

686 8 Additional out-of-band values

687 This section defines additional out-of-band values ~~that can be used with any attribute in principle.~~ As with
688 all out-of-band values, a client or a Printer MUST NOT use an out-of-band value unless the definition of
689 the attribute in an operation request and/or response explicitly allows such usage. See the beginning of
690 [ipp-mod] section 4.1.

691 1.18.1 'not-settable' out-of-band value

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

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

697 8.1.1 Encoding of the 'not-settable' out-of-band attribute value

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

699 8.2 '~~delete-attribute~~default' out-of-band value

700 The '~~delete-attribute~~default' out-of-band values is ~~used~~supplied by the client in ~~the~~ Set-Job-Attributes, ~~Job~~
701 ~~Creation (Create Job, Print Job, Print URI), and Validate Job~~ requests to indicate that the Printer is to
702 remove the supplied attribute and all of its values from the Job object, if present (see section 4.2). ~~indicate~~
703 ~~explicitly that the Printer is to apply its default value with the same semantics and precedence (lower than~~
704 ~~the document content) as if the Job attribute were not present on the Job object. The semantic effect of the~~
705 ~~client supplying the 'default' value in a Set-Job-Attributes operation is as if the attribute were to be removed~~
706 ~~from the Job object. However, if the resulting Job is queried by the Get Job-Attributes or Get Jobs~~
707 ~~operations, the Printer MUST return any attributes with the 'default' value that the client had supplied with~~
708 ~~the 'default' value, rather than not returning the attributes at all. In other words, the Printer MUST NOT~~
709 ~~remove any attribute from the Job object for which the client supplies the 'default' out-of-band value. In~~
710 ~~addition, any attributes that had not been supplied by the client in the Job Creation operation MUST NOT~~
711 ~~be returned with the 'default' value.~~

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

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

720 **8.2.1 Encoding of the 'delete-attribute' out-of-band value**

721 The encoding of the 'delete-attribute' out-of-band value is reserved for this purpose 0x16 (see [ipp-pro]).

722 **8.3 'any-valuename' out-of-band attribute value**

723 The 'any-valuename' out-of-band attribute value is MAY be used in combination with an attribute syntax to
724 represent "any" attribute value of that attribute syntax. by the IPP Printer as a new value returned by Get-
725 Printer-Supported-Values operation. It is a possible value for an attribute which allows the 'name' attribute
726 syntax. Its presence indicates that the Set Printer Attributes operation allows the attribute to have values
727 whose attribute syntax is 'name'.

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

731 The Get Printer Supported Values MAY return the 'any name' for any of the following IPP/1.1 attributes.

732 media-supported
733 job-hold-until-supported
734 job-sheets-supported
735

736
737 If the value 'any name' is one of the values of an attribute returned from the Get-Reset-Printer-Attributes,
738 then the Printer MUST allow the Set-Printer-Attributes operation for that attribute to contain any value
739 whose attribute syntax is 'name'. If the value 'any name' is not one of the values of an attribute returned
740 from the Get-Reset-Printer-Attributes, then the Printer MUST NOT allow the Set-Printer-Attributes
741 operation for that attribute to contain a value whose attribute syntax is 'name'.

742
743 ISSUE 02—Should we change the 'any name out-of-band value to a general 'any' out-of-band value that can
744 be used with any attribute syntax type in principle, rather than inventing a new 'any xxx' out-of-band value
745 for each attribute syntax that we need to provide the 'any' mechanism? Alternatively, we could add a new
746 attribute syntax whose value can be any attribute syntax? With either approach, each attribute definition
747 would be required to indicate explicitly that it is defined to be able to use the 'any' (attribute syntax or out-
748 of-band value). With each approach, how would the new 'collection' attribute syntax use it, since the
749 'collection' attribute syntax has a "begin" and "end" encoding? So far we have seen a need for 'any name'
750 and 'any-mime-media-type' (Carl Kugler), but there could be more.

751 **8.3.1 Encoding of the 'any-value' out-of-band attribute value**

752 The encoding of the 'any-value' out-of-band attribute value is 0x17 TBD (see [ipp-pro]). This out-of-band
753 value REQUIRES a non-zero length and an attribute value which identifies an attribute syntax type. The
754 attribute value is either (1) a one-octet attribute syntax tag as defined in [ipp-pro] (value length = 1) or (2) a
755 0x7F code followed by a 4-octets of an extended attribute syntax type code as allocated in [ipp-pro] (value
756 length = 5).

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

759 9 Conformance Requirements

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

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

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

- 768 1. the Get-Printer-Supported-Values operation (see section 5), if any "xxx-supported" attributes are
769 settable.
- 770 2. the "printer-settable-attributes-supported" Printer Description attribute (see section 6.1)
- 771 3. the 'not-settable' out-of-band value in responses (see section 8.1)
- 772 4. the 'client-error-not-settable' status code (see section 7.1)
- 773 5. If "printer-message-from-operator" Printer Description attribute is supported (see [ipp-mod]
774 section 4.4.25), then it MUST be settable.
- 775 6. the Get-Printer-Supported-Values operation (see section 4.3), if any "xxx-supported" attributes
776 are settable.
- 777 7. If a client can set a value with the '-name' attribute syntax ~~is supported~~ for any one or more "xxx-
778 supported" attributes, then the 'any-value~~name~~' out-of-band attribute value (see section 8.3)
779 MUST be supported in the Get-Printer-Supported-Values response with the 'name' attribute
780 syntax for each such settable attribute (see section 4.3)

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

- 783 1. ~~If~~ the "job-settable-attributes-supported" Printer Description attribute (see section 6.2)
- 784 2. the 'not-settable' out-of-band value in responses (see section 8.1)
- 785 3. the ~~'delete-attribute default'~~ out-of-band value in requests (see section 8.2)
- 786 4. the 'client-error-not-settable' status code (see section 7.1)

- 787 5. If the "job-message-from-operator" Printer Description attribute is supported (see [ipp-mod]
788 4.3.16), then it MUST be settable.

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

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

796 10 IANA Considerations

797 Since this document is intended to be a standards track document, there is no need to also register the
798 operations, attributes, status codes, and out-of-band values defined here-in with ~~The operations and~~
799 attributes in this registration proposal will be published by IANA according to the procedures in RFC 2566
800 [rfc2566] section 6. However, other registration proposals may site the out-of-band attribute values or the
801 status codes defined in this document.~~4 for operations with the following URL:~~

802 <ftp://isi.edu/iana/assignments/ipp/operations/set.txt>

803 11 Internationalization Considerations

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

805 12 Security Considerations

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

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

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

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

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

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

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872 [ipp-set2]

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875 [RFC2565]

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878 [RFC2566]

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880 Semantics", RFC 2566, April 1999.

881 15 Change History

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

884 ~~1.1~~15.1 Changes to the January 30, 2000 version to make the March 1, 2000 version

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

- 887 1. Clarified that this extension may be used with any IPP version, including 1.0, 1.1, and future versions.
- 888 2. Added "READ-ONLY" and "not-settable" terms to the terminology section. READ-ONLY is by
889 definition, and "not-settable" is by implementation.

- 890 3. Assigned the "operation-id" values 0x0013, 0x0014, and 0x0015, respectively, for the Set-Printer-
891 Attributes, Set-Job-Attributes, and Get-Printer-Supported-Values operations.
- 892 4. Clarified that the Set-Printer-Attributes operation while a Printer SHOULD accept a reasonable number
893 of attribute, the Printer need only support setting one attribute in a request, unless it supports setting the
894 three "parallel" attributes, ("printer-uri-supported", "uri-authentication-supported", and "uri-security-
895 supported" (see [ipp-mod] sections 4.4.1 through 4.4.3), in which case it MUST support setting at least
896 three attributes in a single request.
- 897 5. Clarified that for the Set-Printer-Attributes operation the Printer MUST validate all of the supplied
898 attributes in combination with each other, as well as with all of the existing attribute of the Printer
899 object Set-Printer-Attributes.
- 900 6. Changed the requirements for accepting the Set-Printer-Attributes operation when the Printer is in the
901 'stopped' state from MUST to SHOULD, since some implementations may not be able to accept
902 requests when stopped.
- 903 7. Clarified that setting certain Printer attributes with Set-Printer-Attributes MAY require more access
904 rights than other attributes, i.e., System Administrator rights to set policy and only Operator rights to set
905 the configuration attributes to reflect the current hardware setup.
- 906 8. Clarified the order of error checking and what is returned in each case in the Set-Printer-Attributes
907 response.
- 908 9. Changed the 'default' out-of-band value to 'delete-attribute' out-of-band value so that the effect is to
909 actually remove the Job attribute entirely in the Set-Job-Attribute operation.
- 910 10. Clarified that removing a Job attribute that is not present is not an error.
- 911 11. Clarified the validation of the Set-Job-Attributes request and what is returned for each error.
- 912 12. Changed the 'any-name' out-of-band attribute value to a more general 'any-value' out-of-band attribute
913 value which in combination with an attribute syntax represents any value of that attribute syntax. The
914 'any-value' value can be used with the 'name' attribute syntax in a Get-Printer-Supported-Values
915 response to indicate whether or not a Set-Printer-Attributes will accept any name to be set for particular
916 "xxx-supported" (1setOf name | ...) Printer attributes.
- 917 13. Clarified that "printer-message-from-operator" and "job-message-from-operator" both REQUIRE that
918 the Printer accept zero-length messages and the 'no-value' out-of-band value is synonymous with
919 removing any value from these Printer attributes.
- 920 14. Clarified that the Get-Printer-Supported-Values is REQUIRED only if the Set-Printer-Attributes
921 operation will accept setting some "xxx-supported" Printer attributes.
- 922 15. Changed the IANA Considerations to indicate that the operations, attributes, status codes, and out-of-
923 band-values won't be registered and published by IANA, since this document is intended to be standards
924 track.

925 16. Added security considerations for denial of service and sabotage because of the Set operations.

926 **15.2 Changes to the January 20, 2000 version to make the January 30, 2000 version**

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

- 929 1. Deleted the "document-format-varying-scope" operation attribute from the Set-Printer-Attributes
930 operation and made whether or not the "document-format" operation was present determine whether
931 one or all document formats are affected, respectively.
- 932 2. Renamed the Get-Reset-Printer-Attributes operation to Get-Printer-Supported-Values, so that it only
933 returns "xxx-supported" values. Relegate obtaining reset values to another operation to be paired with
934 the Reset-Printer operation in the Set2 [ipp-set2] document.
- 935 3. Added "-supported" to the names of the "printer-settable-attributes" and "job-settable-attributes" Printer
936 Description attributes, so that they could be returned in Get-Printer-Supported-Values and could be set
937 by Set-Printer-Attributes.
- 938 4. Deleted "authentication-methods-supported" (1setOf type2 keyword) and "security-methods-supported"
939 (1setOf type2 keyword) and clarified that "uri-authentication-supported" (1setOf type2 keyword) and
940 "uri-security-supported" (1setOf type2 keyword) can return multiple keywords of the same value in a
941 Get-Printer-Supported-Values operation.

942 **15.3 Changes to the January 4, 2000 version to make the January 20, 2000 version**

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

- 945 1. Replaced the "factory-settings" operation attribute proposed to be added to the Get-Printer-Attributes
946 operation with the Get-Reset-Printer-Attributes operation which returns the reset values and the possible
947 "xxx-supported" values.
- 948 2. Added the out-of-band 'any-name' value to be used with "xxx-supported" attributes with attribute syntax
949 'type3 keyword | name' to indicate that any name will be accepted in a Job Creation operation for
950 configurations that support such a concept.
- 951 3. Added authentication-methods-supported (1setOf type2 keyword) and security-methods-supported
952 (1setOf type2 keyword) Printer Description attributes so that clients can discover the possible values for
953 use in Set-Printer-Attributes to set "uri-authentication-supported" and "uri-security-supported"
954 attributes, since the Reset-Printer operation doesn't change them.
- 955 4. Added validation rules that the Printer MUST use to validate a Set-Printer-Attributes request.
- 956 5. Clarified that the Set-Printer-Attributes operation MUST NOT have any side effects on other attributes,
957 unless explicitly specified in this document.

- 958 6. Moved the specification of the attributes that MUST be READ-ONLY to Appendix A.
- 959 7. Added the "document-format-varying-attributes" (1setOf type2 keyword)
- 960 8. Added the REQUIRED "document-format-varying-scope" operation attribute to Set-Printer-Attributes
961 in order to control whether one or all document formats are affected for those attributes that vary by
962 document format.
- 963 9. Clarified that the Printer returns the 'client-error-attributes-not-settable' status code in a Set-Printer-
964 Attributes response whether the attribute is READ-ONLY, the attribute is not supported, or the value is
965 not supported.
- 966 10. Added the out-of-band 'default' value for use with Set-Job-Attributes and Job Creation operations.
- 967 11. Deleted the "printer-message-operation" Printer Description attribute.
- 968 12. Made the "Get-Reset-Printer-Attributes" operation, along with the "authentication-methods-supported"
969 and the "security-methods-supported" Printer Description attributes REQUIRED, if the Set-Printer-
970 Attributes operation is supported.
- 971 13. Made the 'not-settable' out-of-band value and the 'client-error-not-settable' status code REQUIRED, if
972 the Set-Printer-Attributes operation is supported.
- 973 14. Made the 'default' out-of-band value REQUIRED, if the Set-Job-Attributes operation is supported.
- 974 15. Removed the requirement that "xxx-supported" Printer Description attributes that contain only one
975 value be read-only.

976 **15.4 Changes to the December 8, 1999 version to make the January 4, 2000 version**

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

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

986 16 Appendix A: Allowed Values for Set-Printer-Attributes

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

989 An attribute and

990

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

993 The allowed values include the following cases:

- 994 1. ~~Read-only~~**READ-ONLY**: the Set-Printer-Attributes operation ~~cannot~~**MUST NOT** change this
995 attribute
- 996 2. Any of "xxx-supported": the Set-Printer-Attributes operation accepts values that are allowed
997 according to the IPP/1.1 rules for the "xxx-supported" attribute (see section 3.1.2.3 of the "Internet
998 Printing Protocol/1.1: Implementer's Guide" [ipp-iig]). The 'xxx-supported' attribute value is
999 obtained from a 'Get-Printer-Attributes' response.
- 1000 3. From Get-Printer-Supported-Values: the Set-Printer-Attributes operation accepts values that are
1001 allowed according to the IPP/1.1 rules for the "xxx-supported" attribute (see section 3.1.2.3 of the
1002 "Internet Printing Protocol/1.1: Implementer's Guide" [ipp-iig]). The "xxx-supported" attribute value
1003 is obtained from a Get-Printer-Supported-Values response (see Appendix B: Attributes returned
1004 from Get-Printer-Supported-Values below).
- 1005 4. Any value of the proper attribute syntax: the Set-Printer-Attributes accepts any value of the
1006 specified attribute syntax. The attribute syntaxes supported are enumerated below.
 - 1007 a. Any text(127)
 - 1008 b. Any name(127)
 - 1009 c. Any uri
 - 1010 d. Any boolean
 - 1011 e. Any positive integer
 - 1012 f. Any dateTime
 - 1013 g. 1setOf any uri
- 1014 5. Combination of 'Any of "xxx-supported"' or 'Any name'.

1015 If a Printer implementation doesn't want to allow setting values indicated in this Appendix as "any xxx", it
1016 can make the value be read-only. For example, for a monochrome printer the attribute "color-supported" is
1017 "false" and MUST be read-only. Otherwise an administrator could set it to "true" because the value can
1018 have "any boolean" according to the rules in Table 6 below.

1019 **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 Template Attributes	Values allowed for Set
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"

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

Job Description Attributes	Values allowed for Set
job-impressions-completed (integer(0:MAX))	Read-only READ-ONLY
job-media-sheets-completed (integer(0:MAX))	Read-only READ-ONLY
attributes-charset (charset)	Read-only READ-ONLY
attributes-natural-language (naturalLanguage)	Read-only READ-ONLY

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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"
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

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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

Printer Description Attributes	Values allowed for Set
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 READ-ONLY
printer-state-reasons (1setOf type2 keyword)	Read-only READ-ONLY
printer-state-message (text(MAX))	Read-only 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"
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 (mimeMediaType)	Any of "xxx-supported"
document-format-supported (1setOf mimeMediaType)	From Get-Printer-Supported-Values
printer-is-accepting-jobs (boolean)	Read-only READ-ONLY
queued-job-count (integer(0:MAX))	Read-only 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 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 READ-ONLY
pages-per-minute-color (integer(0:MAX))	Read-only 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 READ-ONLY

Printer Description Attributes	Values allowed for Set
printer-message-time (integer(MIN:MAX))	Read-only READ-ONLY
printer-message-date-time(dateTime)	Read-only READ-ONLY

1026

1027 17 Appendix B: Attributes returned from Get-Printer-Supported-Values

1028 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be a single
1029 integer value in the range specified by the value returned by the Get-Printer-Supported-Values operation.

1030 **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)

1031

1032 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be a single
1033 rangeOfInteger value whose bounds do not exceed those of the range specified by the value returned by the
1034 Get-Printer-Supported-Values operation.

1035 **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)

1036

1037 The following table has the same criteria as the last, but is for Printer Description attributes.

1038 **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)

1039

1040 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be one or
1041 more integers and rangeOfInteger values, such that the integer values described by these integers and
1042 rangeOfInteger is the same as or a subset of the integers described by the integers and rangeOf Integer of
1043 value returned by the Get-Printer-Supported-Values operation.

1044

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))

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

1050

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
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

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

1056

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

Printer Description Attributes	Values allowed for Set
color-supported (boolean)	1 setOf 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

1057

1058 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be a single
 1059 value that matches one of the values returned by the Get-Printer-Supported-Values operation. A keyword,
 1060 enum, boolean, charset, naturalLanguage, uriScheme, mimeType or resolution value matches if it is
 1061 equal. A name matches the 'any-name' out-of-band value.

1062

1063 **Table 13 - Printer Description Attributes returned from Get-Printer-Supported-Values**

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

1064

1065 For the following attributes, the Set-Printer-Attributes operation MUST NOT return a value. The IPP
 1066 Model document [ipp-mod] document specifies the allowed values.

1067

1068 **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

1069

1070 **18 Appendix C: Full Copyright Statement**

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