

8
9 **Internet Printing Protocol (IPP):**
10 **Job and Printer Set Operations**

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21 Abstract

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

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

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

31 Nine Printer Description attributes are defined:

- 32 printer-settable-attributes-supported (1setOf type2 keyword)
- 33 job-settable-attributes-supported (1setOf type2 keyword)
- 34 document-format-varying-attributes (1setOf type2 keyword)
- 35 printer-message-time (integer(MIN:MAX))
- 36 printer-message-date-time (dateTime)
- 37 printer-xri-supported (1setOf collection)
- 38 xri-uri-scheme-supported (1setOf uriScheme)
- 39 xri-authentication-supported (1setOf type2 keyword)
- 40 xri-security-supported (1setOf type2 keyword)

41 The full set of IPP documents includes:

42 Design Goals for an Internet Printing Protocol [RFC2567]

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

44 Internet Printing Protocol/1.1: Model and Semantics ([this document](#)) [RFC2911]

45 Internet Printing Protocol/1.1: Encoding and Transport [~~IPP-PRO~~ RFC2910]

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

47 Mapping between LPD and IPP Protocols [RFC2569]

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

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

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

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

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

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140 1 Introduction

141 The Internet Printing Protocol (IPP) is an application level protocol that can be used for distributed printing
142 using Internet tools and technologies. IPP version 1.1 [~~ipp-mod~~RFC2911, ~~ipp-pro~~RFC2910] focuses on end
143 user functionality with a few administrative operations included. This document defines additional
144 OPTIONAL end user, operator, and administrator Set-Job-Attributes and Set-Printer-Attributes operations
145 used to modify IPP Job objects and Printer objects, respectively. It also defines a third administrator Get-
146 Printer-Supported-Values operation that returns values that the IPP Printer will accept for setting its "xxx-
147 supported" attributes. The Get-Printer-Supported-Values operation MUST be supported, if the
148 implementation supports setting any "xxx-supported" Printer attributes using the Set-Printer-Attributes
149 operation.

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

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

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

160 This document is an extension to IPP/1.0 [RFC2565, RFC2566] and IPP/1.1 [~~ipp-mod~~RFC2911, ~~ipp-
161 pro~~RFC2910], and future versions.

162 2 Terminology

163 This section defines terminology used throughout this document.

164 2.1 Conformance Terminology

165 Capitalized terms, such as MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, MAY, NEED
166 NOT, and OPTIONAL, have special meaning relating to conformance. These terms are defined in [~~ipp-
167 mod~~RFC2911] section 12.1 on conformance terminology, most of which is taken from RFC 2119
168 [RFC2119].

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

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

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

174 2.2 Other terminology

175 This document uses terms such as Job object (or Job), IPP Printer object (or Printer), "operation", "request",
176 "response", "attributes", "keywords", and "support". These terms have special meaning and are defined in the

177 model terminology [~~ipp-mod~~[RFC2911](#)] section 12.2. The following additional terms are introduced in this
178 document:

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

183 3 Requirements and Use Cases

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

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

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

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

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

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

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

199 The system administrator is remotely configuring the IPP Printer after installing it, and so is replacing the
200 Printer Description attributes that have the out-of-band 'no-value' value (see [~~ipp-mod~~[RFC2911](#)] section
201 4.1) 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~~[RFC2911](#)] 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 operation.
211 That job identification MAY either be a single Job URI or a combination of a Printer URI with a Job ID as
212 defined in [~~ipp-mod~~[RFC2911](#)]. 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	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

218 4.1 Set-Printer-Attributes Operation

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

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

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

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

- 230 2. The Printer MUST support the attribute.
- 231 3. The attribute MUST NOT be READ-ONLY, i.e., the definition of the attribute MUST NOT indicate that
232 the attribute is READ-ONLY (see Appendix A for an indication of which IPP/1.1 attributes are READ-
233 ONLY).
- 234 4. The attribute MUST be settable in this implementation.
- 235 5. The Printer MUST support the value according to the rules defined in Appendix A, i.e., each value of each
236 supplied "xxx" attribute MUST be validated against a value of a corresponding "xxx-supported" Printer
237 attribute. One of those rules permits an administrator to set arbitrary 'name' values to those "xxx-
238 supported" Printer attributes that include the 'name' attribute syntax if the implementation supports the
239 'admin-define' out-of-band value for that "xxx-supported" attribute (see section 15 and 8.3).
- 240 6. The attribute's values MUST NOT conflict with the values of other Printer attributes, including ones being
241 set in this same operation.

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

246 The Printer MUST accept this operation when its READ-ONLY "printer-state" attribute (see [ipp-
247 modRFC2911](#)] section 4.4.11) is 'idle' or 'stopped', and SHOULD accept it when the value is 'processing'.
248 The Printer MUST accept this operation for any of the values of the Printer object's READ-ONLY "printer-
249 state-reasons" and "printer-is-accepting-jobs" attributes, unless explicitly defined otherwise in the definition of
250 these attributes' values.

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

260 4.1.1 Settable and READ-ONLY Printer Description attributes

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

262 all Job Template Default ("xxx-default") attributes

263 all Job Template Supported ("xxx-supported") attributes

264 all Job Template Ready ("xxx-ready") attributes

265 that the implementation supports (see [[ipp-modRFC2911](#)] section 4.2 and extensions).

266 Some Printer Description attributes (see [[ipp-modRFC2911](#)] section 4.4) MUST NOT be settable, i.e., they
267 are defined to be READ-ONLY. An attribute marked as "READ-ONLY" in the Printer Description attribute
268 table in Appendix A is such an attribute. The Printer attributes that are not marked as "READ-ONLY" MAY
269 be settable using the Set-Printer-Attributes operation, depending on implementation.

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

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

278 For example, if the "operations-supported" Printer Description attribute (see [[ipp-modRFC2911](#)] section
279 4.4.15) is settable in a particular implementation, then changing its value with a Set-Printer-Attributes
280 operation MUST affect the operations that the implementation accepts or rejects. Such an implementation
281 will need to be able to reject values for operations that it contains no code support for (see section 4.3). If
282 the "operations-supported" Printer Description attribute is not settable in a particular implementation, then
283 that implementation MUST reject an attempt to set it with a Set-Printer-Attributes operation, return the
284 'client-error-attributes-not-settable' status code (see section 7.1), and return the "operations-supported"
285 attribute with the out-of-band 'not-settable' value in the Unsupported Attributes Group.

286 As another example, consider an implementation in which the "media-default" and "media-supported" are
287 settable. If a client supplies a Set-Printer-Attributes request that contains the "media-default" attribute with
288 a value that is not a member of the Printer's "media-supported" attribute, the Printer MUST reject the

289 request and return the "client-error-conflicting-attributes" status code with the "media-default" and "media-
290 supported" attributes and their values (see [ipp-modRFC2911] section 3.1.7).

291 As a third example, if a client supplies a Set-Printer-Attributes request that contains both the "media-
292 default" and the "media-supported" attributes, but includes a value in the "media-default" that is not a
293 member of the supplied "media-supported" attribute, the Printer MUST reject the request and return the
294 "client-error-conflicting-attributes" status code with the "media-default" and "media-supported" attributes
295 and their values (see [ipp-modRFC2911] section 3.1.7).

296 *Access Rights:* The authenticated user (see [ipp-modRFC2911] section 8.3) performing this operation must
297 be an operator or administrator of the Printer object (see [ipp-modRFC2911] Sections 1 and 8.5). Most
298 Printer attributes will require administrator access rights to set, such as "xxx-supported", while some will
299 require operator access rights only, such as "media-ready" and "printer-message-from-operator". Which
300 attributes require which access rights depends on implementation and MAY depend on site policy.

301 4.1.2 Set-Printer-Attributes Request

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

303 Group 1: Operation Attributes

304 Natural Language and Character Set:

305 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-
306 modRFC2911] section 3.1.4.1.

307
308 Target:

309 The "printer-uri" (uri) operation attribute which is the target for this operation as described in [ipp-
310 modRFC2911] section 3.1.5.

311
312 Requesting User Name:

313 The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as
314 described in [ipp-modRFC2911] section 8.3.

315
316 "document-format" (mimeMediaType):

317 The client OPTIONALLY supplies this attribute. The Printer object MUST support this attribute.
318 This attribute is useful for a client to select the document-format to which the attribute modification
319 should be applied. A Printer implementation MAY allow some attributes to have different values for
320 each document format that it supports. See [ipp-modRFC2911] section 3.2.5.1 "Get-Printer-
321 Attributes Request".

322
323 If the client includes this attribute, the Printer MUST change the supplied attributes for the document
324 format specified by this attribute. If a supplied attribute is a member of the "document-format-
325 varying-attributes" (i.e., the attribute varies by document format, see section 6.3), the Printer MUST
326 change the supplied attribute for the document format specified by this attribute, but not for other
327 document formats. If a supplied attribute isn't a member of the "document-format-varying-attributes"
328 (i.e. it doesn't vary by document format), the Printer MUST change the supplied attribute for all
329 document formats.

330
331 If the client omits this attribute, the Printer MUST change the supplied attributes for all document
332 formats whether or not they vary by document-format.

333
334 If the client supplies a value for the "document-format" Operation attribute that is either
335 'application/octet-stream' or not supported by the Printer, i.e., is not among the values of the Printer
336 object's "document-format-supported" attribute, the Printer object MUST reject the operation and

337 return the 'client-error-document-format-not-supported' status code. Note: the document-format
338 'application/octet-stream' is the union of several document-formats (see [~~ipp-mod~~RFC2911] section
339 3.2.5.1, Get-Printer-Attributes) and is not a true document-format.
340

341 Group 2: Printer Attributes

342 The client MUST supply a set of Printer attributes with one or more values (including explicitly
343 allowed out-of-band values) as defined in [~~ipp-mod~~RFC2911] section 4.2 Job Template Attributes
344 ("xxx-default", "xxx-supported", and "xxx-ready" attributes), section 4.4 Printer Description
345 Attributes, and any attribute extensions supported by the Printer. The value(s) of each Printer
346 attribute supplied in Group 2 replaces the value(s) of the corresponding Printer attribute on the target
347 Printer object. For attributes that can have multiple values (1setOf), all values supplied by the client
348 replace all values of the corresponding Printer object attribute. If a Printer object attribute had not
349 been configured yet and so had the 'no-value' out-of-band value (see [~~ipp-mod~~RFC2911] section
350 4.1), the supplied value(s) replace the 'no-value' value.
351

352 4.1.3 Set-Printer-Attributes Response

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

354 Group 1: Operation Attributes

355 Status Message:

356 In addition to the REQUIRED status code returned in every response, the response OPTIONALLY
357 includes a "status-message" (text(255)) and/or a "detailed-status-message" (text(MAX)) operation
358 attribute as described in [~~ipp-mod~~RFC2911] sections 13 and 3.1.6.
359

360 Natural Language and Character Set:

361 The "attributes-charset" and "attributes-natural-language" attributes as described in [~~ipp-~~
362 ~~mod~~RFC2911] section 3.1.4.2.
363

364 Group 2: Unsupported Attributes

365 See [~~ipp-mod~~RFC2911] section 3.1.7 for details on returning Unsupported Attributes.
366

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

- 372 1. The number of attributes supplied by the client exceeds the maximum number that the Printer
373 supports in a Set-Printer-Attributes request: return the 'client-error-request-entity-too-large'
374 (see [~~ipp-mod~~RFC2911] section 13.1.4.9).
- 375 2. The Printer doesn't support the attribute: return the attribute with the "out-of-band" value
376 'unsupported' (see [~~ipp-mod~~RFC2911] section 3.1.7 and [~~ipp-pro~~RFC2910]) and the 'client-
377 error-attributes-or-values-not-supported' (see [~~ipp-mod~~RFC2911] section 13.1.4.12).
- 378 3. The attribute is either READ-ONLY (in its definition) or is not-settable in this implementation:
379 return the attribute with the "out-of-band" value 'not-settable' (see section 8.1) and the 'client-
380 error-attributes-not-settable' status code (see section 7.1).

- 381 4. The Printer doesn't support the value: if the attribute in the operation has a single value return it.
382 If the attribute in the operation is multi-valued, return only those values in a 1setOf that are not
383 supported. Return the 'client-error-attributes-or-values-not-supported' status code (see [~~ipp-~~
384 ~~mod~~[RFC2911](#)] section 13.1.4.12).
- 385 5. The values of some of the supplied attributes conflict with one another and/or other Printer
386 attribute values not being set: if the conflicting attribute in the operation has a single value return
387 the attribute and the value. If the attribute in the operation is multi-valued, return only the
388 attribute and those values in a 1setOf that are conflicting with other attributes. Return the 'client-
389 error-conflicting-attributes' status code (see [~~ipp-~~~~mod~~[RFC2911](#)] section 13.1.4.15).

390 4.2 Set-Job-Attributes Operation

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

395 This operation is almost identical to the Set-Printer-Attributes operation and follows the same rules for
396 validation (see section 4.1). The only differences are that the Set-Job-Attributes operation is directed at a Job
397 object rather than a Printer object, there is no "document-format" operation attribute used when setting a Job
398 object, the operation can add an attribute to the (Job) object, the 'delete-attributes' out-of-band value is
399 permitted to remove an attribute, and the validation is the same as the Job Creation operations (Print-Job,
400 Print-URI, and Create-Job), i.e., depends on the "xxx-supported" Printer Description attributes (see [~~ipp-~~
401 ~~mod~~[RFC2911](#)] section 3.1). Using the Set-Printer-Attributes operation, the administrator can set arbitrary
402 'name' values to those "xxx-supported" Printer attributes that include the 'name' attribute syntax if the
403 implementation supports the 'admin-define' out-of-band value for that "xxx-supported" attribute (see section
404 15 and 8.3). However, the Set-Job-Attributes cannot be used to add unsupported names to the Job object.

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

407 If the client supplies a job attribute with the "out-of-band" value 'delete-attribute' (see section 8.2), then the
408 Printer MUST remove the attribute and all of its values from the Job object, if present. The semantic effect of
409 the client supplying the 'delete-attribute' value in a Set-Job-Attributes operation MUST be the same as if the
410 attribute had not been supplied with the Job object in the Job Creation operation, i.e., the Printer applies its
411 default attribute or behavior with lower precedence than the PDL (see the beginning of [~~ipp-~~~~mod~~[RFC2911](#)]
412 section 4.2 and [~~ipp-~~~~mod~~[RFC2911](#)] 3.2.1.1). Any subsequent query of the Job object using Get-Job-
413 Attributes or Get-Jobs MUST NOT return any attribute that has been deleted using the 'delete-attribute' out-
414 of-band value. However, a client can re-establish such a deleted Job attribute with any supported value(s)
415 using a subsequent Set-Job-Attributes operation.

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

420 The validation of the Set-Job-Attributes request is performed by the Printer as if the job had been submitted
421 originally with the new attribute values (and the deleted attributes removed) and with "ipp-attribute-fidelity" set
422 to 'true', i.e., all modified attributes Job attributes and values MUST be supported in combination with the Job
423 attributes not modified. If such a Job Creation operation would have been accepted, then the Set-Job-
424 Attributes MUST be accepted. If such a Job Creation operation would have been rejected, then the Set-Job-
425 Attributes MUST be rejected and the Job MUST be unchanged. In addition, if any of the supplied attributes

426 are not supported, are not settable, or the values are not supported, the Printer object MUST reject the entire
 427 operation; the Printer object MUST NOT partially set some of the supplied attributes. In other words, after
 428 the operation, all the supplied attributes MUST be set or none of them MUST be set, thus making the Set-
 429 Job-Attributes an atomic operation.

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

434 **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'

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

439 4.2.1 Settable and READ-ONLY Job Description attributes

440 If the Printer supports the "job-message-from-operator" Job Description attribute (see [~~ipp-mod~~[RFC2911](#)]
 441 section 4.3.16) and the client explicitly supplies a new value for the "job-message-from-operator" in the Set-
 442 Job-Attributes request, then the Printer MUST set the "job-message-from-operator" Job attribute to this new
 443 value.

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

445 all Job Template job ("xxx") attributes

446 that the implementation supports (see [~~ipp-mod~~[RFC2911](#)] section 4.2 and extensions).

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

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

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

457 4.2.2 Set-Job-Attributes Request

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

459 Group 1: Operation Attributes

460 Natural Language and Character Set:

461 The "attributes-charset" and "attributes-natural-language" attributes as described in [~~ipp-~~
462 ~~mod~~RFC2911] section 3.1.4.1.

463 Target:

464 Either (1) the "printer-uri" (uri) plus "job-id" (integer(1:MAX)) or (2) the "job-uri" (uri) operation
465 attribute(s) which define the target for this operation as described in [~~ipp-mod~~RFC2911] section
466 3.1.5.

467 Requesting User Name:

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

473 Group 2: Job Attributes

474 The client MUST supply a set of Job attributes with one or more values (including explicitly allowed
475 out-of-band values) as defined in [~~ipp-mod~~RFC2911] section 4.2 Job Template Attributes ("xxx"
476 attributes), section 4.3 Job Description Attributes, and any attribute extensions supported by the
477 Printer. The value(s) of each Job attribute supplied in Group 2 replaces the value(s) of the
478 corresponding Job attribute on the target Job object. For attributes that can have multiple values
479 (1setOf), all values supplied by the client replace all values of the corresponding Job object attribute.

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

484 4.2.3 Set-Job-Attributes Response

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

486 Group 1: Operation Attributes

487 Status Message:

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

491 Natural Language and Character Set:

492 The "attributes-charset" and "attributes-natural-language" attributes as described in [~~ipp-~~
493 ~~mod~~RFC2911] section 3.1.4.2.

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Group 2: Unsupported Attributes

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See [\[ipp-modRFC2911\]](#) section 3.1.7 for details on returning Unsupported Attributes.

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

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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 [\[ipp-modRFC2911\]](#) section 13.1.4.9).

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2. The Printer doesn't support the attribute: return the attribute with the 'unsupported' out-of-band attribute value (see [\[ipp-modRFC2911\]](#) section 3.1.7 and [\[ipp-proRFC2910\]](#)) and the 'client-error-attributes-or-values-not-supported' (see [\[ipp-modRFC2911\]](#) section 13.1.4.12).

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

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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 [\[ipp-modRFC2911\]](#) section 13.1.4.12).

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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 [\[ipp-modRFC2911\]](#) section 13.1.4.15).

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4.3 Get-Printer-Supported-Values Operation

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

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

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This operation has identical request/response attributes to the Get-Printer-Attributes operation in IPP/1.1 [\[ipp-modRFC2911\]](#). The operation also behaves identically to the Get-Printer-Attributes operation in IPP/1.1 [\[ipp-modRFC2911\]](#) with the following exceptions:

535

1. The Get-Printer-Supported-Values operation supports only "xxx-supported" attributes.

- 536 2. The Get-Printer-Attributes operation returns the few "xxx-supported" attributes that are defined to be
537 single valued, such as "page-ranges-supported" (boolean) or "pdl-override-supported" (type2 keyword),
538 as single values, while Get-Printer-Supported-Values returns the possible values that can be set as a
539 1setOf of the same attribute syntax type (See Appendix B: Attributes returned from Get-Printer-
540 Supported-Values).
- 541 3. The Get-Printer-Attributes operation returns the current values of requested attributes while the Get-
542 Printer-Supported-Values operation returns the values that are inherently supported by the implementation
543 code, i.e., the values that an administrative client can set in a Set-Printer-Attributes request.
- 544 4. The Get-Printer-Attributes operation returns the current values of requested "xxx-supported" attributes
545 that the Printer is configured to accept in Job Creation operations, including additional values defined by
546 the administrator, while the Get-Printer-Supported-Values operation returns only the values of "xxx-
547 supported" attributes that are inherently supported by the implementation and does not return any
548 additional values defined by the administrator where the implementation supports the 'admin-define' out-
549 of-band value.
- 550 5. The Get-Printer-Attributes never returns the 'admin-define' out-of-band attribute value, while the Get-
551 Printer-Supported-Attributes operation does, if the implementation allows the administrator to define name
552 values by setting that "xxx-supported" attribute with any 'name' value(s).
- 553 6. The Get-Printer-Attributes operation only requires end-user access rights, while the Get-Printer-
554 Supported-Values requires administrator access rights.

555 *Access Rights:* The authenticated user (see [~~ipp-mod~~[RFC2911](#)] section 8.3) performing this operation must
556 be an administrator of the Printer object (see [~~ipp-mod~~[RFC2911](#)] Sections 1 and 8.5).

557 **4.3.1 Definition of the usage of the 'admin-define' out-of-band attribute value**

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

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

571 The Get-Printer-Supported-Values MAY return the 'admin-define' out-of-band attribute value for any
572 IPP/1.1 or extension Job Template attribute if the implementation supports allowing the System Administrator
573 to add values to the "xxx-supported" attribute using the Set-Printer-Attributes operation. In this case, the
574 Printer MUST accept any 'name' value of the correct attribute syntax in a Set-Printer-Attributes operation that
575 is setting that attribute. For "xxx-supported" attributes that are defined with a choice of attribute syntaxes,
576 such as 'keyword | name', it is the 'name' attribute syntax that the System Administrator can use to add new
577 values, not the 'keyword' attribute syntax. For IPP/1.1 this requirement includes the following Job Template
578 attributes:

579 media-supported

580 job-hold-until-supported
581 job-sheets-supported

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

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

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

590 **5 New Operation attributes**

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

594 **5.1 printer-message-from-operator (text(127))**

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

597 Pause-Printer
598 Resume-Printer
599 Purge-Jobs

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

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

610 In addition, the Printer automatically copies:

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

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

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

625 5.2 job-message-from-operator (text(127))

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

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

632 The client OPTIONALLY supplies this attribute in the above operations. The value of this attribute is a
633 message from the operator about the Job object on which the operator has just performed an operation. If
634 supported, the Printer copies the value to the Job's "job-message-from-operator" Job Description attribute
635 (see [[ipp-modRFC2911](#)] section 4.3.16) (even if this Operation attribute is a zero-length text value or consists
636 solely of white space).

637 If the Printer supports this operation attribute, it MUST support both a zero-length text value and the 'no-
638 value' out-of-band value (see [[ipp-modRFC2911](#)] section 4.1) to indicate that the operator has sent no
639 message. In this case, the Printer sets the value of the "job-message-from-operator" to the zero-length value
640 or 'no-value' out-of-band value, respectively. If the client queries the "job-message-from-operator" Job
641 attribute, the IPP object returns the attribute with the zero-length value or the 'no-value' value, respectively.

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

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

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

654 6 New Printer Description Attributes

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

6.1 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-~~[modRFC2911](#)] 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-~~[modRFC2911](#)] 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 "printer-message-from-operator" operation attribute (see section 5.1) or was explicitly set using the Set-Printer-Attributes operation (see section 4.1). This attribute allows the users to know when the "printer-message-from-operator" attribute was last set.

The Printer sets the value of this attribute by copying the value of the Printer's "printer-up-time" attribute (see [~~ipp-~~[modRFC2911](#)] section 4.3.14). If the Printer resets its "printer-up-time" attribute to 1 on power-up,

696 then it MUST change the value of the "printer-message-time" to 0 or a negative number as specified in [~~ipp-~~
697 ~~mod~~[RFC2911](#)] section 4.3.14.

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

700 **6.5 printer-message-date-time (dateTime)**

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

706 This attribute MUST be supported if the Printer supports both the "printer-message-time" and the "printer-
707 current-time" (dateTime) attributes (see [~~ipp-mod~~[RFC2911](#)] section 4.4.30).

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

710 **6.6 printer-xri-supported (1setOf collection)**

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

714 printer-uri-supported (1setOf uri) - see [~~ipp-mod~~[RFC2911](#)] section 4.4.1
715 uri-authentication-supported (1setOf type2 keyword) - see [~~ipp-mod~~[RFC2911](#)] section 4.4.2
716 uri-security-supported (1setOf type2 keyword) - see [~~ipp-mod~~[RFC2911](#)] section 4.4.3

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

721 An IPP Printer MUST NOT provide any other way using IPP to set these three IPP/1.1 READ-ONLY
722 Printer Description attributes, since they are READ-ONLY and MUST have consistent values at all times.
723 Note: The "xri-printer-supported" (1setOf collection) attribute can be put into a directory schema that
724 requires a single text string value, such as SLP or LDPA, by using suitable delimiting characters to separate
725 member attributes of the collection and/or terminating collection values. See [~~svrloc-printer~~] and [~~ldap-~~
726 ~~printer~~].

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

728

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

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

729

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

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

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1. the three IPP/1.1 attribute names: "printer-uri-supported", "uri-authentication-supported", "uri-security-supported" and getting back the parallel values OR

736

737

2. the single attribute name: "printer-xri-supported" and getting back the 1setOf collection which contains the same information semantically, but in a different form.

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A client can query what member attribute values can be set by supplying the three attribute names: "xri-uri-scheme-supported", "xri-authentication-supported", and "xri-security-supported" in a Get-Printer-Supported-Values request and getting back the uriScheme and type2 keyword values that can be set. Since the "printer-xri-supported", "uri-authentication-supported", and "uri-security-supported" attributes are READ-ONLY, they are not queryable with the Get-Printer-Supported-Values operation (see section 4.3). See Table 15.

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744

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

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```
"printer-xri-supported" =
  {
    "xri-uri" = ipp://abc.com/p1
    "xri-authentication" = basic, digest
    "xri-security" = tls
  },
  {
    "xri-uri" = http://abc.com/pq
    "xri-authentication" = none
    "xri-security" = none
  }
}
```

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

760

761

```
"printer-uri-supported" = { ipp://abc.com/p1, ipp://abc.com/p1,
                             http://abc.com/pq }
"uri-authentication-supported" = { basic, digest, none }
"uri-security-supported" = { tls, tls, none }
```

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767 Because there were two authentication values for the `ipp://abc.com/p1` URL, that URL value is repeated.
768 Had the `ipp` URL had 2 authentication values and 3 security values, then there would have been 7 ($2*3 + 1$)
769 parallel values for each of the three attributes, 6 with the same `ipp` URI and 1 with the `http` URI.

770 **6.7 xri-uri-scheme-supported (1setOf uriScheme)**

771 This OPTIONAL READ-ONLY Printer Description attribute identifies the URI schemes that the
772 implementation supports for use in the "printer-uri-supported" (1setOf uri) Printer Description attribute (see
773 [[ipp-modRFC2911](#)] section 4.4.1) and the "xri-uri" member attribute of the "xri-printer-supported" (1setOf
774 collection) Printer Description attribute (see section 6.6).

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

777 **6.8 xri-authentication-supported (1setOf type2 keyword)**

778 This OPTIONAL READ-ONLY Printer Description attribute identifies the Client Authentication mechanisms
779 that the implementation supports for use in the "printer-uri-authentication-supported" (1setOf type2 keyword)
780 Printer Description attribute (see [[ipp-modRFC2911](#)] section 4.4.2) and the "xri-authentication" member
781 attribute of the "xri-printer-supported" (1setOf collection) Printer Description attribute (see section 6.6).

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

784 **6.9 xri-security-supported (1setOf type2 keyword)**

785 This OPTIONAL READ-ONLY Printer Description attribute identifies the URI schemes that the
786 implementation supports for use in the "printer-uri-security-supported" (1setOf type2 keyword) Printer
787 Description attribute (see [[ipp-modRFC2911](#)] section 4.4.3) and the "xri-security" member attribute of the
788 "xri-printer-supported" (1setOf collection) Printer Description attribute (see section 6.6).

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

791 **7 Additional status codes**

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

793 **7.1 'client-error-attributes-not-settable' (0x0413)**

794 The Set-Printer-Attributes or Set-Job-Attributes operation failed because one or more of the specified
795 attributes cannot be set either because the attribute is defined to be READ-ONLY or the attribute is not
796 settable in this implementation (see sections 4.1.3 and 4.2.3), the Printer MUST return this error code and the
797 attribute keyword name(s) and the 'not-settable' out-of-band value (see section 8.1) in the Unsupported
798 Attributes Group (see [[ipp-modRFC2911](#)] section 3.1.7) for all of the attributes that could not be set. When
799 the Printer returns this status, it MUST NOT change any of the attributes supplied in the operation.

800 **8 Additional out-of-band values**

801 This section defines additional out-of-band values. As with all out-of-band values, a client or a Printer MUST
802 NOT use an out-of-band value unless the definition of the attribute in an operation request and/or response
803 explicitly allows such usage. See the beginning of [~~ipp-mod~~[RFC2911](#)] section 4.1.

804 **8.1 'not-settable' out-of-band value**

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

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

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

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

820 **8.1.1 Encoding of the 'not-settable' out-of-band attribute value**

821 The encoding of the 'not-settable' out-of-band value is 0x15 (see [~~ipp-pro~~[RFC2910](#)]). The value-length
822 MUST be 0 and the value empty.

823 **8.2 'delete-attribute' out-of-band value**

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

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

829 An IPP Printer MUST support the 'delete-attribute' out-of-band value if it supports the Set-Job-Attributes
830 operation. A client MUST NOT supply and an IPP object MUST NOT support the 'delete-attribute' out-of-
831 band value in other operations, unless the operations' definition document explicitly defines such usage. For
832 example, the 'delete-attribute' out-of-band value MUST NOT be used in the Set-Printer-Attributes operation,
833 where the absence of an attribute from an IPP object indicates that the attribute is not supported. If a Printer
834 receives this out-of-band value in other operation requests, the Printer MUST either (1) reject the entire
835 request and return the 'client-error-bad-request' status code or (2) ignore the attribute and return it with the
836 'unsupported' out-of-band value.

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

839 **8.2.1 Encoding of the 'delete-attribute' out-of-band value**

840 The encoding of the 'delete-attribute' out-of-band value is 0x16 (see [~~ipp-pr~~[RFC2910](#)]). The value-length
841 MUST be 0 and the value empty.

842 **8.3 'admin-define' out-of-band attribute value**

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

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

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

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

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

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

874 **8.3.1 Encoding of the 'admin-define' out-of-band attribute value**

875 The encoding of the 'admin-define' out-of-band attribute value is 0x17 (see [~~ipp-pr~~[RFC2910](#)]). The value-
876 length MUST be 0 and the value empty.

877 9 Conformance Requirements

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

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

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

- 886 1. the Get-Printer-Supported-Values operation (see section 5), if any "xxx-supported" attributes are
887 settable.
- 888 2. the "printer-settable-attributes-supported" Printer Description attribute (see section 6.1)
- 889 3. the 'not-settable' out-of-band value in responses (see section 8.1)
- 890 4. the 'client-error-not-settable' status code (see section 7.1)
- 891 5. If "printer-message-from-operator" Printer Description attribute is supported (see [~~ipp-mod~~[RFC2911](#)]
892 section 4.4.25), then it MUST be settable.
- 893 6. the Get-Printer-Supported-Values operation (see section 4.3), if any "xxx-supported" attributes are
894 settable.
- 895 7. If a client can set a value with the 'name' attribute syntax for one or more "xxx-supported" attributes,
896 then the 'admin-define' out-of-band attribute value (see section 8.3) MUST be supported in the Get-
897 Printer-Supported-Values response for each such settable attribute (see section 4.3)

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

- 900 1. the "job-settable-attributes-supported" Printer Description attribute (see section 6.2)
- 901 2. the 'not-settable' out-of-band value in responses (see section 8.1)
- 902 3. the 'delete-attribute' out-of-band value in requests (see section 8.2)
- 903 4. the 'client-error-not-settable' status code (see section 7.1)
- 904 5. If the "job-message-from-operator" Printer Description attribute is supported (see [~~ipp-mod~~[RFC2911](#)]
905 4.3.16), then it MUST be settable.

906 It is OPTIONAL for the Printer object to support the "printer-message-time" (integer) and "printer-message-
907 date-time" (dateTime) Printer Description attributes. If both the "printer-message-time" (integer) and the
908 "printer-current-time" (dateTime) (see [~~ipp-mod~~[RFC2911](#)] section 4.4.30) attributes are supported, then the
909 "printer-message-date-time" (dateTime) Printer Description attribute MUST be supported.

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

912 10 IANA Considerations

913 This section contains the exact information for IANA to add to the IPP Registries according to the procedures
 914 defined in RFC 2911 [RFC2911] section 6.

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

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

921 10.1 Operation Registrations

922 The operations defined in this document will be published by IANA according to the procedures in RFC 2911
 923 [RFC2911] section 6.4 with the following path:

924 <ftp.isi.edu/iana/assignments/ipp/operations/>

925
 926
 927 The registry entry will contain the following information:

928	Operations:	Ref.
929	Section:	
930	Set-Printer-Attributes	RFC NNNN
931	4.1	
932	Set-Job-Attributes	RFC NNNN
933	4.2	
934	Get-Printer-Supported-Values	RFC NNNN
935	4.3	
936		
937		

938 10.2 Attribute Registrations

939 The attributes defined in this document will be published by IANA according to the procedures in RFC 2911
 940 [RFC2911] section 6.2 with the following path:

941 <ftp.isi.edu/iana/assignments/ipp/attributes/>

942
 943
 944 The registry entry will contain the following information:

945	Operation attributes:	Ref.
946	Section:	
947	printer-message-from-operator (text(127))	RFC NNNN
948	5.1	
949	job-message-from-operator (text(127))	RFC NNNN
950	5.2	
951		
952		
953	Printer Description attributes:	Ref.
954	Section:	
955	printer-settable-attributes-supported (1setOf type2 keyword)	RFC NNNN
956	6.1	
957	job-settable-attributes-supported (1setOf type2 keyword)	RFC NNNN
958	6.2	
959		
960		

961 document-format-varying-attributes (1setOf type2 keyword)
 962 RFC NNNN
 963 6.3
 964 printer-message-time (integer(MIN:MAX)) RFC NNNN
 965 6.4
 966 printer-message-date-time (dateTime) RFC NNNN
 967 6.5
 968 printer-xri-supported (1setOf collection) RFC NNNN
 969 6.6
 970 xri-uri-scheme-supported (1setOf uriScheme) RFC NNNN
 971 6.7
 972 xri-authentication-supported (1setOf type2 keyword)
 973 6.8
 974 xri-security-supported (1setOf type2 keyword) RFC NNNN
 975 6.9
 976

977 **10.3 Status code Registrations**

978 The status codes defined in this document will be published by IANA according to the procedures in RFC
 979 2911 [RFC2911] section 6.6 with the following path:

980
 981 <ftp.isi.edu/iana/assignments/ipp/status-codes/>
 982

983 The registry entry will contain the following information:

984
 985 Status codes: Ref.
 986 Section:
 987 'client-error-attributes-not-settable' (0x0413) RFC NNNN
 988 7.1
 989

990 **10.4 Out-of-band Attribute Value Registrations**

991 The out-of-band attribute values defined in this document will be published by IANA according to the
 992 procedures in RFC 2911 [RFC2911] section 6.7 with the following path:

993
 994 <ftp.isi.edu/iana/assignments/ipp/out-of-band-attribute-value-tags/>
 995

996 The registry entry will contain the following information:

997
 998 Out-of-band Attribute Values: Ref.
 999 Section:
 000 'not-settable' out-of-band value RFC NNNN
 001 8.1
 002 'delete-attribute' out-of-band value RFC NNNN
 003 8.2
 004 'admin-define' out-of-band attribute value RFC NNNN
 005 8.3

006 **11 Internationalization Considerations**

007 This document has the same localization considerations as the [~~ipp-mod~~RFC2911].

008 12 Security Considerations

009 The IPP Model and Semantics document [~~ipp-mod~~[RFC2911](#) section 8] discusses high level security
010 requirements (Client Authentication, Server Authentication and Operation Privacy). Client Authentication is the
011 mechanism by which the client proves its identity to the server in a secure manner. Server Authentication is the
012 mechanism by which the server proves its identity to the client in a secure manner. Operation Privacy is
013 defined as a mechanism for protecting operations from eavesdropping.

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

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

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

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

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

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099 **15 Change History**

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

102 **15.1 Changes to the March 21, 2000 version to make the March 23, 2000 version**

103 ~~The following changes have been made to the March 21, 2000 version to make the March 23, 2000 version~~
104 ~~as a result of the IPP WG telecons and mailing list discussion:~~

- 105 ~~1. Changed the name of the 'custom' out of band value to 'admin-define'.~~
- 106 ~~2. Tightened up the spec for 'admin-define' so that it cannot be used returned in a Get Printer Attributes response~~
107 ~~to allow users to submit arbitrary values in a Job Creation operation. If that functionality is needed, it will have~~
108 ~~to be done with another out of band value.~~
- 109 ~~3. Clarified that the 'admin-define' out of band value is only intended to be used with "xxx-supported" attributes in a~~
110 ~~Get Printer Supported Values response that are defined to include the 'name' attribute syntax. If other~~
111 ~~documents extend this usage, they MUST define for which attributes and operations.~~
- 112 ~~4. Added the definitions of the xri-uri-scheme-supported (1setOf uriScheme), xri-authentication-supported (1setOf~~
113 ~~type2 keyword), and xri-security-supported (1setOf type2 keyword) READ-ONLY Printer attributes that~~
114 ~~were only referred to. Also made them returnable only in Get Printer Attributes, not Get Printer Supported~~
115 ~~Values, since they are READ-ONLY and the administrator cannot change them.~~
- 116 ~~5. Clarified that the few "xxx-supported" attributes that are single valued, are made 1setOf X in the Get Printer~~
117 ~~Supported Values so that the implementation can indicate what possible values can be set.~~
- 118 ~~6. Required the client to have administrator access rights in order to use the Get Printer Supported Values~~
119 ~~operation, since its purpose is for administrators to use before doing a Set Printer Attributes operation.~~
- 120 ~~7. Clarified that if an implementation supports setting arbitrary names in a Set Printer Attributes request, then it~~
121 ~~MUST support the 'admin-define' out of band value in the Get Printer Supported Values response.~~
- 122 ~~8. Copied the validation rules from the Implementer's Guide into Appendix A, since the IIG is not a standards track~~
123 ~~document. Still refer to the IIG for additional non-normative explanation.~~

124 **15.2 Changes to the March 8, 2000 version to make the March 21, 2000 version**

125 ~~The following changes have been made to the March 8, 2000 version to make the March 21, 2000 version as~~
126 ~~a result of the IPP WG telecons and mailing list discussion:~~

127 ~~9.Changed the name of the 'any value' out of band value to 'custom'. Removed the idea of encoding the attribute~~
128 ~~syntax that the 'custom' out of band value goes with. Required the value length to be zero. Instead, the spec~~
129 ~~for the attribute or attribute syntax defines whether or not the 'custom' out of band value can be used.~~

130 ~~10.Clarified that the 'custom' out of band value can be used in combination with other values of an "xxx-~~
131 ~~supported" Printer attribute.~~

132 ~~11.Clarified that an implementation is not prevented from supporting some 'name' attribute values for "xxx-~~
133 ~~supported" out of the box, if desired. But these values would be returned in a Get Printer Supported Values~~
134 ~~response, such like keywords are.~~

135 ~~15.3Changes to the March 1, 2000 version to make the March 8, 2000 version~~

136 ~~The following changes have been made to the March 1, 2000 version to make the March 8, 2000 version as a~~
137 ~~result of the IPP WG telecons and mailing list discussion:~~

138 ~~1.Added the "printer xri supported" (1setOf collection) attribute so that the three parallel IPP/1.1 "printer uri-~~
139 ~~supported", "uri authentication supported", and "uri security supported" attributes could be set as one atomic~~
140 ~~attribute. Consequently, changed the three parallel attributes to be READ ONLY and removed the~~
141 ~~requirement that three attributes MUST be set in a single request if the three parallel IPP/1.1 "printer uri-~~
142 ~~supported", "uri authentication supported", and "uri security supported" were settable.~~

143 ~~2.Clarified Get Printer Supported Values so that if an implementation does not support setting a settable attribute,~~
144 ~~it MUST NOT return the attribute in the Printer Attribute group and it NEED NOT return the attribute in the~~
145 ~~Unsupported Attributes group, same as in a Get Printer Attributes response for unsupported attributes. Same~~
146 ~~clarification when unsupported attributes are requested.~~

147 ~~3.Fixed "printer message date time" (dateTime) attribute to be OPTIONAL.~~

148 ~~4.Added note as to why the "printer current time" Printer Description attribute is settable (to fix an incorrect time~~
149 ~~or time zone).~~

150 ~~5.Added "xri authentication supported" (1setOf type2 keyword) and "xri security supported" (1setOf type2~~
151 ~~keyword) attributes to the table of attributes that can be queried with Get Printer Supported Values. Added a~~
152 ~~note that these two attributes are NOT queriable with Get Printer Attributes, since the client queries either (1)~~
153 ~~the three "printer uri supported" (1setOf uri), "uri authentication supported" (1setOf type2 keyword), "uri~~
154 ~~security supported" (1setOf type2 keyword) attributes, or (2) the single "printer xri supported" (1setOf~~
155 ~~collection) attribute.~~

156 ~~15.4Changes to the January 30, 2000 version to make the March 1, 2000 version~~

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

159 ~~1.Clarified that this extension may be used with any IPP version, including 1.0, 1.1, and future versions.~~

160 ~~2.Added "READ ONLY" and "not settable" terms to the terminology section. READ ONLY is by definition, and~~
161 ~~"not settable" is by implementation.~~

162 ~~3.Assigned the "operation id" values 0x0013, 0x0014, and 0x0015, respectively, for the Set Printer Attributes,~~
163 ~~Set Job Attributes, and Get Printer Supported Values operations.~~

- 164 ~~4. Clarified that the Set Printer Attributes operation while a Printer SHOULD accept a reasonable number of~~
165 ~~attribute, the Printer need only support setting one attribute in a request, unless it supports setting the three~~
166 ~~"parallel" attributes, ("printer-uri-supported", "uri-authentication-supported", and "uri-security-supported" (see~~
167 ~~[ipp-mod] sections 4.4.1 through 4.4.3), in which case it MUST support setting at least three attributes in a~~
168 ~~single request.~~
- 169 ~~5. Clarified that for the Set Printer Attributes operation the Printer MUST validate all of the supplied attributes in~~
170 ~~combination with each other, as well as with all of the existing attribute of the Printer object Set Printer-~~
171 ~~Attributes.~~
- 172 ~~6. Changed the requirements for accepting the Set Printer Attributes operation when the Printer is in the 'stopped'~~
173 ~~state from MUST to SHOULD, since some implementations may not be able to accept requests when~~
174 ~~stopped.~~
- 175 ~~7. Clarified that setting certain Printer attributes with Set Printer Attributes MAY require more access rights than~~
176 ~~other attributes, i.e., System Administrator rights to set policy and only Operator rights to set the configuration~~
177 ~~attributes to reflect the current hardware setup.~~
- 178 ~~8. Clarified the order of error checking and what is returned in each case in the Set Printer Attributes response.~~
- 179 ~~9. Changed the 'default' out-of-band value to 'delete-attribute' out-of-band value so that the effect is to actually~~
180 ~~remove the Job attribute entirely in the Set Job Attribute operation.~~
- 181 ~~10. Clarified that removing a Job attribute that is not present is not an error.~~
- 182 ~~11. Clarified the validation of the Set Job Attributes request and what is returned for each error.~~
- 183 ~~12. Changed the 'any-name' out-of-band attribute value to a more general 'any-value' out-of-band attribute value~~
184 ~~which in combination with an attribute syntax represents any value of that attribute syntax. The 'any-value'~~
185 ~~value can be used with the 'name' attribute syntax in a Get Printer Supported Values response to indicate~~
186 ~~whether or not a Set Printer Attributes will accept any name to be set for particular "xxx-supported" (1setOf~~
187 ~~name+...) Printer attributes.~~
- 188 ~~13. Clarified that "printer-message-from-operator" and "job-message-from-operator" both REQUIRE that the~~
189 ~~Printer accept zero-length messages and the 'no-value' out-of-band value is synonymous with removing any~~
190 ~~value from these Printer attributes.~~
- 191 ~~14. Clarified that the Get Printer Supported Values is REQUIRED only if the Set Printer Attributes operation will~~
192 ~~accept setting some "xxx-supported" Printer attributes.~~
- 193 ~~15. Changed the IANA Considerations to indicate that the operations, attributes, status codes, and out-of-band~~
194 ~~values won't be registered and published by IANA, since this document is intended to be standards track.~~
- 195 ~~16. Added security considerations for denial of service and sabotage because of the Set operations.~~
- 196 **~~15.5 Changes to the January 20, 2000 version to make the January 30, 2000 version~~**
- 197 ~~The following changes to the January 20, 2000 version to make the January 30, 2000 version as a result of the~~
198 ~~IPP WG telecons and mailing list discussion:~~
- 199 ~~1. Deleted the "document-format-varying-scope" operation attribute from the Set Printer Attributes operation and~~
200 ~~made whether or not the "document-format" operation was present determine whether one or all document~~
201 ~~formats are affected, respectively.~~

- 202 ~~2. Renamed the Get-Reset-Printer-Attributes operation to Get-Printer-Supported-Values, so that it only returns~~
203 ~~"xxx-supported" values. Relegate obtaining reset values to another operation to be paired with the Reset-~~
204 ~~Printer operation in the Set2 [ipp-set2] document.~~
- 205 ~~3. Added "supported" to the names of the "printer-settable-attributes" and "job-settable-attributes" Printer~~
206 ~~Description attributes, so that they could be returned in Get-Printer-Supported-Values and could be set by~~
207 ~~Set-Printer-Attributes.~~
- 208 ~~4. Deleted "authentication-methods-supported" (1setOf type2 keyword) and "security-methods-supported" (1setOf~~
209 ~~type2 keyword) and clarified that "uri-authentication-supported" (1setOf type2 keyword) and "uri-security-~~
210 ~~supported" (1setOf type2 keyword) can return multiple keywords of the same value in a Get-Printer-~~
211 ~~Supported-Values operation.~~

212 ~~15.6 Changes to the January 4, 2000 version to make the January 20, 2000 version~~

213 ~~The following changes to the January 4, 2000 version to make the January 4, 2000 version as a result of the~~
214 ~~IPP-WG telecons and mailing list discussion:~~

- 215 ~~1. Replaced the "factory-settings" operation attribute proposed to be added to the Get-Printer-Attributes operation~~
216 ~~with the Get-Reset-Printer-Attributes operation which returns the reset values and the possible "xxx-supported"~~
217 ~~values.~~
- 218 ~~2. Added the out-of-band 'any-name' value to be used with "xxx-supported" attributes with attribute syntax 'type3~~
219 ~~keyword|name' to indicate that any name will be accepted in a Job-Creation operation for configurations that~~
220 ~~support such a concept.~~
- 221 ~~3. Added authentication-methods-supported (1setOf type2 keyword) and security-methods-supported (1setOf~~
222 ~~type2 keyword) Printer-Description attributes so that clients can discover the possible values for use in Set-~~
223 ~~Printer-Attributes to set "uri-authentication-supported" and "uri-security-supported" attributes, since the Reset-~~
224 ~~Printer operation doesn't change them.~~
- 225 ~~4. Added validation rules that the Printer MUST use to validate a Set-Printer-Attributes request.~~
- 226 ~~5. Clarified that the Set-Printer-Attributes operation MUST NOT have any side-effects on other attributes, unless~~
227 ~~explicitly specified in this document.~~
- 228 ~~6. Moved the specification of the attributes that MUST be READ-ONLY to Appendix A.~~
- 229 ~~7. Added the "document-format-varying-attributes" (1setOf type2 keyword)~~
- 230 ~~8. Added the REQUIRED "document-format-varying-scope" operation attribute to Set-Printer-Attributes in order~~
231 ~~to control whether one or all document formats are affected for those attributes that vary by document format.~~
- 232 ~~9. Clarified that the Printer returns the 'client-error-attributes-not-settable' status code in a Set-Printer-Attributes~~
233 ~~response whether the attribute is READ-ONLY, the attribute is not supported, or the value is not supported.~~
- 234 ~~10. Added the out-of-band 'default' value for use with Set-Job-Attributes and Job-Creation operations.~~
- 235 ~~11. Deleted the "printer-message-operation" Printer-Description attribute.~~
- 236 ~~12. Made the "Get-Reset-Printer-Attributes" operation, along with the "authentication-methods-supported" and the~~
237 ~~"security-methods-supported" Printer-Description attributes REQUIRED, if the Set-Printer-Attributes~~
238 ~~operation is supported.~~

239 ~~13. Made the 'not-settable' out-of-band value and the 'client-error-not-settable' status code REQUIRED, if the~~
240 ~~Set-Printer-Attributes operation is supported.~~

241 ~~14. Made the 'default' out-of-band value REQUIRED, if the Set-Job-Attributes operation is supported.~~

242 ~~15. Removed the requirement that "xxx-supported" Printer-Description attributes that contain only one value be~~
243 ~~read-only.~~

244 ~~15.7 Changes to the December 8, 1999 version to make the January 4, 2000 version~~

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

247 ~~1. Removed the Set operations and related items from the Set2 specification [ipp-set2] to create this Set~~
248 ~~specification.~~

249 ~~2. Added that an attribute that can only be set to one fixed value SHOULD NOT be included in the "printer-~~
250 ~~settable-attributes" or "job-settable-attributes" attributes.~~

251 ~~3. Indicated that the encoding of the 'not-settable' out-of-band value is TBD.~~

252 ~~4. Added that Set-Job-Attributes operation adds an attribute to the Job object if it wasn't already there~~

253 ~~5. Added the conformance section to make it easy to understand the conformance requirements.~~

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15 Appendix A: Allowed Values for Set-Printer-Attributes and Set-Job-Attributes requests

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

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

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The allowed values include the following cases:

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1. **READ-ONLY:** the Set-Printer-Attributes or Set-Job-Attributes operation **MUST NOT** change this attribute and **MUST** reject the entire operation (see section 7.1).
2. **Any of "xxx-supported":** the Set-Printer-Attributes or Set-Job-Attributes operation accepts values that are allowed according to the IPP/1.1 rules for validating the value(s) of an "xxx" Printer or Job attribute against the value(s) of the corresponding "xxx-supported" Printer attribute. Table 4 summarizes those validation rules depending on each attribute syntax and value of an "xxx" attribute supplied in the request and that of the corresponding "xxx-supported" Printer attribute. The "xxx-supported" attribute syntax type and value(s) are obtained from a Get-Printer-Supported-Values response (see the tables in this Appendix).

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Table 4 - Validation rules for 'Any of "xxx-supported" '

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

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

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3. **From Get-Printer-Supported-Values:** the Set-Printer-Attributes operation accepts values that are allowed according to the IPP/1.1 rules for validating the value(s) of an "xxx" Printer attribute against the value(s) of the corresponding "xxx-supported" Printer attribute. Table 5 summarizes those validation rules depending on each attribute syntax and value of an "xxx" attribute supplied in the request and that of the corresponding "xxx-supported" Printer attribute. The "xxx-supported" attribute syntax type and attribute value(s) are obtained from a Get-Printer-Supported-Values response (see Appendix B: Attributes returned from Get-Printer-Supported-Values below).

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Table 5 - Validation rules for 'From Get-Printer-Supported-Values'

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

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

- 287 4. Any value of the proper attribute syntax: the Set-Printer-Attributes or Set-Job-Attributes operation
288 accepts any value of the specified attribute syntax. The attribute syntaxes supported are enumerated
289 below.
- 290 a. Any text(127)
 - 291 b. Any name(127)
 - 292 c. Any uri
 - 293 d. Any boolean
 - 294 e. Any positive integer
 - 295 f. Any dateTime
 - 296 g. 1setOf any uri
- 297 5. Combination of 'Any of "xxx-supported"' or 'Any name'.

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

300

Table 6 - 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"

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Table 7 - 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

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305**Table 8 - 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 9 - Values allowed for Printer Description Attributes in the Set-Printer-Attributes Operation

Printer Description Attributes	Values allowed for Set
printer-uri-supported (1setOf uri)	READ-ONLY
uri-authentication-supported (1setOf type2 keyword)	READ-ONLY
uri-security-supported (1setOf type2 keyword)	READ-ONLY
printer-xri-supported (1setOf collection) member attributes:	
xri-uri (uri)	any uriScheme of "xri-uri-scheme-supported" from Get-Printer-Attributes
xri-authentication (1setOf type2 keyword)	any keyword of "xri-authentication-supported" from Get-Printer-Attributes
xri-security (1setOf type2 keyword)	any keyword of "xri-security-supported" from Get-Printer-Attributes
xri-uri-scheme-supported (1setOf uriScheme)	READ-ONLY
xri-authentication-supported (1setOf type2 keyword)	READ-ONLY
xri-security-supported (1setOf type2 keyword)	READ-ONLY
printer-name (name(127))	Any name(127)
printer-location (text(127))	Any text(127)
printer-info (text(127))	Any text(127)
printer-more-info (uri)	Any uri
printer-driver-installer (uri)	Any uri
printer-make-and-model (text(127))	Any text(127)
printer-more-info-manufacturer (uri)	Any uri
printer-state (type1 enum)	READ-ONLY
printer-state-reasons (1setOf type2 keyword)	READ-ONLY
printer-state-message (text(MAX))	READ-ONLY
ipp-versions-supported (1setOf type2 keyword)	From Get-Printer-Supported-Values
operations-supported (1setOf type2 enum)	From Get-Printer-Supported-Values
multiple-document-jobs-supported (boolean)	From Get-Printer-Supported-Values
charset-configured (charset)	Any of "xxx-supported", use "charset-supported"
charset-supported (1setOf charset)	From Get-Printer-Supported-Values
natural-language-configured (naturalLanguage)	Any of "xxx-supported", use "generated-natural-language-supported"
generated-natural-language-supported (1setOf naturalLanguage)	From Get-Printer-Supported-Values
document-format-default (mimeMediaType)	Any of "xxx-supported"
document-format-supported (1setOf mimeMediaType)	From Get-Printer-Supported-Values
printer-is-accepting-jobs (boolean)	READ-ONLY
queued-job-count (integer(0:MAX))	READ-ONLY
printer-message-from-operator (text(127))	Any text(127)

Printer Description Attributes	Values allowed for Set
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

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

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16 Appendix B: Attributes returned from Get-Printer-Supported-Values

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This Appendix is a normative part of this document and lists all the attributes that are possible for an implementation to return in a Get-Printer-Supported-Values response, i.e., all the "xxx-supported" attributes that can be supplied in a Set-Printer-Attributes request. READ-ONLY attributes MUST NOT be returned in a Get-Printer-Supported-Values response and are indicated in the tables as "READ-ONLY - MUST NOT be returned."

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

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Table 10 - 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)

320

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

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

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

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

327 **Table 12 - 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)

328

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

333 **Table 13 - 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))

334

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

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

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

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

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

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Table 15 - Printer Description Attributes returned from Get-Printer-Supported-Values

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

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

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349 17 Appendix C: Full Copyright Statement

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