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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 Get-Printer-Supported-Values operation returns values that the
27 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-value', and 'not-
29 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 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 The full set of IPP documents includes:

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

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

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

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

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

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

68

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137 **1 Introduction**

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

146 Three out-of-band values are defined for use with these three operations: 'delete-attribute' for deleting Job
147 attributes with the Set-Job-Attributes request, 'not-settable' for use in either the Set-Job-Attributes or Set-
148 Printer-Attributes responses, and 'any-value' for use in the Get-Printer-Supported-Values response.

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

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

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

158 **2 Terminology**

159 This section defines terminology used throughout this document.

160 **2.1 Conformance Terminology**

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

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

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

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

169 2.2 Other terminology

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

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

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

178 3 Requirements and Use Cases

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

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

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

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

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

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

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

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

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

196 4 Definition of the Set operations

197 The Set-Printer-Attributes operation (as are all Printer operations) are directed at Printer objects. A client
198 MUST always supply the "printer-uri" operation attribute in order to identify the correct target of the

199 operation. These descriptions assume all of the common semantics of IPP/1.1 Model and Semantics
200 document [ipp-mod] section 3.1.

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

208 The Set Printer operations are summarized in Table 1:

209 **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

210 **4.1 Set-Printer-Attributes Operation**

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

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

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

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

- 222 2. The Printer MUST support the attribute.
- 223 3. The attribute MUST NOT be READ-ONLY, i.e., the definition of the attribute MUST NOT indicate
224 that the attribute is READ-ONLY (see Appendix A for an indication of which IPP/1.1 attributes are
225 READ-ONLY).
- 226 4. The attribute MUST be settable in this implementation.
- 227 5. The Printer MUST support the value according to the rules defined in Appendix A.

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

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

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

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

248 4.1.1 Settable and READ-ONLY Printer Description attributes

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

250 all Job Template Default ("xxx-default") attributes
251 all Job Template Supported ("xxx-supported") attributes
252 all Job Template Ready ("xxx-ready") attributes

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

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

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

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

264 For example, if the "operations-supported" Printer Description attribute (see [ipp-mod] section
265 4.4.15) is settable in a particular implementation, then changing its value with a Set-Printer-
266 Attributes operation **MUST** affect the operations that the implementation accepts or rejects. Such
267 an implementation will need to be able to reject values for operations that it contains no code
268 support for (see section 5). If the "operations-supported" Printer Description attribute is not settable
269 in a particular implementation, then that implementation **MUST** reject an attempt to set it with a
270 Set-Printer-Attributes operation, return the 'client-error-attributes-not-settable' status code (see
271 section 7.1), and return the "operations-supported" attribute with the out-of-band 'not-settable' value
272 in the Unsupported Attributes Group.

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

278 **4.1.2 Set-Printer-Attributes Request**

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

280 Group 1: Operation Attributes

281 Natural Language and Character Set:

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

284

285 Target:

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

288

289 Requesting User Name:

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

292

293 "document-format" (mimeMediaType):

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

299

300 If the client includes this attribute, the Printer **MUST** change the supplied attributes for the
301 document format specified by this attribute. If a supplied attribute is a member of the "document-
302 format-varying-attributes" (i.e., the attribute varies by document format, see section 6.3), the Printer
303 **MUST** change the supplied attribute for the document format specified by this attribute, but not for
304 other document formats. If a supplied attribute isn't a member of the "document-format-varying-

305 attributes" (i.e. it doesn't vary by document format), the Printer MUST change the supplied attribute
306 for all document formats.

307
308 If the client omits this attribute, the Printer MUST change the supplied attributes for all document
309 formats whether or not they vary by document-format.

310
311 If the client supplies a value for the "document-format" Operation attribute that is either
312 'application/octet-stream' or not supported by the Printer, i.e., is not among the values of the Printer
313 object's "document-format-supported" attribute, the Printer object MUST reject the operation and
314 return the 'client-error-document-format-not-supported' status code. Note: the document-format
315 'application/octet-stream' is the union of several document-formats (see [ipp-mod] section 3.2.5.1,
316 Get-Printer-Attributes) and is not a true document-format.

317

318 Group 2: Printer Attributes

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

328

329 4.1.3 Set-Printer-Attributes Response

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

331 Group 1: Operation Attributes

332 Status Message:

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

336

337 Natural Language and Character Set:

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

340

341 Group 2: Unsupported Attributes

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

343

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

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

367 4.2 Set-Job-Attributes Operation

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

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

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

380 If the client supplies a job attribute with the "out-of-band" value 'delete-attribute' (see section 8.2), then the
381 Printer **MUST** remove the attribute and all of its values from the Job object, if present. The semantic effect
382 of the client supplying the 'delete-attribute' value in a Set-Job-Attributes operation **MUST** be the same as if
383 the attribute had not been supplied with the Job object in the Job Creation operation, i.e., the Printer applies
384 its default attribute or behavior with lower precedence than the PDL (see the beginning of [ipp-mod] section
385 4.2 and [ipp-mod] 3.2.1.1). Any subsequent query of the Job object using Get-Job-Attributes or Get-Jobs
386 **MUST NOT** return any attribute that has been deleted using the 'delete-attribute' out-of-band value.
387 However, a client can re-establish such a deleted Job attribute with any supported value(s) using a
388 subsequent Set-Job-Attributes operation.

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

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

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

407

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'

408

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

413 **4.2.1 Settable and READ-ONLY Job Description attributes**

414 If the Printer supports the "job-message-from-operator" Job Description attribute (see [ipp-mod] section
 415 4.3.16) and the client explicitly supplies a new value for the "job-message-from-operator" in the Set-Job-
 416 Attributes request, then the Printer **MUST** set the "job-message-from-operator" Job attribute to this new
 417 value.

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

419 all Job Template job ("xxx") attributes

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

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

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

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

431 **4.2.2 Set-Job-Attributes Request**

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

433 Group 1: Operation Attributes

434 Natural Language and Character Set:

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

437 Target:

438 Either (1) the "printer-uri" (uri) plus "job-id" (integer(1:MAX)) or (2) the "job-uri" (uri) operation
439 attribute(s) which define the target for this operation as described in [ipp-mod] section 3.1.5.
440

441 Requesting User Name:

442 The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as
443 described in [ipp-mod] section 8.3.
444

445 Group 2: Job Attributes

446 The client MUST supply a set of Job attributes with one or more values (including explicitly
447 allowed out-of-band values) as defined in [ipp-mod] section 4.2 Job Template Attributes ("xxx"
448 attributes), section 4.3 Job Description Attributes, and any attribute extensions supported by the
449 Printer. The value(s) of each Job attribute supplied in Group 2 replaces the value(s) of the
450 corresponding Job attribute on the target Job object. For attributes that can have multiple values
451 (1setOf), all values supplied by the client replace all values of the corresponding Job object
452 attribute.
453

454 If the client supplies an "xxx" attribute with the 'delete-attribute' out-of-band value (see section 8.2),
455 the Printer MUST remove the "xxx" attribute from the Job object, if present.
456
457

458 **4.2.3 Set-Job-Attributes Response**

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

460 Group 1: Operation Attributes

461 Status Message:

462 In addition to the REQUIRED status code returned in every response, the response OPTIONALLY
463 includes a "status-message" (text(255)) and/or a "detailed-status-message" (text(MAX)) operation
464 attribute as described in [ipp-mod] sections 13 and 3.1.6.
465

466 Natural Language and Character Set:

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

469

470 Group 2: Unsupported Attributes

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

472

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

- 478 1. The number of attributes supplied by the client exceeds the maximum number that the
479 Printer supports in a Set-Printer-Attributes request: return the 'client-error-request-entity-
480 too-large' (see [ipp-mod] section 13.1.4.9).
- 481 2. The Printer doesn't support the attribute: return the attribute with the "out-of-band" value
482 'unsupported' (see [ipp-mod] section 3.1.7 and [ipp-pro]) and the 'client-error-attributes-or-
483 values-not-supported' (see [ipp-mod] section 13.1.4.12).
- 484 3. The attribute is READ-ONLY (in its definition) or is not-settable in this implementation:
485 return the attribute with the "out-of-band" value 'not-settable' (see section 8.1) and the
486 'client-error-attributes-not-settable' status code (see section 7.1).
- 487 4. The Printer doesn't support the value: if the attribute in the operation has a single value
488 return it. If the attribute in the operation is multi-valued, return only those values in a 1setOf
489 that are not supported. Return the 'client-error-attributes-or-values-not-supported' status
490 code (see [ipp-mod] section 13.1.4.12).
- 491 5. The values of some of the supplied attributes conflict with one another and/or other Job
492 attribute values not being set: if the conflicting attribute in the operation has a single value
493 return the attribute and the value. If the attribute in the operation is multi-valued, return only
494 the attribute and those values in a 1setOf that are conflicting with other attributes. Return
495 the 'client-error-conflicting-attributes' status code (see [ipp-mod] section 13.1.4.15).

496 **4.3 Get-Printer-Supported-Values Operation**

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

- 503 1. The Get-Printer-Supported-Values operation supports only "xxx-supported" attributes.
- 504 2. The Get-Printer-Attributes operation returns the current value of specified attributes while the Get-
505 Printer-Supported-Values operation returns values that permit a client to determine what values of
506 "xxx-supported" attributes the Printer supports in the Set-Printer-Attributes operation.
- 507 3. If an implementation does not support setting an attribute that is requested, it **MUST NOT** return
508 that attribute in the Printer Attributes Group of the Get-Printer-Supported-Values response.
509 Furthermore, in such a case, as in the Get-Printer-Attributes response, the Unsupported Attributes
510 Group of the response **NEED NOT** contain the "requested-attributes" operation attribute with any
511 supplied values (attribute keywords) that were requested by the client but are not supported or are
512 not settable by the IPP Printer.
- 513 4. The Get-Printer-Supported-Values operation does not return any 'name' attribute syntax values for
514 any "xxx-supported" attributes. Instead, if the Set-Printer-Attributes operation will accept (any)
515 name value for an "xxx-supported" attribute, then the Get-Printer-Supported-Values operation
516 **MUST** return the 'any-value' out-of-band attribute value with the 'name' attribute syntax (see section
517 8.3) as one of the values of the "xxx-supported" attribute. In other words, the 'any-value' out-of-
518 band attribute value used in combination with the 'name' attribute syntax indicates that the Printer
519 implementation supports clients setting 'name' attribute syntax values for "xxx-supported" attributes
520 that are defined with the 'name' attribute syntax.

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

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

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

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

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

538 5 New Operation attributes

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

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

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

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

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

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

558 In addition, the Printer automatically copies:

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

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

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

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

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

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

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

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

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

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

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

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

602 **6 New Printer Description Attributes**

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

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

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

613 Standard keyword values are:

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

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

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

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

622 Standard keyword values are:

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

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

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

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

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

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

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

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

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

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

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

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

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

658 **6.6 printer-xri-supported (1setOf collection)**

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

662 printer-uri-supported (1setOf uri) - see [ipp-mod] section 4.4.1

663 uri-authentication-supported (1setOf type2 keyword) - see [ipp-mod] section 4.4.2

664 uri-security-supported (1setOf type2 keyword) - see [ipp-mod] section 4.4.3

665 When setting the "printer-xri-supported" attribute with a Set-Printer-Attributes request, the Printer MUST
666 also set these three IPP/1.1 READ-ONLY Printer Description attributes as a defined side effect. Thus, this
667 collection attribute provides the means to guarantee that these three IPP/1.1 READ-ONLY attributes are
668 always set together, thereby never leaving these three attributes in a partially inconsistent state.

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

670

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

671 Each collection value MUST contain a single unique value for the "xri-uri" member attribute. However,
 672 the other two member attributes are multi-valued, so that a single URI can support more than one
 673 authentication scheme and/or more than one security scheme. Other than the uniqueness and the cardinality
 674 requirements, the semantics of these three member attributes is given in [ipp-mod] sections 4.4.1, 4.4.2, and
 675 4.4.3, respectively.

676 A client can query the current values by supplying in a Get-Printer-Attributes request either:

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

681 A client can query what member attribute values can be set by supplying the two attribute names: "xri-
 682 authentication-supported" and "xri-security-supported" in a Get-Printer-Supported-Values request and
 683 getting back the 1setOf type2 keyword values that can be set. Since the "printer-xri-supported", "uri-
 684 authentication-supported", and "uri-security-supported" attributes are READ-ONLY, they are not queriable
 685 with Get-Printer-Supported-Values operation (see section 4.3). See Table 13.

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

```

691 "printer-xri-supported =
692     { "printer-xri-supported-uri" = ipp://abc.com/p1
693       "printer-xri-supported-authentication" = basic, digest
694       "printer-xri-supported-security" = tls
695     },
696     { "printer-xri-supported-uri" = http://abc.com/pq
697       "printer-xri-supported-authentication" = none
698       "printer-xri-supported-security" = none
699     }
700 }
701
```

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

```
704 "printer-uri-supported" = { ipp://abc.com/p1, ipp://abc.com/p1,  
705 http://abc.com/pg }  
706 "uri-authentication-supported" = { basic, digest, none }  
707 "uri-security-supported" = { tls, tls, none }  
708  
709
```

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

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

716 **7 Additional status codes**

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

718 **7.1 'client-error-attributes-not-settable' (0x0413)**

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

725 **8 Additional out-of-band values**

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

729 **8.1 'not-settable' out-of-band value**

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

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

735 **8.1.1 Encoding of the 'not-settable' out-of-band attribute value**

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

737 **8.2 'delete-attribute' out-of-band value**

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

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

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

749 **8.2.1 Encoding of the 'delete-attribute' out-of-band value**

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

751 **8.3 'any-value' out-of-band attribute value**

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

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

757

758 **8.3.1 Encoding of the 'any-value' out-of-band attribute value**

759 The encoding of the 'any-value' out-of-band attribute value is 0x17 (see [ipp-pro]). This out-of-band value
760 REQUIRES a non-zero length and an attribute value which identifies an attribute syntax type. The attribute
761 value is either (1) a one-octet attribute syntax tag as defined in [ipp-pro] (value length = 1) or (2) a 0x7F
762 code followed by a 4-octets of an extended attribute syntax type code as allocated in [ipp-pro] (value length
763 = 5).

764 9 Conformance Requirements

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

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

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

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

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

- 788 1. the "job-settable-attributes-supported" Printer Description attribute (see section 6.2)
- 789 2. the 'not-settable' out-of-band value in responses (see section 8.1)
- 790 3. the 'delete-attribute' out-of-band value in requests (see section 8.2)
- 791 4. the 'client-error-not-settable' status code (see section 7.1)
- 792 5. If the "job-message-from-operator" Printer Description attribute is supported (see [ipp-mod]
793 4.3.16), then it MUST be settable.

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

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

800 **10 IANA Considerations**

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

805 **11 Internationalization Considerations**

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

807 **12 Security Considerations**

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

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

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

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

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

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

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892 15 Change History

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

895 15.1 Changes to the March 1, 2000 version to make the March 8, 2000 version

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

- 898 1. Added the "printer-xri-supported" (1setOf collection) attribute so that the three parallel IPP/1.1 "printer-
899 uri-supported", "uri-authentication-supported", and "uri-security-supported" attributes could be set as
900 one atomic attribute. Consequently, changed the three parallel attributes to be READ-ONLY and
901 removed the requirement that three attributes MUST be set in a single request if the three parallel
902 IPP/1.1 "printer-uri-supported", "uri-authentication-supported", and "uri-security-supported" were
903 settable.
- 904 2. Clarified Get-Printer-Supported-Values so that if an implementation does not support setting a settable
905 attribute, it MUST NOT return the attribute in the Printer Attribute group and it NEED NOT return the
906 attribute in the Unsupported Attributes group, same as in a Get-Printer-Attributes response for
907 unsupported attributes. Same clarification when unsupported attributes are requested.
- 908 3. Fixed "printer-message-date-time" (dateTime) attribute to be OPTIONAL.
- 909 4. Added note as to why the "printer-current-time" Printer Description attribute is settable (to fix an
910 incorrect time or time zone).
- 911 5. Added "xri-authentication-supported" (1setOf type2 keyword) and "xri-security-supported" (1setOf
912 type2 keyword) attributes to the table of attributes that can be queried with Get-Printer-Supported-
913 Values. Added a note that these two attributes are NOT queriable with Get-Printer-Attributes, since the
914 client queries either (1) the three "printer-uri-supported" (1setOf uri), "uri-authentication-supported"
915 (1setOf type2 keyword), "uri-security-supported" (1setOf type2 keyword) attributes, or (2) the single
916 "printer-xri-supported" (1setOf collection) attribute.

917 **15.2 Changes to the January 30, 2000 version to make the March 1, 2000 version**

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

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

- 933 6. Changed the requirements for accepting the Set-Printer-Attributes operation when the Printer is in the
934 'stopped' state from MUST to SHOULD, since some implementations may not be able to accept
935 requests when stopped.
- 936 7. Clarified that setting certain Printer attributes with Set-Printer-Attributes MAY require more access
937 rights than other attributes, i.e., System Administrator rights to set policy and only Operator rights to set
938 the configuration attributes to reflect the current hardware setup.
- 939 8. Clarified the order of error checking and what is returned in each case in the Set-Printer-Attributes
940 response.
- 941 9. Changed the 'default' out-of-band value to 'delete-attribute' out-of-band value so that the effect is to
942 actually remove the Job attribute entirely in the Set-Job-Attribute operation.
- 943 10. Clarified that removing a Job attribute that is not present is not an error.
- 944 11. Clarified the validation of the Set-Job-Attributes request and what is returned for each error.
- 945 12. Changed the 'any-name' out-of-band attribute value to a more general 'any-value' out-of-band attribute
946 value which in combination with an attribute syntax represents any value of that attribute syntax. The
947 'any-value' value can be used with the 'name' attribute syntax in a Get-Printer-Supported-Values
948 response to indicate whether or not a Set-Printer-Attributes will accept any name to be set for particular
949 "xxx-supported" (1setOf name | ...) Printer attributes.
- 950 13. Clarified that "printer-message-from-operator" and "job-message-from-operator" both REQUIRE that
951 the Printer accept zero-length messages and the 'no-value' out-of-band value is synonymous with
952 removing any value from these Printer attributes.
- 953 14. Clarified that the Get-Printer-Supported-Values is REQUIRED only if the Set-Printer-Attributes
954 operation will accept setting some "xxx-supported" Printer attributes.
- 955 15. Changed the IANA Considerations to indicate that the operations, attributes, status codes, and out-of-
956 band-values won't be registered and published by IANA, since this document is intended to be standards
957 track.
- 958 16. Added security considerations for denial of service and sabotage because of the Set operations.

959 **15.3 Changes to the January 20, 2000 version to make the January 30, 2000 version**

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

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

- 965 2. Renamed the Get-Reset-Printer-Attributes operation to Get-Printer-Supported-Values, so that it only
966 returns "xxx-supported" values. Relegate obtaining reset values to another operation to be paired with
967 the Reset-Printer operation in the Set2 [ipp-set2] document.
- 968 3. Added "-supported" to the names of the "printer-settable-attributes" and "job-settable-attributes" Printer
969 Description attributes, so that they could be returned in Get-Printer-Supported-Values and could be set
970 by Set-Printer-Attributes.
- 971 4. Deleted "authentication-methods-supported" (1setOf type2 keyword) and "security-methods-supported"
972 (1setOf type2 keyword) and clarified that "uri-authentication-supported" (1setOf type2 keyword) and
973 "uri-security-supported" (1setOf type2 keyword) can return multiple keywords of the same value in a
974 Get-Printer-Supported-Values operation.

975 **15.4 Changes to the January 4, 2000 version to make the January 20, 2000 version**

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

- 978 1. Replaced the "factory-settings" operation attribute proposed to be added to the Get-Printer-Attributes
979 operation with the Get-Reset-Printer-Attributes operation which returns the reset values and the possible
980 "xxx-supported" values.
- 981 2. Added the out-of-band 'any-name' value to be used with "xxx-supported" attributes with attribute syntax
982 'type3 keyword | name' to indicate that any name will be accepted in a Job Creation operation for
983 configurations that support such a concept.
- 984 3. Added authentication-methods-supported (1setOf type2 keyword) and security-methods-supported
985 (1setOf type2 keyword) Printer Description attributes so that clients can discover the possible values for
986 use in Set-Printer-Attributes to set "uri-authentication-supported" and "uri-security-supported"
987 attributes, since the Reset-Printer operation doesn't change them.
- 988 4. Added validation rules that the Printer MUST use to validate a Set-Printer-Attributes request.
- 989 5. Clarified that the Set-Printer-Attributes operation MUST NOT have any side effects on other attributes,
990 unless explicitly specified in this document.
- 991 6. Moved the specification of the attributes that MUST be READ-ONLY to Appendix A.
- 992 7. Added the "document-format-varying-attributes" (1setOf type2 keyword)
- 993 8. Added the REQUIRED "document-format-varying-scope" operation attribute to Set-Printer-Attributes
994 in order to control whether one or all document formats are affected for those attributes that vary by
995 document format.
- 996 9. Clarified that the Printer returns the 'client-error-attributes-not-settable' status code in a Set-Printer-
997 Attributes response whether the attribute is READ-ONLY, the attribute is not supported, or the value is
998 not supported.

- 999 10. Added the out-of-band 'default' value for use with Set-Job-Attributes and Job Creation operations.
- 1000 11. Deleted the "printer-message-operation" Printer Description attribute.
- 1001 12. Made the "Get-Reset-Printer-Attributes" operation, along with the "authentication-methods-supported"
1002 and the "security-methods-supported" Printer Description attributes REQUIRED, if the Set-Printer-
1003 Attributes operation is supported.
- 1004 13. Made the 'not-settable' out-of-band value and the 'client-error-not-settable' status code REQUIRED, if
1005 the Set-Printer-Attributes operation is supported.
- 1006 14. Made the 'default' out-of-band value REQUIRED, if the Set-Job-Attributes operation is supported.
- 1007 15. Removed the requirement that "xxx-supported" Printer Description attributes that contain only one
1008 value be read-only.

1009 **15.5 Changes to the December 8, 1999 version to make the January 4, 2000 version**

1010 The following changes to the December 8, 1999 version to make the January 4, 2000 version as a result of
1011 the IPP WG telecons and mailing list discussion:

- 1012 1. Removed the Set operations and related items from the Set2 specification [ipp-set2] to create this Set
1013 specification.
- 1014 2. Added that an attribute that can only be set to one fixed value SHOULD NOT be included in the
1015 "printer-settable-attributes" or "job-settable-attributes" attributes.
- 1016 3. Indicated that the encoding of the 'not-settable' out-of-band value is TBD.
- 1017 4. Added that Set-Job-Attributes operation adds an attribute to the Job object if it wasn't already there
- 1018 5. Added the conformance section to make it easy to understand the conformance requirements.

1019 **16 Appendix A: Allowed Values for Set-Printer-Attributes**

1020 This appendix is a normative part of this document and contains a table of all IPP/1.1 attributes. Each row
1021 contains

1022 An attribute and

1023

1024 The values allowed in the Set-Printer-Attributes operation for the attribute. The entry in each cell is
1025 the name (first few words) of each item below 1, 2, 3, 4a-g, and 5.

1026 The allowed values include the following cases:

- 1027 1. READ-ONLY: the Set-Printer-Attributes operation MUST NOT change this attribute

- 1028 2. Any of "xxx-supported": the Set-Printer-Attributes operation accepts values that are allowed
 1029 according to the IPP/1.1 rules for the "xxx-supported" attribute (see section 3.1.2.3 of the "Internet
 1030 Printing Protocol/1.1: Implementer's Guide" [ipp-iig]). The 'xxx-supported' attribute value is
 1031 obtained from a 'Get-Printer-Attributes' response.
- 1032 3. From Get-Printer-Supported-Values: the Set-Printer-Attributes operation accepts values that are
 1033 allowed according to the IPP/1.1 rules for the "xxx-supported" attribute (see section 3.1.2.3 of the
 1034 "Internet Printing Protocol/1.1: Implementer's Guide" [ipp-iig]). The "xxx-supported" attribute value
 1035 is obtained from a Get-Printer-Supported-Values response (see Appendix B: Attributes returned
 1036 from Get-Printer-Supported-Values below).
- 1037 4. Any value of the proper attribute syntax: the Set-Printer-Attributes accepts any value of the
 1038 specified attribute syntax. The attribute syntaxes supported are enumerated below.
- 1039 a. Any text(127)
 1040 b. Any name(127)
 1041 c. Any uri
 1042 d. Any boolean
 1043 e. Any positive integer
 1044 f. Any dateTime
 1045 g. 1setOf any uri
- 1046 5. Combination of 'Any of "xxx-supported"' or 'Any name'.

1047 If a Printer implementation doesn't want to allow setting values indicated in this Appendix as "any xxx", it
 1048 can make the value be read-only. For example, for a monochrome printer the attribute "color-supported" is
 1049 "false" and MUST be read-only. Otherwise an administrator could set it to "true" because the value can
 1050 have "any boolean" according to the rules in Table 7 below.

1051 **Table 4 - Values allowed for Job Template Attributes in the Set-Job-Attributes Operation**

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

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Table 5 - Values allowed for Job Description Attributes in the Set-Job-Attributes Operation

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

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Table 6 - Values allowed for Printer Job Template Attributes in the Set-Printer-Attributes Operation

Printer Job Template Attributes	Values allowed for Set
job-priority-default (integer(1:100))	Any of "xxx-supported"
job-hold-until-default (type3 keyword name (MAX))	Any of "xxx-supported"
job-sheets-default (type3 keyword name(MAX))	Any of "xxx-supported"
multiple-document-handling-default (type2 keyword)	Any of "xxx-supported"
copies-default (integer(1:MAX))	Any of "xxx-supported"

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

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Table 7 - 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-name (name(127))	Any name(127)
printer-location (text(127))	Any text(127)
printer-info (text(127))	Any text(127)
printer-more-info (uri)	Any uri
printer-driver-installer (uri)	Any uri
printer-make-and-model (text(127))	Any text(127)
printer-more-info-manufacturer (uri)	Any uri
printer-state (type1 enum)	READ-ONLY
printer-state-reasons (1setOf type2 keyword)	READ-ONLY
printer-state-message (text(MAX))	READ-ONLY
ipp-versions-supported (1setOf type2 keyword)	From Get-Printer-Supported-Values
operations-supported (1setOf type2 enum)	From Get-Printer-Supported-Values

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

1058

1059 ** - The "printer-current-time" (dateTime) attribute is settable in order to allow an administrator to correct
 1060 an incorrect dateTime or time zone.

1061 17 Appendix B: Attributes returned from Get-Printer-Supported-Values

1062 This Appendix is a normative part of this document and lists all the attributes that are possible for an
 1063 implementation to return in a Get-Printer-Supported-Values response, i.e., all the "xxx-supported" attributes
 1064 that can be supplied in a Set-Printer-Attributes request. READ-ONLY attributes MUST NOT be returned
 1065 in a Get-Printer-Supported-Values response and are indicated in the tables as "READ-ONLY - MUST NOT
 1066 be returned."

1067 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be a single
1068 integer value in the range specified by the value returned by the Get-Printer-Supported-Values operation.

1069 **Table 8 - 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)

1070

1071 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be a single
1072 rangeOfInteger value whose bounds do not exceed those of the range specified by the value returned by the
1073 Get-Printer-Supported-Values operation.

1074 **Table 9 - Printer Job Template Attributes returned from Get-Printer-Supported-Values**

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

1075

1076 The following table has the same criteria as the last, but is for Printer Description attributes.

1077 **Table 10 - 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)

1078

1079 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be one or
1080 more integers and rangeOfInteger values, such that the integer values described by these integers and
1081 rangeOfInteger is the same as or a subset of the integers described by the integers and rangeOf Integer of
1082 value returned by the Get-Printer-Supported-Values operation.

1083 **Table 11 - 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))

1084

1085 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be one or
1086 more values, where each such value matches a value returned by the Get-Printer-Supported-Values
1087 operation. A keyword, enum, boolean, charset, naturalLanguage, uriScheme, mimeType or resolution
1088 value matches if it is equal. A name matches the 'any-name' out-of-band value.

1089

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

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

1090

1091 The following table has the same criteria as the last, but is for Printer Description attributes.

1092

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

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

1093

1094

1095

** Note: there is no corresponding "xri-authentication-supported" (1setOf type2 keyword) and "xri-security-supported" (1setOf type2 keyword) Printer Description attributes that can be queried using the Get-Printer-Attributes operation. Instead, the client queries either: (1) the three "printer-uri-supported" (uri),

1096 "uri-authentication-supported" (1setOf type2 keyword) and "uri-security-supported" (1setOf type2 keyword)
 1097 attributes or (2) the single "priner-xri-supported" (1setOf collection) attribute.

1098 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be a single
 1099 value that matches one of the values returned by the Get-Printer-Supported-Values operation. A keyword,
 1100 enum, boolean, charset, naturalLanguage, uriScheme, mimeType or resolution value matches if it is
 1101 equal. A name matches the 'any-name' out-of-band value.

1102

1103 **Table 14 - Printer Description Attributes returned from Get-Printer-Supported-Values**

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

1104

1105 For the following attributes, the Set-Printer-Attributes operation MUST NOT return a value. The IPP
 1106 Model document [ipp-mod] document specifies the allowed values.

1107

1108 **Table 15 - Printer Description Attributes returned from Get-Printer-Supported-Values**

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

1109

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