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

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22 Abstract

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

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

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

32 ~~Six~~ [Nine](#) Printer Description attributes are defined:

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

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

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

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

37 printer-message-date-time (dateTime)

38 printer-xri-supported (1setOf collection)

- 39 [xri-uri-scheme-supported \(1setOf uriScheme\)](#)
- 40 [xri-authentication-supported \(1setOf type2 keyword\)](#)
- 41 [xri-security-supported \(1setOf type2 keyword\)](#)

42 The full set of IPP documents includes:

- 43 Design Goals for an Internet Printing Protocol [RFC2567]
- 44 Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
- 45 Internet Printing Protocol/1.1: Model and Semantics (this document)
- 46 Internet Printing Protocol/1.1: Encoding and Transport [IPP-PRO]
- 47 Internet Printing Protocol/1.1: Implementer's Guide [IPP-IIG]
- 48 Mapping between LPD and IPP Protocols [RFC2569]

49

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

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

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

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

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

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144

145 1 Introduction

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

154 Three out-of-band values are defined for use with these three operations: 'delete-attribute' for deleting Job
155 attributes with the Set-Job-Attributes request, 'not-settable' for use in either the Set-Job-Attributes or Set-
156 Printer-Attributes responses, and ~~'any-value'~~[admin-define](#) for use in the Get-Printer-Supported-Values
157 response.

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

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

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

167 2 Terminology

168 This section defines terminology used throughout this document.

169 2.1 Conformance Terminology

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

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

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

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

178 2.2 Other terminology

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

183 READ-ONLY: used in an attribute definition [document](#) to indicate that the attribute MUST NOT be
184 settable using an IPP protocol Set operation. In other words, the attribute is not settable by
185 definition.

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

188 3 Requirements and Use Cases

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

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

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

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

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

197 Usage: The system administrator is adding additional [named](#) media to the supported media list ([setting](#)
198 ['name' values to the "media-supported" Printer attribute](#)).

199 The system administrator is reducing the capability of the IPP Printer by removing one of the operations
200 from the supported operations list, such as Cancel-Job, because the policy is to run the IPP Printer like a
201 public facsimile machine. [After having removed Cancel-Job from the list of supported operations, an](#)
202 [administrative client needs to be able to display to an administrator that the implementation is capable](#)
203 [of being reconfigured to support Cancel-Job once again.](#)

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

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

209 4 Definition of the Set operations

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

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

221 The Set Printer operations are summarized in Table 1:

222 **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

223 4.1 Set-Printer-Attributes Operation

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

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

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

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

- 235 2. The Printer MUST support the attribute.

- 236 3. The attribute MUST NOT be READ-ONLY, i.e., the definition of the attribute MUST NOT indicate
237 that the attribute is READ-ONLY (see Appendix A for an indication of which IPP/1.1 attributes are
238 READ-ONLY).
- 239 4. The attribute MUST be settable in this implementation.
- 240 5. The Printer MUST support the value according to the rules defined in Appendix A, i.e., each value
241 of each supplied "xxx" attribute MUST be validated against a value of a corresponding "xxx-
242 supported" Printer attribute. One of those rules permits an administrator to set arbitrary 'name'
243 values to those "xxx-supported" Printer attributes that include the 'name' attribute syntax if the
244 implementation supports the 'admin-define' out-of-band value for that "xxx-supported" attribute (see
245 section 4.3.1 and 8.3).
- 246 6. The attribute's values MUST NOT conflict with the values of other Printer attributes, including ones
247 being set in this same operation.

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

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

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

266 4.1.1 Settable and READ-ONLY Printer Description attributes

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

- 268 all Job Template Default ("xxx-default") attributes
- 269 all Job Template Supported ("xxx-supported") attributes
- 270 all Job Template Ready ("xxx-ready") attributes

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

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

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

279 The current values of each "xxx-supported" Printer attribute MUST reflect the current policy for support of
280 the corresponding "xxx" attribute. If an "xxx-supported" Printer ~~Description~~ attribute ~~is~~are settable ~~in an~~
281 implementation, then ~~they~~its value(s) MUST affect the behavior of the implementation. If ~~they~~an "xxx-
282 supported" Printer attribute is defined to be ~~are~~READ-ONLY or is not-settable in an implementation, then
283 ~~they~~its values MUST NOT be settable ~~reflect the implementation and cannot be changed explicitly~~ using
284 the Set-Printer-Attributes operation. Consider the following example:

285 For example, if the "operations-supported" Printer Description attribute (see [ipp-mod] section
286 4.4.15) is settable in a particular implementation, then changing its value with a Set-Printer-
287 Attributes operation MUST affect the operations that the implementation accepts or rejects. Such
288 an implementation will need to be able to reject values for operations that it contains no code
289 support for (see section 4.35). If the "operations-supported" Printer Description attribute is not
290 settable in a particular implementation, then that implementation MUST reject an attempt to set it
291 with a Set-Printer-Attributes operation, return the 'client-error-attributes-not-settable' status code
292 (see section 7.1), and return the "operations-supported" attribute with the out-of-band 'not-settable'
293 value in the Unsupported Attributes Group.

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

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

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

310 4.1.2 Set-Printer-Attributes Request

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

312 Group 1: Operation Attributes

313 Natural Language and Character Set:

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

316 Target:

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

319 Requesting User Name:

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

322 "document-format" (mimeType):

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

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

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

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

343 Group 2: Printer Attributes

351 The client MUST supply a set of Printer attributes with one or more values (including explicitly
352 allowed out-of-band values) as defined in [ipp-mod] section 4.2 Job Template Attributes ("xxx-
353 default", "xxx-supported", and "xxx-ready" attributes), section 4.4 Printer Description Attributes,
354 and any attribute extensions supported by the Printer. The value(s) of each Printer attribute supplied
355 in Group 2 replaces the value(s) of the corresponding Printer attribute on the target Printer object.
356 For attributes that can have multiple values (1setOf), all values supplied by the client replace all
357 values of the corresponding Printer object attribute. If a Printer object attribute had not been
358 configured yet and so had the 'no-value' out-of-band value (see [ipp-mod] section 4.1), the supplied
359 value(s) replace the 'no-value' value.
360

361 4.1.3 Set-Printer-Attributes Response

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

363 Group 1: Operation Attributes

364 Status Message:

365 In addition to the REQUIRED status code returned in every response, the response OPTIONALLY
366 includes a "status-message" (text(255)) and/or a "detailed-status-message" (text(MAX)) operation
367 attribute as described in [ipp-mod] sections 13 and 3.1.6.
368

369 Natural Language and Character Set:

370 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]
371 section 3.1.4.2.
372

373 Group 2: Unsupported Attributes

374 See [ipp-mod] section 3.1.7 for details on returning Unsupported Attributes.
375

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

- 381 1. The number of attributes supplied by the client exceeds the maximum number that the
382 Printer supports in a Set-Printer-Attributes request: return the 'client-error-request-entity-
383 too-large' (see [ipp-mod] section 13.1.4.9).
- 384 2. The Printer doesn't support the attribute: return the attribute with the "out-of-band" value
385 'unsupported' (see [ipp-mod] section 3.1.7 and [ipp-pro]) and the 'client-error-attributes-or-
386 values-not-supported' (see [ipp-mod] section 13.1.4.12).
- 387 3. The attribute is either READ-ONLY (in its definition) or is not-settable in this
388 implementation: return the attribute with the "out-of-band" value 'not-settable' (see section
389 8.1) and the 'client-error-attributes-not-settable' status code (see section 7.1).

- 390 4. The Printer doesn't support the value: if the attribute in the operation has a single value
391 return it. If the attribute in the operation is multi-valued, return only those values in a 1setOf
392 that are not supported. Return the 'client-error-attributes-or-values-not-supported' status
393 code (see [ipp-mod] section 13.1.4.12).
- 394 5. The values of some of the supplied attributes conflict with one another and/or other Printer
395 attribute values not being set: if the conflicting attribute in the operation has a single value
396 return the attribute and the value. If the attribute in the operation is multi-valued, return only
397 the attribute and those values in a 1setOf that are conflicting with other attributes. Return
398 the 'client-error-conflicting-attributes' status code (see [ipp-mod] section 13.1.4.15).

399 4.2 Set-Job-Attributes Operation

400 This OPTIONAL operation allows a client to set the values of the attributes of a Job object. In the request,
401 the client supplies the set of Job keyword attribute names ~~s keywords~~ and values that are to be set. In the
402 response, the IPP object returns success or rejects the entire request with indications of which attribute or
403 attributes could not be set.

404 This operation is almost identical to the Set-Printer-Attributes operation and follows the same rules for
405 validation (see section 4.1). The only differences are that the Set-Job-Attributes operation is directed at a
406 Job object rather than a Printer object, there is no "document-format" operation attribute used when setting
407 a Job object, the operation can add an attribute to the (Job) object, the 'delete-attributes' out-of-band value is
408 permitted to remove an attribute, and the validation is the same as the Job Creation operations (Print-Job,
409 Print-URI, and Create-Job), i.e., depends on the "xxx-supported" Printer Description attributes (see [ipp-
410 mod] section 3.1). Using the Set-Printer-Attributes operation, the administrator can set arbitrary 'name'
411 values to those "xxx-supported" Printer attributes that include the 'name' attribute syntax if the
412 implementation supports the 'admin-define' out-of-band value for that "xxx-supported" attribute (see section
413 4.3.1 and 8.3). However, the Set-Job-Attributes cannot be used to add unsupported names to the Job
414 object.

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

417 If the client supplies a job attribute with the "out-of-band" value 'delete-attribute' (see section 8.2), then the
418 Printer MUST remove the attribute and all of its values from the Job object, if present. The semantic effect
419 of the client supplying the 'delete-attribute' value in a Set-Job-Attributes operation MUST be the same as if
420 the attribute had not been supplied with the Job object in the Job Creation operation, i.e., the Printer applies
421 its default attribute or behavior with lower precedence than the PDL (see the beginning of [ipp-mod] section
422 4.2 and [ipp-mod] 3.2.1.1). Any subsequent query of the Job object using Get-Job-Attributes or Get-Jobs
423 MUST NOT return any attribute that has been deleted using the 'delete-attribute' out-of-band value.
424 However, a client can re-establish such a deleted Job attribute with any supported value(s) using a
425 subsequent Set-Job-Attributes operation.

426 If the client supplies an attribute in a Set-Job-Attributes request with the 'delete-attribute' value and that
427 attribute is not present on the Job object, the Printer ignores that supplied attribute in the request, does not

428 return the attribute in the Unsupported Attributes group, and returns the 'successful-ok' status code, if there
429 are no other problems with the request.

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

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

444 **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'

445

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

4.2.1 Settable and READ-ONLY Job Description attributes

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

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

all Job Template job ("xxx") attributes

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

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

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

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

4.2.2 Set-Job-Attributes Request

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

Group 1: Operation Attributes

Natural Language and Character Set:

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

Target:

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

Requesting User Name:

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

Group 2: Job Attributes

484 The client MUST supply a set of Job attributes with one or more values (including explicitly
485 allowed out-of-band values) as defined in [ipp-mod] section 4.2 Job Template Attributes ("xxx"
486 attributes), section 4.3 Job Description Attributes, and any attribute extensions supported by the
487 Printer. The value(s) of each Job attribute supplied in Group 2 replaces the value(s) of the
488 corresponding Job attribute on the target Job object. For attributes that can have multiple values
489 (1setOf), all values supplied by the client replace all values of the corresponding Job object
490 attribute.

491
492 If the client supplies an "xxx" attribute with the 'delete-attribute' out-of-band value (see section 8.2),
493 the Printer MUST remove the "xxx" attribute from the Job object, if present.
494

495 4.2.3 Set-Job-Attributes Response

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

497 Group 1: Operation Attributes

498 Status Message:

499 In addition to the REQUIRED status code returned in every response, the response OPTIONALLY
500 includes a "status-message" (text(255)) and/or a "detailed-status-message" (text(MAX)) operation
501 attribute as described in [ipp-mod] sections 13 and 3.1.6.
502

503 Natural Language and Character Set:

504 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]
505 section 3.1.4.2.
506

507 Group 2: Unsupported Attributes

508 See [ipp-mod] section 3.1.7 for details on returning Unsupported Attributes.
509

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

- 515 1. The number of attributes supplied by the client exceeds the maximum number that the
516 Printer supports in a Set-Printer-Attributes request: return the 'client-error-request-entity-
517 too-large' (see [ipp-mod] section 13.1.4.9).
- 518 2. The Printer doesn't support the attribute: return the attribute with the "out-of-band" value
519 'unsupported' [out-of-band attribute value](#) (see [ipp-mod] section 3.1.7 and [ipp-pro]) and the
520 'client-error-attributes-or-values-not-supported' (see [ipp-mod] section 13.1.4.12).

- 521 3. The attribute is READ-ONLY (in its definition) or is not-settable in this implementation:
522 return the attribute with the ~~"out-of-band" value~~ 'not-settable' out-of-band attribute value (see
523 section 8.1) and the 'client-error-attributes-not-settable' status code (see section 7.1).
- 524 4. The Printer doesn't support the value: if the attribute in the operation has a single value
525 return it. If the attribute in the operation is multi-valued, return only those values in a 1setOf
526 that are not supported. Return the 'client-error-attributes-or-values-not-supported' status
527 code (see [ipp-mod] section 13.1.4.12).
- 528 5. The values of some of the supplied attributes conflict with one another and/or other Job
529 attribute values not being set: if the conflicting attribute in the operation has a single value
530 return the attribute and the value. If the attribute in the operation is multi-valued, return only
531 the attribute and those values in a 1setOf that are conflicting with other attributes. Return
532 the 'client-error-conflicting-attributes' status code (see [ipp-mod] section 13.1.4.15).

533 4.3 Get-Printer-Supported-Values Operation

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

538 The Printer MUST return in the Get-Printer-Supported-Values response those, and only those, "xxx-
539 supported" Printer attributes that it supports setting with the Set-Printer-Attributes operation. If an
540 implementation does not support setting an attribute that is requested, it MUST NOT return that attribute in
541 the Printer Attributes Group of the Get-Printer-Supported-Values response. Furthermore, in such a case if a
542 client requests the value of an attribute that is not settable or is not supported (as in the Get-Printer-
543 Attributes response), the Unsupported Attributes Group of the response NEED NOT contain the
544 "requested-attributes" operation attribute with any such supplied-requested (attribute keyword) values
545 (attribute keywords) that were requested by the client but are not supported or are not settable by the IPP
546 Printer.

547 This operation has identical request/response attributes to the Get-Printer-Attributes operation in IPP/1.1
548 [ipp-mod]. The operation also behaves identically to the Get-Printer-Attributes operation in IPP/1.1 [ipp-
549 mod] with the following exceptions:

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

- 556 3. The Get-Printer-Attributes operation returns the current values of ~~specified~~ requested attributes
 557 while the Get-Printer-Supported-Values operation returns the values that are inherently supported by
 558 the implementation code, i.e., the values that an administrative client can set in ~~permit a client to~~
 559 ~~determine what values of "xxx-supported" attributes the Printer supports in the~~ a Set-Printer-
 560 Attributes ~~operation~~ request.
- 561 4. The Get-Printer-Attributes operation returns the current values of requested "xxx-supported"
 562 attributes that the Printer is configured to accept in Job Creation operations, including additional
 563 values defined by the administrator, while ~~the~~ Get-Printer-Supported-Values operation returns only
 564 the values of "xxx-supported" attributes that are inherently supported by the implementation and
 565 does not return any ~~'name' attribute syntax~~ additional values defined by the administrator where the
 566 implementation supports the 'admin-define' out-of-band value for any "xxx-supported" attributes.
- 567 5. The Get-Printer-Attributes never returns the 'admin-define' out-of-band attribute value, while the
 568 Get-Printer-Supported-Attributes operation does, if the implementation allows the administrator to
 569 define name values by setting that "xxx-supported" attribute with any 'name' value(s).
- 570 6. The Get-Printer-Attributes operation only requires end-user access rights, while the Get-Printer-
 571 Supported-Values requires administrator access rights.

572 Access Rights: The authenticated user (see [ipp-mod] section 8.3) performing this operation must be an
 573 administrator of the Printer object (see [ipp-mod] Sections 1 and 8.5). ~~ISSUE—Should the access control~~
 574 ~~for Get-Printer-Supported-Values should be same as Set-Printer-Attributes, i.e., administrator, so that an~~
 575 ~~administrator client can test whether the user has the proper privileges to perform the Set-Printer-Attributes~~
 576 ~~operation as a by-product of doing the Get-Printer-Supported-Values operation which the client SHOULD~~
 577 ~~do before hand anyway?~~

578 **4.3.1 Definition of the usage of the 'admin-define' out-of-band attribute value**

579 If the Set-Printer-Attributes operation allows the System Administrator to define arbitrary 'name' values ~~will~~
 580 accept (any) name value for an "xxx-supported" attribute, then the Get-Printer-Supported-Values operation
 581 MUST return the 'any value admin-define' out-of-band attribute value ~~with the 'name' attribute syntax (see~~
 582 section 8.3) as one of the values of the "xxx-supported" attribute. In other words, the ~~'any value admin-~~
 583 define' out-of-band attribute value ~~used in combination with the 'name' attribute syntax indicates that the~~
 584 Printer implementation supports clients setting arbitrary 'name' attribute syntax values for that "xxx-
 585 supported" attributes using the Set-Printer-Attributes operation as long as the attribute is defined with the
 586 'name' attribute syntax.

587 For example, if the Get-Printer-Supported-Values operation returns several keywords as the value of the
 588 "media-supported" attribute, then the Set-Printer-Attributes operation MUST accept any of these keywords
 589 as values for the "media-supported" attribute. If the Get-Printer-Supported-Values operation returns an
 590 'any value admin-define' out-of-band attribute value ~~with the 'name' attribute syntax~~ as one of the values of
 591 the "media-supported" attribute, then the Set-Printer-Attributes operation MUST accept any value whose
 592 attribute syntax is 'name' as a values for the "media-supported" attribute (provided that the user is properly
 593 authenticated to use the Set-Printer-Attributes operation, e.g., has administrative access rights).

594 The Get-Printer-Supported-Values MAY return the '~~any value~~admin-define' out-of-band attribute value ~~in~~
595 ~~combination with the 'name' attribute syntax~~ for any IPP/1.1 or extension Job Template attribute if the
596 implementation supports allowing the System Administrator to add values to the "xxx-supported" attribute
597 using the Set-Printer-Attributes operation. In this case, of the following IPP/1.1 attributes in which case the
598 Printer MUST accept any 'name' value of the correct attribute syntax in a Set-Printer-Attributes operation
599 that is setting that attribute. For "xxx-supported" attributes that are defined with a choice of attribute
600 syntaxes, such as 'keyword | name', it is the 'name' attribute syntax that the System Administrator can use to
601 add new values, not the 'keyword' attribute syntax. For IPP/1.1 this requirement includes the following Job
602 Template attributes:

603 media-supported
604 job-hold-until-supported
605 job-sheets-supported

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

608 If the '~~any value~~admin-define' out-of-band attribute value ~~in combination with the 'name' attribute syntax~~ is
609 not one of the values of an "xxx-supported" attribute returned in a Get-Printer-Supported-Values response,
610 then the Printer MUST NOT allow the Set-Printer-Attributes operation for that attribute to contain a value
611 ~~whose attribute syntax is 'name'~~that is not one of the explicit 'keyword' or 'name' values returned in a Get-
612 Printer-Supported-Values response.

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

615 5 New Operation attributes

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

619 5.1 "printer-message-from-operator" (text(127))

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

622 Pause-Printer
623 Resume-Printer
624 Purge-Jobs

625 The client OPTIONALLY supplies this attribute in the above operations. The value of this attribute is a
626 message from the operator about the Printer object on which the operator is performing the operation. If
627 this operation attribute is supported, the Printer copies the value to its "printer-message-from-operator"

628 Printer Description attribute (see [ipp-mod] section 4.4.25) even if this Operation attribute is a zero-length
629 text value or consists solely of white space.

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

635 In addition, the Printer automatically copies:

- 636 1. the value of its "printer-up-time" attribute (see [ipp-mod] section 4.4.29) to its "printer-message-
637 time" attribute,
- 638 2. the value of its printer-current-time" (dateTime) attribute (see [ipp-mod] section 4.4.30) to its
639 "printer-message-date-time" attribute, if supported.

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

642 The "printer-message-from-operator" operation attribute MUST NOT be supported as an operation attribute
643 for the Set-Printer-Attributes operation. If the operator wants to set the Printer's "printer-message-from-
644 operator" Printer Description attribute when issuing the Set-Printer-Attributes operation, the client supplies
645 the "printer-message-from-operator" explicitly with its new value as one of the Printer Description
646 attributes in Group 2 in the request. The Printer also updates its "printer-message-time" and "printer-
647 message-date-time" Printer Description attributes. If the client does not explicitly supply the "printer-
648 message-from-operator" with its new value in the Set-Printer-Attributes request, the Printer leaves the value
649 of the Printer's "printer-message-from-operator" Printer Description attribute unchanged.

650 5.2 "job-message-from-operator" (text(127))

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

653 Cancel-Job
654 Hold-Job
655 Release-Job
656 Restart-Job

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

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

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

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

671 The "job-message-from-operator" operation attribute MUST NOT be supported as an operation attribute for
672 the Set-Job-Attributes operation. If the operator wants to set the Job's "job-message-from-operator" Job
673 Description attribute when issuing the Set-Job-Attributes operation, the client MUST supply the "job-
674 message-from-operator" with its new value as one of the Job Description attributes in Group 2 in the
675 request. Otherwise, the Printer leaves the value of the Job's "job-message-from-operator" Job Description
676 attribute unchanged by not explicitly setting the attribute. If the client does not explicitly supply the "job-
677 message-from-operator" with its new value in the Set-Job-Attributes request, the Printer leaves the value of
678 the Job's "job-message-from-operator" Job Description attribute unchanged.

679 **6 New Printer Description Attributes**

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

682 **6.1 printer-settable-attributes-supported (1setOf type2 keyword)**

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

690 Standard keyword values are:

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

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

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

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

Standard keyword values are:

'none': There are no settable Job attributes.

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

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

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

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

This OPTIONAL READ-ONLY Printer Description attribute contains the time that the Printer's "printer-message-from-operator" was changed by the operator using any operation where the client supplied the "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-mod] section 4.3.14). If the Printer resets its "printer-up-time" attribute to 1 on power-up, then it MUST change the value of the "printer-message-time" to 0 or a negative number as specified in [ipp-mod] section 4.3.14.

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

725 6.5 printer-message-date-time (dateTime)

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

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

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

735 6.6 printer-xri-supported (1setOf collection)

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

- 739 printer-uri-supported (1setOf uri) - see [ipp-mod] section 4.4.1
- 740 uri-authentication-supported (1setOf type2 keyword) - see [ipp-mod] section 4.4.2
- 741 uri-security-supported (1setOf type2 keyword) - see [ipp-mod] section 4.4.3

742 When setting the "printer-xri-supported" attribute with a Set-Printer-Attributes request, the Printer **MUST**
 743 also set these three IPP/1.1 READ-ONLY Printer Description attributes as a defined side effect. Thus, this
 744 collection attribute provides the means to **set these three IPP/1.1 READ-ONLY attributes atomically so that**
 745 **they are guarantee that these three IPP/1.1 READ-ONLY attributes are always set together, thereby** never
 746 **leaving these three attributes** in a partially inconsistent state.

747 **An IPP Printer MUST NOT provide any other way using IPP to set these three IPP/1.1 READ-ONLY**
 748 **Printer Description attributes, since they are READ-ONLY and MUST have consistent values at all times.**

749 Note: The "xri-printer-supported" (1setOf collection) attribute can be put into a directory schema that
 750 requires a single text string value, such as SLP or LDAPA, by using suitable delimiting characters to separate
 751 member attributes of the collection and/or terminating collection values. See [svrloc-printer] and [ldap-
 752 printer].

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

754 **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

755 Each collection value MUST contain a single unique value for the "xri-uri" member attribute. However,
 756 the other two member attributes are multi-valued, so that a single URI can support more than one
 757 authentication scheme and/or more than one security scheme. Other than the uniqueness and the cardinality
 758 requirements, the semantics of these three member attributes is given in [ipp-mod] sections 4.4.1, 4.4.2, and
 759 4.4.3, respectively.

760 A client can query the current values ~~by supplying using the in a~~ Get-Printer-Attributes ~~request~~ operation by
 761 supplying either:

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

766 A client can query what member attribute values can be set by supplying the ~~two~~ three attribute names: "xri-
 767 uri-scheme-supported", "xri-authentication-supported", and "xri-security-supported" in a Get-Printer-
 768 Supported-Values request and getting back the uriScheme and 1setOf-type2 keyword values that can be set.
 769 Since the "printer-xri-supported", "uri-authentication-supported", and "uri-security-supported" attributes are
 770 READ-ONLY, they are not querable with the Get-Printer-Supported-Values operation (see section 4.3).
 771 See Table 15.

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

```
777 "printer-xri-supported =
778   { "printer-xri-supported-uri" = ipp://abc.com/pl
779     "printer-xri-supported-authentication" = basic, digest
780     "printer-xri-supported-security" = tls
781   },
782   { "printer-xri-supported-uri" = http://abc.com/pg
783     "printer-xri-supported-authentication" = none
784     "printer-xri-supported-security" = none
785   }
786
787
```

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

790

```
791     "printer-uri-supported" = { ipp://abc.com/p1, ipp://abc.com/p1,  
792                               http://abc.com/pg }  
793     "uri-authentication-supported" = { basic, digest, none }  
794     "uri-security-supported" = { tls, tls, none }  
795
```

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

799 **6.7 xri-uri-scheme-supported (1setOf uriScheme)**

800 This OPTIONAL READ-ONLY Printer Description attribute identifies the URI schemes that the
801 implementation supports for use in the "printer-uri-supported" (1setOf uri) Printer Description attribute (see
802 [ipp-mod] section 4.4.1) and the "xri-uri" member attribute of the "xri-printer-supported" (1setOf
803 collection) Printer Description attribute (see section 6.6).

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

806 **6.8 xri-authentication-supported (1setOf type2 keyword)**

807 This OPTIONAL READ-ONLY Printer Description attribute identifies the Client Authentication
808 mechanisms that the implementation supports for use in the "printer-authentication-supported" (1setOf
809 type2 keyword) Printer Description attribute (see [ipp-mod] section 4.4.2) and the "xri-authentication"
810 member attribute of the "xri-printer-supported" (1setOf collection) Printer Description attribute (see section
811 6.6).

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

814 **6.9 xri-security-supported (1setOf type2 keyword)**

815 This OPTIONAL READ-ONLY Printer Description attribute identifies the URI schemes that the
816 implementation supports for use in the "printer-security-supported" (1setOf type2 keyword) Printer
817 Description attribute (see [ipp-mod] section 4.4.3) and the "xri-security" member attribute of the "xri-
818 printer-supported" (1setOf collection) Printer Description attribute (see section 6.6).

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

821 **7 Additional status codes**

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

823 7.1 'client-error-attributes-not-settable' (0x0413)

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

830 8 Additional out-of-band values

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

834 8.1 'not-settable' out-of-band value

835 The 'not-settable' out-of-band attribute value is used-returned by the IPP Printer in the Unsupported
836 Attributes group of a ~~Set-Job-Attributes or Set-Printer-Attributes~~ response to indicate that thean attribute
837 (supplied by the client) in the request is READ-ONLY by definition or is not settable in this
838 implementation (see sections 4.1.3 and 4.2.3).

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

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

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

851 8.1.1 Encoding of the 'not-settable' out-of-band attribute value

852 The encoding of the 'not-settable' out-of-band value is 0x15 (see [ipp-pro]). The value-length MUST be 0
853 and the value empty.

854 8.2 'delete-attribute' out-of-band value

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

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

861 An IPP Printer MUST support the 'delete-attribute' out-of-band value if it supports the Set-Job-Attributes
862 operation. A Client MUST NOT supply and an IPP object MUST NOT support the 'delete-attribute' out-
863 of-band value in other operations, unless the operations' definition document explicitly defines such usage.
864 For example, the 'delete-attribute' out-of-band value MUST NOT be used in ~~such as~~ the Set-Printer-
865 Attributes operation, where the absence of an attribute from an IPP object indicates that the attribute is not
866 supported. If a Printer receives this out-of-band value in other operation requests, the Printer MUST either
867 (1) reject the entire request and return the 'client-error-bad-request' status code ~~and not process any of the~~
868 other-supplied-attributes or (2) ignore the attribute and return it with the 'unsupported' out-of-band value.

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

871 8.2.1 Encoding of the 'delete-attribute' out-of-band value

872 The encoding of the 'delete-attribute' out-of-band value is 0x16 (see [ipp-pro]). The value-length MUST be
873 0 and the value empty.

874 ~~1.38.3~~ 'any-valueadmin-define' out-of-band attribute value

875 Section 4.3 defines the Get-Printer-Supported-Values response to contain the values of an "xxx-supported"
876 attribute that are supported by the implementation before any additional value are defined by the
877 administrator. The 'any-valueadmin-define' out-of-band attribute value ~~MAY be used~~ is returned as an
878 additional value of an "xxx-supported" attribute in a Get-Printer-Supported-Values response ~~in combination~~
879 with an attribute syntax to represent "any" attribute value of that attribute syntax indicate that the
880 implementation supports allowing an administrator to define additional arbitrary 'name' values for that
881 "xxx-supported" attribute.

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

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

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

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

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

909 **1.1.18.3.1 Encoding of the '~~any-value~~admin-define' out-of-band attribute value**

910 The encoding of the '~~any-value~~admin-define' out-of-band attribute value is 0x17 (see [ipp-pro]). The value-
911 length MUST be 0 and the value empty. This out-of-band value REQUIRES a non-zero length and an
912 attribute value which identifies an attribute syntax type. The attribute value is either (1) a one-octet
913 attribute syntax tag as defined in [ipp-pro] (value length = 1) or (2) a 0x7F code followed by a 4 octets of
914 an extended attribute syntax type code as allocated in [ipp-pro] (value length = 5).

915 **9 Conformance Requirements**

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

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

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

- 924 1. the Get-Printer-Supported-Values operation (see section 5), if any "xxx-supported" attributes are
925 settable.
- 926 2. the "printer-settable-attributes-supported" Printer Description attribute (see section 6.1)
- 927 3. the 'not-settable' out-of-band value in responses (see section 8.1)
- 928 4. the 'client-error-not-settable' status code (see section 7.1)
- 929 5. If "printer-message-from-operator" Printer Description attribute is supported (see [ipp-mod]
930 section 4.4.25), then it MUST be settable.
- 931 6. the Get-Printer-Supported-Values operation (see section 4.3), if any "xxx-supported" attributes
932 are settable.
- 933 7. If a client can set a value with the 'name' attribute syntax for one or more "xxx-supported"
934 attributes, then the '~~any value~~admin-define' out-of-band attribute value (see section 8.3) MUST
935 be supported in the Get-Printer-Supported-Values response ~~with the 'name' attribute syntax~~ for
936 each such settable attribute (see section 4.3)

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

- 939 1. the "job-settable-attributes-supported" Printer Description attribute (see section 6.2)
- 940 2. the 'not-settable' out-of-band value in responses (see section 8.1)
- 941 3. the 'delete-attribute' out-of-band value in requests (see section 8.2)
- 942 4. the 'client-error-not-settable' status code (see section 7.1)
- 943 5. If the "job-message-from-operator" Printer Description attribute is supported (see [ipp-mod]
944 4.3.16), then it MUST be settable.

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

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

952 **10 IANA Considerations**

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

957 **11 Internationalization Considerations**

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

959 **12 Security Considerations**

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

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

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

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

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

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

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1044 15 Change History

1045 This section summarizes the changes. Each sub-section is in reverse chronological order. Adding or
1046 removing ISSUES that don't change the document are not listed here.

1047 15.1 Changes to the March 21, 2000 version to make the March 23, 2000 version

1048 The following changes have been made to the March 21, 2000 version to make the March 23, 2000 version
1049 as a result of the IPP WG telecons and mailing list discussion:

- 1050 1. Changed the name of the 'custom' out-of-band value to 'admin-define'.
- 1051 2. Tightened up the spec for 'admin-define' so that it cannot be used returned in a Get-Printer-Attributes
1052 response to allow users to submit arbitrary values in a Job Creation operation. If that functionality is
1053 needed, it will have to be done with another out of band value.

- 1054 3. Clarified that the 'admin-define' out-of-band value is only intended to be used with "xxx-supported"
1055 attributes in a Get-Printer-Supported-Values response that are defined to include the 'name' attribute
1056 syntax. If other documents extend this usage, they MUST define for which attributes and operations.
- 1057 4. Added the definitions of the xri-uri-scheme-supported (1setOf uriScheme), xri-authentication-supported
1058 (1setOf type2 keyword), and xri-security-supported (1setOf type2 keyword) READ-ONLY Printer
1059 attributes that were only referred to. Also made them returnable only in Get-Printer-Attributes, not Get-
1060 Printer-Supported-Values, since they are READ-ONLY and the administrator cannot change them.
- 1061 5. Clarified that the few "xxx-supported" attributes that are single valued, are made 1setOf X in the Get-
1062 Printer-Supported-Values so that the implementation can indicate what possible values can be set.
- 1063 6. Required the client to have administrator access rights in order to use the Get-Printer-Supported-Values
1064 operation, since its purpose is for administrators to use before doing a Set-Printer-Attributes operation.
- 1065 7. Clarified that if an implementation supports setting arbitrary names in a Set-Printer-Attributes request,
1066 then it MUST support the 'admin-define' out-of-band value in the Get-Printer-Supported-Values
1067 response.
- 1068 8. Copied the validation rules from the Implementer's Guide into Appendix A, since the IIG is not a
1069 standards track document. Still refer to the IIG for additional non-normative explanation.

1070 **15.2 Changes to the March 8, 2000 version to make the March 21, 2000 version**

1071 The following changes have been made to the March 8, 2000 version to make the March 21, 2000 version
1072 as a result of the IPP WG telecons and mailing list discussion:

- 1073 9. Changed the name of the 'any-value' out-of-band value to 'custom'. Removed the idea of encoding the
1074 attribute syntax that the 'custom' out-of-band value goes with. Required the value length to be zero.
1075 Instead, the spec for the attribute or attribute syntax defines whether or not the 'custom' out-of-band
1076 value can be used.
- 1077 10. Clarified that the 'custom' out-of-band value can be used in combination with other values of an "xxx-
1078 supported" Printer attribute.
- 1079 11. Clarified that an implementation is not prevented from supporting some 'name' attribute values for
1080 "xxx-supported" out-of-the-box, if desired. But these values would be returned in a Get-Printer-
1081 Supported-Values response, such like keywords are.

1082 **15.3 Changes to the March 1, 2000 version to make the March 8, 2000 version**

1083 The following changes have been made to the March 1, 2000 version to make the March 8, 2000 version as
1084 a result of the IPP WG telecons and mailing list discussion:

- 1085 1. Added the "printer-xri-supported" (1setOf collection) attribute so that the three parallel IPP/1.1 "printer-
1086 uri-supported", "uri-authentication-supported", and "uri-security-supported" attributes could be set as

- 1087 one atomic attribute. Consequently, changed the three parallel attributes to be READ-ONLY and
1088 removed the requirement that three attributes MUST be set in a single request if the three parallel
1089 IPP/1.1 "printer-uri-supported", "uri-authentication-supported", and "uri-security-supported" were
1090 settable.
- 1091 2. Clarified Get-Printer-Supported-Values so that if an implementation does not support setting a settable
1092 attribute, it MUST NOT return the attribute in the Printer Attribute group and it NEED NOT return the
1093 attribute in the Unsupported Attributes group, same as in a Get-Printer-Attributes response for
1094 unsupported attributes. Same clarification when unsupported attributes are requested.
- 1095 3. Fixed "printer-message-date-time" (dateTime) attribute to be OPTIONAL.
- 1096 4. Added note as to why the "printer-current-time" Printer Description attribute is settable (to fix an
1097 incorrect time or time zone).
- 1098 5. Added "xri-authentication-supported" (1setOf type2 keyword) and "xri-security-supported" (1setOf
1099 type2 keyword) attributes to the table of attributes that can be queried with Get-Printer-Supported-
1100 Values. Added a note that these two attributes are NOT queryable with Get-Printer-Attributes, since the
1101 client queries either (1) the three "printer-uri-supported" (1setOf uri), "uri-authentication-supported"
1102 (1setOf type2 keyword), "uri-security-supported" (1setOf type2 keyword) attributes, or (2) the single
1103 "printer-xri-supported" (1setOf collection) attribute.

1104 ~~15.3~~15.4 Changes to the January 30, 2000 version to make the March 1, 2000 version

1105 The following changes to the January 30, 2000 version to make the March 1, 2000 version as a result of the
1106 IPP WG telecons and mailing list discussion:

- 1107 1. Clarified that this extension may be used with any IPP version, including 1.0, 1.1, and future versions.
- 1108 2. Added "READ-ONLY" and "not-settable" terms to the terminology section. READ-ONLY is by
1109 definition, and "not-settable" is by implementation.
- 1110 3. Assigned the "operation-id" values 0x0013, 0x0014, and 0x0015, respectively, for the Set-Printer-
1111 Attributes, Set-Job-Attributes, and Get-Printer-Supported-Values operations.
- 1112 4. Clarified that the Set-Printer-Attributes operation while a Printer SHOULD accept a reasonable number
1113 of attribute, the Printer need only support setting one attribute in a request, unless it supports setting the
1114 three "parallel" attributes, ("printer-uri-supported", "uri-authentication-supported", and "uri-security-
1115 supported" (see [ipp-mod] sections 4.4.1 through 4.4.3), in which case it MUST support setting at least
1116 three attributes in a single request.
- 1117 5. Clarified that for the Set-Printer-Attributes operation the Printer MUST validate all of the supplied
1118 attributes in combination with each other, as well as with all of the existing attribute of the Printer
1119 object Set-Printer-Attributes.

- 1120 6. Changed the requirements for accepting the Set-Printer-Attributes operation when the Printer is in the
1121 'stopped' state from MUST to SHOULD, since some implementations may not be able to accept
1122 requests when stopped.
- 1123 7. Clarified that setting certain Printer attributes with Set-Printer-Attributes MAY require more access
1124 rights than other attributes, i.e., System Administrator rights to set policy and only Operator rights to set
1125 the configuration attributes to reflect the current hardware setup.
- 1126 8. Clarified the order of error checking and what is returned in each case in the Set-Printer-Attributes
1127 response.
- 1128 9. Changed the 'default' out-of-band value to 'delete-attribute' out-of-band value so that the effect is to
1129 actually remove the Job attribute entirely in the Set-Job-Attribute operation.
- 1130 10. Clarified that removing a Job attribute that is not present is not an error.
- 1131 11. Clarified the validation of the Set-Job-Attributes request and what is returned for each error.
- 1132 12. Changed the 'any-name' out-of-band attribute value to a more general 'any-value' out-of-band attribute
1133 value which in combination with an attribute syntax represents any value of that attribute syntax. The
1134 'any-value' value can be used with the 'name' attribute syntax in a Get-Printer-Supported-Values
1135 response to indicate whether or not a Set-Printer-Attributes will accept any name to be set for particular
1136 "xxx-supported" (1setOf name | ...) Printer attributes.
- 1137 13. Clarified that "printer-message-from-operator" and "job-message-from-operator" both REQUIRE that
1138 the Printer accept zero-length messages and the 'no-value' out-of-band value is synonymous with
1139 removing any value from these Printer attributes.
- 1140 14. Clarified that the Get-Printer-Supported-Values is REQUIRED only if the Set-Printer-Attributes
1141 operation will accept setting some "xxx-supported" Printer attributes.
- 1142 15. Changed the IANA Considerations to indicate that the operations, attributes, status codes, and out-of-
1143 band-values won't be registered and published by IANA, since this document is intended to be standards
1144 track.
- 1145 16. Added security considerations for denial of service and sabotage because of the Set operations.

1146 **15.5 Changes to the January 20, 2000 version to make the January 30, 2000 version**

1147 The following changes to the January 20, 2000 version to make the January 30, 2000 version as a result of
1148 the IPP WG telecons and mailing list discussion:

- 1149 1. Deleted the "document-format-varying-scope" operation attribute from the Set-Printer-Attributes
1150 operation and made whether or not the "document-format" operation was present determine whether
1151 one or all document formats are affected, respectively.

- 1152 2. Renamed the Get-Reset-Printer-Attributes operation to Get-Printer-Supported-Values, so that it only
1153 returns "xxx-supported" values. Relegate obtaining reset values to another operation to be paired with
1154 the Reset-Printer operation in the Set2 [ipp-set2] document.
- 1155 3. Added "-supported" to the names of the "printer-settable-attributes" and "job-settable-attributes" Printer
1156 Description attributes, so that they could be returned in Get-Printer-Supported-Values and could be set
1157 by Set-Printer-Attributes.
- 1158 4. Deleted "authentication-methods-supported" (1setOf type2 keyword) and "security-methods-supported"
1159 (1setOf type2 keyword) and clarified that "uri-authentication-supported" (1setOf type2 keyword) and
1160 "uri-security-supported" (1setOf type2 keyword) can return multiple keywords of the same value in a
1161 Get-Printer-Supported-Values operation.

1162 **15.6 Changes to the January 4, 2000 version to make the January 20, 2000 version**

1163 The following changes to the January 4, 2000 version to make the January 4, 2000 version as a result of the
1164 IPP WG telecons and mailing list discussion:

- 1165 1. Replaced the "factory-settings" operation attribute proposed to be added to the Get-Printer-Attributes
1166 operation with the Get-Reset-Printer-Attributes operation which returns the reset values and the possible
1167 "xxx-supported" values.
- 1168 2. Added the out-of-band 'any-name' value to be used with "xxx-supported" attributes with attribute syntax
1169 'type3 keyword | name' to indicate that any name will be accepted in a Job Creation operation for
1170 configurations that support such a concept.
- 1171 3. Added authentication-methods-supported (1setOf type2 keyword) and security-methods-supported
1172 (1setOf type2 keyword) Printer Description attributes so that clients can discover the possible values for
1173 use in Set-Printer-Attributes to set "uri-authentication-supported" and "uri-security-supported"
1174 attributes, since the Reset-Printer operation doesn't change them.
- 1175 4. Added validation rules that the Printer MUST use to validate a Set-Printer-Attributes request.
- 1176 5. Clarified that the Set-Printer-Attributes operation MUST NOT have any side effects on other attributes,
1177 unless explicitly specified in this document.
- 1178 6. Moved the specification of the attributes that MUST be READ-ONLY to Appendix A.
- 1179 7. Added the "document-format-varying-attributes" (1setOf type2 keyword)
- 1180 8. Added the REQUIRED "document-format-varying-scope" operation attribute to Set-Printer-Attributes
1181 in order to control whether one or all document formats are affected for those attributes that vary by
1182 document format.
- 1183 9. Clarified that the Printer returns the 'client-error-attributes-not-settable' status code in a Set-Printer-
1184 Attributes response whether the attribute is READ-ONLY, the attribute is not supported, or the value is
1185 not supported.

- 1186 10. Added the out-of-band 'default' value for use with Set-Job-Attributes and Job Creation operations.
- 1187 11. Deleted the "printer-message-operation" Printer Description attribute.
- 1188 12. Made the "Get-Reset-Printer-Attributes" operation, along with the "authentication-methods-supported"
1189 and the "security-methods-supported" Printer Description attributes REQUIRED, if the Set-Printer-
1190 Attributes operation is supported.
- 1191 13. Made the 'not-settable' out-of-band value and the 'client-error-not-settable' status code REQUIRED, if
1192 the Set-Printer-Attributes operation is supported.
- 1193 14. Made the 'default' out-of-band value REQUIRED, if the Set-Job-Attributes operation is supported.
- 1194 15. Removed the requirement that "xxx-supported" Printer Description attributes that contain only one
1195 value be read-only.

1196 **15.7 Changes to the December 8, 1999 version to make the January 4, 2000 version**

1197 The following changes to the December 8, 1999 version to make the January 4, 2000 version as a result of
1198 the IPP WG telecons and mailing list discussion:

- 1199 1. Removed the Set operations and related items from the Set2 specification [ipp-set2] to create this Set
1200 specification.
- 1201 2. Added that an attribute that can only be set to one fixed value SHOULD NOT be included in the
1202 "printer-settable-attributes" or "job-settable-attributes" attributes.
- 1203 3. Indicated that the encoding of the 'not-settable' out-of-band value is TBD.
- 1204 4. Added that Set-Job-Attributes operation adds an attribute to the Job object if it wasn't already there
- 1205 5. Added the conformance section to make it easy to understand the conformance requirements.

1206 **16 Appendix A: Allowed Values for Set-Printer-Attributes and Set-Job-Attributes requests**

1207 This appendix is a normative part of this document and contains a table of all IPP/1.1 attributes. Each row
1208 contains:

1209 - An attribute and

1210

1211 - The values allowed in the Set-Printer-Attributes or Set-Job-Attributes operation-request for the
1212 attribute. The entry in each cell is the name (first few words) of each item below 1, 2, 3, 4a-g,
1213 and 5.

1214 The allowed values include the following cases:

- 1215 1. READ-ONLY: the Set-Printer-Attributes or Set-Job-Attributes operation MUST NOT change this
1216 attribute and MUST reject the entire operation (see section 7.1).
- 1217 2. Any of "xxx-supported": the Set-Printer-Attributes or Set-Job-Attributes operation accepts values
1218 that are allowed according to the IPP/1.1 rules for validating the value(s) of an "xxx" Printer or Job
1219 attribute against the value(s) of the corresponding "xxx-supported" Printer attribute. Table 4
1220 summarizes those validation rules depending on each attribute syntax and value of an "xxx"
1221 attribute supplied in the request and that of the corresponding "xxx-supported" Printer attribute.
1222 The "xxx-supported" attribute syntax type and value(s) are obtained from a Get-Printer-Supported-
1223 Values response (see the tables in this Appendix).

1224

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

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

1225

1226 For additional non-normative explanatory information see section 3.1.2.3 of the "Internet Printing
1227 Protocol/1.1: Implementer's Guide" [ipp-iig]).

- 1228 3. From Get-Printer-Supported-Values: the Set-Printer-Attributes operation accepts values that are
1229 allowed according to the IPP/1.1 rules for validating the value(s) of an "xxx" Printer attribute
1230 against the value(s) of the corresponding "xxx-supported" Printer attribute. Table 5 summarizes
1231 those validation rules depending on each attribute syntax and value of an "xxx" attribute supplied in
1232 the request and that of the corresponding "xxx-supported" Printer attribute. The "xxx-supported"
1233 attribute syntax type and attribute value(s) are obtained from a Get-Printer-Supported-Values
1234 response (see Appendix B: Attributes returned from Get-Printer-Supported-Values below).

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

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

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

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

If a Printer implementation doesn't want to allow setting values indicated in this Appendix as "any xxx", it can make the value be read-only-not-settable. ~~For example, for a monochrome printer the attribute "color-supported" is "false" and MUST be read-only. Otherwise an administrator could set it to "true" because the value can have "any boolean" according to the rules in Table 7 below.~~

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"

Job Template Attributes	Values allowed for Set
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"

1255

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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

Job Description Attributes	Values allowed for Set
attributes-natural-language (naturalLanguage)	READ-ONLY

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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:	

Printer Description Attributes	Values allowed for Set
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)
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 **

Printer Description Attributes	Values allowed for Set
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

1261

1262 ** - The "printer-current-time" (dateTime) attribute is settable in order to allow an administrator to correct
1263 an incorrect dateTime or time zone.

1264 17 Appendix B: Attributes returned from Get-Printer-Supported-Values

1265 This Appendix is a normative part of this document and lists all the attributes that are possible for an
1266 implementation to return in a Get-Printer-Supported-Values response, i.e., all the "xxx-supported" attributes
1267 that can be supplied in a Set-Printer-Attributes request. READ-ONLY attributes MUST NOT be returned
1268 in a Get-Printer-Supported-Values response and are indicated in the tables as "READ-ONLY - MUST NOT
1269 be returned."

1270 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be a single
1271 integer value in the range specified by the value returned by the Get-Printer-Supported-Values operation.

1272 **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)

1273

1274 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be a single
1275 rangeOfInteger value whose bounds do not exceed those of the range specified by the value returned by the
1276 Get-Printer-Supported-Values operation.

1277 **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)

1278

1279 The following table has the same criteria as the last, but is for Printer Description attributes.

1280 **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)

1281

1282 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be one or
 1283 more integers and rangeOfInteger values, such that the integer values described by these integers and
 1284 rangeOfInteger is the same as or a subset of the integers described by the integers and rangeOf Integer of
 1285 value returned by the Get-Printer-Supported-Values operation.

1286 **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))

1287

1288 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be one or
 1289 more values, where each such value matches a value returned by the Get-Printer-Supported-Values
 1290 operation. A keyword, enum, boolean, charset, naturalLanguage, uriScheme, mimeType or resolution
 1291 value matches if it is equal. **For Job Template attributes with the attribute syntax 'type3 keyword | name',
 1292 Any 'name' attribute syntax value matches the '~~any-name~~admin-define' out-of-band value, if the
 1293 implementation allows the administrator to set any name values for the attribute.**

1294 **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 any name 'admin-define')
job-sheets-supported (1setOf(type3 keyword name(MAX)))	1setOf (type3 keyword any name '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 any name 'admin-define')

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

1295 **** Note: the Get-Printer-Supported-Values returns a '1setOf boolean' so that all possible values are**
 1296 **indicated, while Get-Printer-Attributes returns only a single 'boolean' value.**

1297 The following table has the same criteria as the last, but is for Printer Description attributes.

1298 **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
<u>xri-printer-supported (1setOf collection)</u>	<u>MUST NOT be returned; see next three attributes returned with Get-Printer-Attributes:</u>
<u>xri-uri-scheme-supported (1setOf uriScheme)</u>	<u>READ-ONLY - MUST NOT be returned</u>
xri-authentication-supported (1setOf type2 keyword)-**	<u>READ-ONLY - MUST NOT be returned</u> 1setOf type2 keyword
xri-security-supported (1setOf type2 keyword)-**	<u>READ-ONLY - MUST NOT be returned</u> 1setOf type2 keyword
ipp-versions-supported (1setOf type2 keyword)	1setOf type2 keyword
operations-supported (1setOf type2 enum)	1setOf type2 keyword
multiple-document-jobs-supported (boolean)	1setOf boolean **
charset-supported (1setOf charset)	1setOf charset
generated-natural-language-supported (1setOf naturalLanguage)	1setOf naturalLanguage
document-format-supported (1setOf mimeType)	1setOf mimeType
color-supported (boolean)	1setOf boolean **
reference-uri-schemes-supported (1setOf uriScheme)	1setOf uriScheme
<u>pdl-override-supported (type2 keyword)</u>	<u>1setOf type2 keyword **</u>
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

1299 **** Note: the Get-Printer-Supported-Values returns a '1setOf X' so that all possible values are indicated,**
 1300 **while Get-Printer-Attributes returns only a single 'X' value.**

1301 ~~** Note: there is no corresponding "xri authentication supported" (1setOf type2 keyword) and "xri-~~
 1302 ~~security supported" (1setOf type2 keyword) Printer Description attributes that can be queried using the Get-~~
 1303 ~~Printer Attributes operation. Instead, the client queries either: (1) the three "printer uri supported" (uri),~~
 1304 ~~"uri authentication supported" (1setOf type2 keyword) and "uri security supported" (1setOf type2 keyword)~~
 1305 ~~attributes or (2) the single "printer xri supported" (1setOf collection) attribute.~~

1306 ~~For the following attributes, the value allowed by the Set Printer Attributes operation MUST be a single~~
 1307 ~~value that matches one of the values returned by the Get Printer Supported Values operation. A keyword,~~
 1308 ~~enum, boolean, charset, naturalLanguage, uriScheme, mimeType or resolution value matches if it is~~
 1309 ~~equal. A name matches the 'any name' out of band value.~~

1310

1311 ~~**Table 16 – Printer Description Attributes returned from Get Printer Supported Values**~~

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

1312

1313 ~~For the following attributes, the Set Printer Attributes operation MUST NOT return a value. The IPP~~
 1314 ~~Model document [ipp-mod] document specifies the allowed values.~~

1315

1316 ~~**Table 17 – Printer Description Attributes returned from Get Printer Supported Values**~~

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

1317

1318 **18 Appendix C: Full Copyright Statement**

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