Internet Printing Protocol/1.1: Set2 Operations

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Abstract

This document specifies 216 additional OPTIONAL operations for use with the Internet Printing Protocol/1.0 (IPP) [RFC2565, RFC2566] and IPP/1.1 [ipp-mod, ipp-pro]. These operations are the Set-Printer-Attributes operation that operators/administrators may perform on a Printer object and the Set-Job-Attributes operation that end-users may perform on their jobs and operators/administrators may perform on any job, depending on circumstances.

The Interpreter object is added for those implementations that make a distinction on the values of some Printer attributes depending on the document-format, such as "resolution-supported".

Two operation attributes: "printer-message-from-operator" (text) and "job-message-from-operator" (text) are included to set the corresponding IPP/1.1 Printer and Job Description attributes with the same names. A "factory-settings" (boolean) operation attribute is added to the Get-Printer-Attributes operation.

New Printer Description attributes are added:
        printer-settable-attributes (1setOf type2 keyword)
        job-settable-attributes (1setOf type2 keyword)
        printer-message-time (integer(MIN:MAX))
        printer-message-date-time (dateTime)
        printer-message-operation (type2 enum)

38   A new status code is added: 'client-error-attributes-not-settable'.

39   Finally, the 'not-settable' out-of-band attribute value is added for use with the Set-Printer-Attributes and
40   Set-Job-Attributes operations.

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

46   This document is intended for registration following the registration procedures of IPP/1.0 [RFC2566] and
47   IPP/1.1 [ipp-mod]. This version contains only the Set-Printer-Attributes and Set-Job-Attributes operations
48   which have been removed from the Set2 operation document so that tincludes the comments discussed at
49   the IPP telecon, on 6/23/1999, 6/30/1999, at the IETF IPP WG meeting, 7/7/99 7/8/99, in Copenhagen, and
50   the IPP telecon, 7/17/1999, the August, 1999 IPP meeting in Alaska and subsequent phone conferences and
51   discussions. Specifically, the 9/16 update refers to this set of extensions simply as "Set2" rather than using
52   the term "Administrative" which was misleading, controversial and incorrect as an overall description.
53   Also, two new attributes have been proposed to clarify the intent of each operation in terms of its target, the
54   Printer vs. the Print Job. Unresolved ISSUES are highlighted like this in the .doc and .pdf files.

The full set of IPP documents includes:

Design Goals for an Internet Printing Protocol [RFC2567]

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

Internet Printing Protocol/1.1: Model and Semantics (this document)

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

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

Mapping between LPD and IPP Protocols [RFC2569]

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

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

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

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

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

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129   1   Introduction

130   The Internet Printing Protocol (IPP) is an application level protocol that can be used for distributed printing
131   using Internet tools and technologies. IPP version 1.1 (IPP/1.1) focuses on end user functionality with a
132   few administrative operations included. This document defines additional OPTIONAL end user, operator,
133   and administrator Set-Job-Attributes and Set-Printer-Attributes operations used to control modify Job
134   objects and Printer objects. This document is a registration proposal for an extension to IPP/1.0 and IPP/1.1
135   following the registration procedures in those documents.

136   2   Terminology

137   This section defines terminology used throughout this document.

138   2.1   Conformance Terminology

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

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

143   REQUIRED: if an implementation supports the extensions described in this document, it MUST
144   support a REQUIRED feature.
145   OPTIONAL: if an implementation supports the extensions described in this document, it MAY support
146   an OPTIONAL feature.

147   2.2   Other terminology

148   This document uses terms such as "attributes", "keywords", and "support". These terms have special
149   meaning and are defined in the model terminology [ipp-mod] section 12.2.

150   **IPP Printer object (or Printer for short) -** a software abstraction defined by [ipp-mod].

151   3   Requirements and Use Cases

152   The following requirements and usage cover only the Set operations.

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

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

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

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

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

161   The system administrator is reducing the capability of the IPP Printer by removing one of the operations
162   from the supported operations list, such as Cancel-Job, because the policy is to run the IPP Printer like a
163   public FAX.

164   The system administrator is remotely configuring the Printer after installing it, and so is replacing the
165   Printer Description attributes that have the out-of-band 'no-value' value with the proper values.

166   4   New objects and new relationships of existing objects

167   This section defines the new Interpreter object.

168   4.1   Interpreter object

169   The Interpreter object models the document format interpreters that are contained in the Printer object. The
170   purpose of the Interpreter object is to model those Printer attributes whose value depends on which
171   interpreter is being used to process the document. Depending on implementation, the Printer object
172   attributes whose values ("xxx-supported" and "xxx-default") depend on the interpreter, i.e., on the
173   "document-format" of the document being processed, are considered to be Interpreter object attributes
174   instead. A Get-Printer-Attributes operation returns Printer and Interpreter attributes as specified in the
175   "requested-attributes" operation attribute supplied by the client. Depending on the value of the "document-
176   format" attribute supplied by the client in the Get-Printer-Attributes request (or the "document-format-
177   default", if the client omits the "document-format" attribute), selects the corresponding Interpreter object.

178   If an implementation does not make a distinction on the values of Printer attributes by document format,
179   say, for purposes of job validation (see [ipp-mod] Get-Printer-Attributes), there is no need to implement or
180   support the Interpreter object. The Interpreter object is introduced to provide a means to model an
181   implementation in which some attributes do depend on the document format. Those attributes are then sub-
182   classed to be Interpreter object attributes.

183   Note: the addition of the Interpreter object is completely compatible with IPP/1.0 and IPP/1.1 (see the
184   description of the "document-format" operation attribute in [ipp-mod] section 3.2.5.1 Get-Printer-Attributes
185   request). The protocol and semantics are the same whether or not the Interpreter object is used to
186   distinguish attributes that depend on the "document-format". Consequently, there is no "interpreters-
187   supported" Printer Description attribute. In order to determine which Interpreter objects there MAY be, the
188   client can request the values of the Printer's "document-format-supported" attribute.

189 Note: The Interpreter object is really a sub-class of the Printer object, rather than being a full fledged object
190 in the sense that the Job and Printer objects are. There are no operations defined solely for the Interpreter
191 object. The Get-Printer-Attributes and Set-Printer-Attributes operations operate on the Interpreter object if
192 the implementation has the concept of an Interpreter object. However, if the IPP Printer implementation
193 does not contain Interpreter objects, the same Interpreter object attributes are considered Printer object
194 attributes, instead.

195 ISSUE 01 - Is there a better way to model the Printer attributes that depend on the interpreter (that is still
196 compatible with IPP/1.1)? It should be clear to the operator whether the Set-Printer-Attributes operation is
197 affecting all interpreters or just the one specified by the "document-format" operation attribute (or its
198 default)? There have been suggestions to have "xxx-exceptions" (collection) Printer Description attributes
199 where "xxx" is the document-format that indicate for each interpreter explicitly which Printer attributes are
200 specialized for it. For example: "application-postscript-exceptions" (collection) and "application-vnd-hp-
201 pcl-exceptions (collection). Or have a "set-all-interpreters" (boolean) Set-Printer-Attributes operation
202 attribute that sets all interpreters.

203 *Note: The interaction of the Set operations and fan-out and fan-in will be defined in the Set2 document,*
204 *rather than this document.*

205 5   New Operation attributes

206 This section defines the new operation attributes for use with the IPP/1.1 and the Set operations as shown in
207 Table 1. "printer-message-from-operation" and "job-message-from-operator" operation attributes that set
208 the corresponding Printer and Job Description attributes. .

209   **Table 1 - Operation Attribute Usage**

Operation	"printer-message-from-operator"	"job-message-from-operator"	"factory-settings"
Print-Job	no	no	no
Print-URI	no	no	no
Validate-Job	no	no	no
Create-Job	no	no	no
Get-Printer-Attributes	yes	no	yes
Set-Printer-Attributes	no	no	no
Get-Jobs	no	no	no
Pause-Printer	yes	no	no
Resume-Printer	yes	no	no
Purge-Jobs	yes	no	no
Send-Document	no	no	no
Send-URI	no	no	no
Cancel-Job	no	yes	no
Get-Job-Attributes	no	yes	no
Set-Job-Attributes	no	no	no

Hold-Job	no	yes	no
Release-Job	no	yes	no
Restart-Job	no	yes	no

210

211   5.1   "printer-message-from-operator" (text(127))

212   The client OPTIONALLY supplies this attribute. The Printer object SHOULD supports this operation
213   attribute if it supports the corresponding Printer Description attribute. The value of this attribute is a
214   message from the operator about the Printer object on which the operator is performing the operation. If
215   this operation attribute is supported, the Printer copies the value to the Printer'sits "printer-message-from-
216   operator" Printer Description attribute (see [ipp-mod] section 4.4.25). In addition, the Printer automatically
217   copies:

218   1.   sets the value of the Printer'sits "printer-up-time" attribute (see [ipp-mod] section 4.4.29) to its
219   "printer-message-time" attributewith the current value of the Printer's "printer-up-time" attribute,

220   2.   the value of the its printer-current-time" (dateTime) attribute (see [ipp-mod] section 4.4.30) to its
221   "printer-message-date-time" attribute with the current value of the Printer's printer-current-date-
222   time" attribute, if supported, and

223   3.   the value of the Printer's "printer-message-operation" with the operation-id value of this operation
224   (see [ipp-mod] section 4.4.15) to its "printer-message-operation" attribute.

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

228   If the client supplies this attribute with a zero-length text value or with a value consisting solely of white
229   space, the Printer copies that value as any other value to the Printer's "printer-message-from-operator" and
230   sets the "printer-message-time", "printer-message-date-time", and "printer-message-operation" attributes.
231   Supplying such a value is the way that the operator indicates that there is no longer a printer message from
232   the operator (rather than using the "out-of-band" 'no-value' value).

233

234   This operation attribute is defined for use with the following operator operations on the Printer object:

235   Pause-Printer - see [ipp-mod] section 3.2.7
236   Resume-Printer - see [ipp-mod] section 3.2.8
237   Purge-Jobs - see [ipp-mod] section 3.2.9

238

239   The "printer-message-from-operator" operation attribute MUST NOT be supported as an operation attribute
240   for the Set-Printer-Attributes operation. If the operator wants to set the Printer's "printer-message-from-
241   operator" Printer Description attribute when issuing the Set-Printer-Attributes operation, the client supplies
242   the "printer-message-from-operator" explicitly with its new value as one of the Printer Description
243   attributes in Group 2 in the request. The Printer also updates the Printer'sits "printer-message-time",

244 "printer-message-date-time", and "printer-message-operation" Printer Description attributes. If the client
245 does not explicitly supply the "printer-message-from-operator" with its new value, the Printer leaves the
246 value of the Printer's "printer-message-from-operator" Printer Description attribute unchanged.

247 5.2   "job-message-from-operator" (text(127))

248 The client OPTIONALLY supplies this attribute. The Printer object SHOULD supports this operation
249 attribute if it supports the corresponding Job Description attribute. The value of this attribute is a message
250 from the operator about the Job object on which the operator has just performed an operation. If supported,
251 the Printer copies the value to the Job's "job-message-from-operator" Job Description attribute (see [ipp-
252 mod] section 4.3.16).

253 If the client omits this attribute, the Printer does not change the value of its "printer-message-from-operator"
254 Job Description attribute.

255 If the client supplies this attribute with a zero-length text value or with a value consisting solely of white
256 space, the Printer copies that value as any other value to the job's "job-message-from-operator". Supplying
257 such a value is the way that the operator indicates that there is no longer a job message from the operator
258 (rather than using the "out-of-band" 'no-value' value).

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

261 This operation attribute is defined for use with the following operator operations on the Job object:

262   Cancel-Job - see [ipp-mod] section 3.2.4
263   Hold-Job - see [ipp-mod] section 3.3.5
264   Release-Job - see [ipp-mod] section 3.3.6
265   Restart-Job - see [ipp-mod] section 3.3.7
266

267 The "job-message-from-operator" operation attribute MUST NOT be supported as an operation attribute for
268 the Set-Job-Attributes operation. If the operator wants to set the Job's "job-message-from-operator" Job
269 Description attribute when issuing the Set-Job-Attributes operation, the client supplies the "job-message-
270 from-operator" with its new value as one of the Job Description attributes in Group 2 in the request.
271 Otherwise, the Printer leaves the value of the Job's "job-message-from-operator" Job Description attribute
272 unchanged by not explicitly setting the attribute.

273 5.3   "factory-settings" (boolean) - new operation attribute for Get-Printer-Attributes:

274 The client OPTIONALLY supplies this attribute. The Printer object OPTIONALLY supports this attribute,
275 if it supports the Set-Printer-Attributes operation. If the client omits this attribute or supplies the 'false'
276 value, the Printer returns the current values of the requested attributes that are settable, i.e., the values that
277 have been set by previous Set-Printer-Attributes. If the client supplies the 'true' value, the Printer returns
278 the factory settings, i.e., the inherent values supported by the implementation as shipped from the

279 manufacturer or established at install time. This operation attribute allows an operator to determine which
280 values are supported in an implementation after having modified a settable attribute. Attributes that are not
281 settable are not affected by this operation attribute, so that the Printer returns the same values for non-
282 settable attribute when either the 'true' or 'false' value has been supplied. If this operation attribute is
283 supported, both 'true' and 'false' values MUST be supported.

284 ISSUE 02 - Should the attribute names be modified (e.g., with a unique suffix) to identify them as "factory
285 defaults"? At the IPP WG meeting, some individuals thought that this would make some of the factory
286 default handling easier to specify/implement. Also, some of the attributes could be prefixed/suffixed to
287 indicate that they are [only] applicable to specific document formats. Although preliminary discussion
288 appears encouraging, the topic was deferred for more detailed examination.

289 6   New Printer Description Attributes

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

292 6.1   printer-settable-attributes (1setOf type2 keyword)

293 This READ-ONLY Printer attribute identifies the Printer object attributes that are settable in this
294 implementation, i.e., that are settable using the Set-Printer-Attributes operations (see section 9.1). This
295 attribute MUST be supported if the Set-Printer-Attributes operations is supported. The Printer MUST
296 reject attempts to set any Printer attributes that are not one of the values of this attribute, returning the
297 'client-error-attributes-not-settable' status code (see section 7.1). The value of this attribute MAY depend
298 on the value of the "document-format" operation attribute supplied in the Get-Printer-Attributes operation
299 (see [ipp-mod] section 3.2.5.1).

300 For a Printer attribute that is normally settable, if a Printer object only supports a single fixed value for that
301 attribute, it SHOULD NOT include that attribute's keyword name in this attribute's value. For example, if a
302 Printer only supports "sides" with a 'one-sided' value, then the "sides-supported" keyword SHOULD NOT
303 be one of the values of its "printer-settable-attributes" attribute.

304 Standard keyword values are:

305   'none': There are no settable Printer attributes.
306   'xxx':   Where 'xxx' is any of the keyword attribute names in the list defined inallowed by section 9.1.1

307 6.2   job-settable-attributes (1setOf type2 keyword)

308 This READ-ONLY Printer attribute identifies the Job object attributes that are settable in this
309 implementation, i.e., that are settable using the Set-Job-Attributes operation (see section 9.2). This attribute
310 MUST be supported if the Set-Job-Attributes operations is supported. The Printer MUST reject attempts to
311 set any Job attributes that are not one of the values of this attribute, returning the 'client-error-attributes-not-
312 settable' status code (see section 7.1).

313 For a Job attribute that is normally settable, if a Printer object only supports a single fixed value for that
314 attribute, it SHOULD NOT include that attribute's keyword name in this attribute's value. For example, if a
315 Printer only supports "sides" with a 'one-sided' value, then the "sides" keyword SHOULD NOT be one of
316 the values of its "job-settable-attributes" attribute.

317 Standard keyword values are:

318   'none': There are no settable Job attributes.
319   'xxx':   Where 'xxx' is any of the keyword attribute names in the list defined inallowed by section 9.2.1

320 6.3   printer-message-time (integer(MIN:MAX))

321 This READ-ONLY Printer Description attribute contains the time that the Printer's "printer-message-from-
322 operator" was changed by the operator using any operation where the client supplied the "printer-message-
323 from-operator" operation attribute (see section 5.1) or was explicitly set using the Set-Printer-Attributes
324 operation (see section 9.1). This attribute allows the users to know when the "printer-message-from-
325 operator" attribute was last set.

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

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

332 6.4   printer-message-date-time (dateTime)

333 This READ-ONLY Printer Description attribute contains the date and time that the Printer's "printer-
334 message-from-operator" was changed by the operator using any operation where the client supplied the
335 "printer-message-from-operator" operation attribute (see section 5.1) or was explicitly set using the Set-
336 Printer-Attributes operation (see section 9.1). This attribute allows the users to know when the "printer-
337 message-from-operator" attribute was last set.

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

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

342 6.5   printer-message-operation (type2 keywordenum)

343 This READ-ONLY Printer Description attribute contains identifies the operation that was used to changed
344 the Printer's "printer-message-from-operator" by the operator using any operation where the client supplied
345 the "printer-message-from-operator" operation attribute (see section 5.1) or explicitly set using the Set-

346 Printer-Attributes operation (see section 9.1). This attribute allows the users to know which operation was
347 used to change the "printer-message-from-operator" attribute when it was last set.

348 The standard enum values are those defined for the "operations-supported" Printer Description attribute (see
349 [ipp-mod] section 4.4.15).

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

351 7   Additional status codes

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

353 7.1   'client-error-attributes-not-settable' (0x0413)

354 In a Set-Printer-Attributes or Set-Job-Attributes request, if all the client-supplied attributes are supported,
355 but the Printer object does not support one or more attributes as settable, the Printer object MUST return
356 this status code. The Printer object MUST also return in the Unsupported Attributes Group (see [ipp-mod]
357 section 3.1.7) all the attributes and/or values supplied by the client that are not settable with the values
358 changed to the out-of-band 'not-settable' value (see section 8.1). See [ipp-mod] section 3.1.7. For example,
359 if the request indicates 'job-state', all implementations MUST reject the request. As another example, if the
360 request indicates an attribute that is supported, but not settable by this implementation, such as, say,
361 "printer-name", the implementation rejects the request.

362 8   Additional out-of-band values

363 This section defines additional out-of-band values that can be used with any attribute in principle. See the
364 beginning of [ipp-mod] section 4.1.

365 8.1   'not-settable' out of band value

366 The 'not-settable' out of band value is used by the IPP Printer in a Set-Job-Attributes or Set-Printer-
367 Attributes response to indicate an attribute that was supplied by the client, is supported but is defined to be
368 a READ-ONLY attribute, is not settable in that implementation or as defined by the policy for that system,
369 because it is not in the "job-settable-attributes" or "printer-settable-attributes" Printer Description attributes,
370 respectively.

371 The encoding of the out-of-band value is TBD (see [ipp-pro]).

372   9   Definition of the Set-2 Printer operations

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

377   The Set-Job-Attributes operation (as are all Job operations) are directed at Job objects. A client MUST
378   always supply some means of identifying the Job object in order to identify the correct target of the
379   operation. That job identification MAY either be a single Job URI or a combination of a Printer URI with a
380   Job ID as defined in [ipp-mod]. The IPP object implementation MUST support both forms of identification
381   for every job.

382   The Set-2 Printer operations are summarized in Table 2Table 2:

383   **Table 22 - Printer operation Operation-Id assignments**

Operation Name	Operation-Id	Brief description
Set-Printer-Attributes	0x??	Sets attribute values of the target Printer object
Set-Job-Attributes	0x??	Sets attribute values of the target Job object

384

385   9.1   Set-Printer-Attributes Operation

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

390   How the Printer object validates the client-supplied attributes in the Set-Printer-Attributes request is
391   implementation-dependent, since there are no corresponding Printer attributes that specify the allowed
392   values that may be set on the Printer object. However, if any of the supplied attributes are not supported,
393   are not settable, or the values are not supported, the Printer object MUST reject the entire operation; the
394   Printer object MUST NOT partially set some of the supplied attributes. In other words, after the operation,
395   all the supplied attributes MUST be set or none of them MUST be set.

396   If the Printer supports the "printer-message-from-operator" Printer Description attribute (see [ipp-mod]
397   section 4.4.25) and the client explicitly supplies a new value for the "printer-message-from-operator" in the
398   request, then the Printer MUST set the "printer-message-from-operator" Printer attribute to this new value
399   and MUST also set the "printer-message-time", "printer-message-date-time", and "printer-message-
400   operation" attributes, if supported (see sections 6.3, 6.4, and 6.5).

401   ISSUE 03 - While reviewing the Set-Printer-Attributes operation at the IPP WG meeting, it was suggested
402   that a more general mechanism should be defined for handling and supporting side effects - such as
403   modifying values of any related attributes.

404 The Printer MUST accept this operation in any state, i.e., for any of the values of the Printer object's
405 "printer-state" and "printer-state-reasons" attributes, unless explicitly defined otherwise in the definition of
406 the values.

407 9.1.1   Settable and READ-ONLY Printer Description attributes

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

409   all Job Template Default ("xxx-default") attributes
410   all Job Template Supported ("xxx-supported") attributes
411   all Job Template Ready ("xxx-ready") attributes

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

413 The following Printer Description attributes (see [ipp-mod] section 4.4) MUST NOT be settable, i.e., they
414 are READ-ONLY:

415   printer-state
416   printer-state-reasons
417   printer-state-message
418   printer-is-accepting-jobs - see Enable-Printer/Disable-Printer
419   queued-job-count
420   printer-up-time

421 The following Set2 Printer Description attributes defined in this document MUST NOT be settable, i.e.,
422 they are READ-ONLY:

423   printer-message-time - see Set-Printer-Attributes when setting "printer-message-from-operator"
424   printer-message-date-time - see Set-Printer-Attributes when setting "printer-message-from-operator"
425   printer-message-operation - see Set-Printer-Attributes when setting "printer-message-from-operator"

426 Note: From now on, all extensions that define new object attributes will indicate whether or not they are
427 READ-ONLY, by including the "READ-ONLY" adjective in their descriptions. or whether they MAY be
428 settable. If "READ-ONLY" is omitted, it is assumed that the attribute MAY be settable by the appropriate
429 Set-Xxx operation.

430 The remaining Printer Description attributes MAY be settable using the Set-Printer-Attributes operation,
431 depending on implementation. If "xxx-supported" Printer Description attribute are settable, then they
432 MUST affect the behavior of the implementation. If they are READ-ONLY then they reflect the
433 implementation and cannot be changed using the Set-Printer-Attributes operation. Consider the following
434 examples:

435   For example, if the "operations-supported" Printer Description attribute (see [ipp-mod] section
436   4.4.15) is settable in a particular implementation, then changing its value with a Set-Printer-
437   Attributes operation MUST affect the operations that the implementation accepts or rejects. Such
438   an implementation will need to be able to reject values for operations that it contains no code
439   support for. If the "operations-supported" Printer Description attribute is not settable in a particular
440   implementation, then that implementation MUST reject an attempt to set it with a Set-Printer-
441   Attributes operation and return the 'client-error-attributes-not-settable' status code (see section 7.1).

442   As another example, if the "ipp-versions-supported" Printer Description attribute (see [ipp-mod]
443   section 4.4.14) is settable in a particular implementation, then changing its value with a Set-Printer-
444   Attributes operation MUST affect the protocol versions that are accepted or rejected. Such an
445   implementation will need to be able to reject values for versions that it contains no code support for.

446   See the "factory-settings" operation attribute (see section 5.3) for a way to query the implementation
447   supported values using the Get-Printer-Attributes operation.

448   *Access Rights:* The authenticated user (see [ipp-mod] section 8.3) performing this operation must be an
449   operator or administrator of the Printer object (see [ipp-mod] Sections 1 and 8.5).

450   Most Printer attributes will require administrator privileges to set, such as "xxx-supported", while some will
451   require operator privileges only, such as "media-ready" and "printer-message-from-operator". Which
452   attributes require which privileges depends on implementation and MAY depend on site policy.

453   9.1.2   Set-Printer-Attributes Request

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

455   Group 1: Operation Attributes

456   Natural Language and Character Set:
457   The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]
458   section 3.1.4.1.
459
460   Target:
461   The "printer-uri" (uri) operation attribute which is the target for this operation as described in [ipp-
462   mod] section 3.1.5.
463
464   Requesting User Name:
465   The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as
466   described in [ipp-mod] section 8.3.
467
468   "document-format" (mimeMediaType):
469   The client SHOULD supply this attribute. The Printer object MUST support this attribute. This
470   attribute is useful for a client to select the Interpreter object to which the attribute modification
471   should be applied. Each Printer object is modeled to contain one or more Interpreter objects. Those
472   Printer attributes whose values vary from Interpreter to Interpreter, are modeled as Interpreter object
473   attributes, while those that do not are Printer object attributes. Thus the target of a Get-Printer-
474   Attributes or Set-Printer-Attributes operation is ~~either~~ both the Printer object ~~or~~ and the Interpreter
475   object identified by the "document-format" operation attribute supplied by the client. Except for
476   Get-Printer-Attributes and Set-Printer-Attributes, there are no other operations with the Interpreter
477   object as a target. See [ipp-mod] section 3.2.5.1 "Get-Printer-Attributes Request".
478
479   If the client omits this "document-format" operation attribute, the Printer object MUST respond as if
480   the attribute had been supplied with the value of the Printer object's "document-format-default"

481 attribute. It is recommended that the client always supply a value for "document-format", since the
482 Printer object's "document-format-default" may be 'application/octet-stream', in which case the set
483 attributes and values are for the union of the document formats that the Printer can automatically
484 sense. For more details, see the description of the 'mimeMediaType' attribute syntax in [ipp-mod]
485 section 4.1.9.
486
487 If a client wants to set an attribute for all of the Interpreter objects to the same value, it can query the
488 Printer's "document-format-supported" Printer Description attribute and perform separate Set-
489 Printer-Attributes for each document format supported.
490
491 If the Printer object does not distinguish between different sets of supported values for each
492 different document format when validating jobs in the create and Validate-Job operations, it MUST
493 NOT distinguish between different document formats in the Set-Printer-Attributes operation. If the
494 Printer object does distinguish between different sets of supported values for each different
495 document format specified by the client, this specialization applies only to the same Printer
496 attributes as the Get-Printer-Attributes operation (see [ipp-mod] section 3.2.5.1).
497
498 If the client supplies a value for the "document-format" Operation attribute that is not supported by
499 the Printer, i.e., is not among the values of the Printer object's "document-format-supported"
500 attribute, the Printer object MUST reject the operation and return the 'client-error-document-format-
501 not-supported' status code.
502

503 Group 2: Printer Attributes

504 The client MUST supply a set of Printer attributes as defined in [ipp-mod] section 4.2 Job Template
505 Attributes ("xxx-default", "xxx-supported", and "xxx-ready" attributes), section 4.4 Printer
506 Description Attributes, and any attribute extensions supported by the Printer. Each Printer attribute
507 supplied in Group 2 replaces the value(s) of the corresponding Printer attribute on the target Printer
508 object. For attributes that can have multiple values (1setOf), all values supplied by the client
509 replace all values of the corresponding Printer object attribute. If a Printer object attribute had not
510 been configured yet and so had the 'no-value' out-of-band value (see [ipp-mod] 4.1), the supplied
511 value(s) replace the 'no-value' value.
512

513 9.1.3   Set-Printer-Attributes Response

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

515 Group 1: Operation Attributes

516 Status Message:
517 In addition to the REQUIRED status code returned in every response, the response OPTIONALLY
518 includes a "status-message" (text(255)) and/or a "detailed-status-message" (text(MAX)) operation
519 attribute as described in [ipp-mod] sections 13 and 3.1.6.
520

521   Natural Language and Character Set:
522   The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]
523   section 3.1.4.2.
524

525   Group 2: Unsupported Attributes

526   See [ipp-mod] section 3.1.7 for details on returning Unsupported Attributes.
527

528   In the case ofIf all the client-supplied attributes that are supported, but one or more are not settable
529   by the implementation, i.e., are not among the values of the Printer's "printer-settable-attributes"
530   Printer Description attribute (see section 6.1), the Printer object MUST reject the operation, returns
531   the 'client-error-attributes-not-settable' status code, and return the client-supplied attribute(s) with a
532   substituted out-of-band value of 'not-settable' (see section 8.1). This value's syntax type is "out-of-
533   band" and its encoding is defined by special rules for "out-of-band" values in the "Encoding and
534   Transport" document [IPP-PRO]. Its value indicates that the attribute is supported, but is not
535   settable.
536

537   9.2   Set-Job-Attributes Operation

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

541   This operation is almost identical to the Set-Printer-Attributes operation (see section 9.1). The only
542   differences are that the Set-Job-Attributes operation is directed at a Job object rather than a Printer object,
543   there is no "document-format" operation attribute used when setting a Job object, and the validation is the
544   same as the create job operations, i.e., depends on the "xxx-supported" Printer Description attributes.

545   The validation of the Set-Job-Attributes request is performed as if the job had been submitted originally
546   with the new values and with "ipp-attribute-fidelity" set to 'true', i.e., all modified attributes MUST be
547   supported along with the attributes not modified. If such a create job operation would have been accepted,
548   then the Set-Job-Attributes MUST be accepted. If such a create job operation would have been rejected,
549   then the Set-Job-Attributes MUST be rejected and the Job MUST be unchanged. In addition, if any of the
550   supplied attributes are not supported, are not settable, or the values are not supported, the Printer object
551   MUST reject the entire operation; the Printer object MUST NOT partially set some of the supplied
552   attributes. In other words, after the operation, all the supplied attributes MUST be set or none of them
553   MUST be set.

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

556   ISSUE 04 - How does a client indicate in a Set-Job-Attributes operation that a Job attribute is to be
557   removed from the Job object? At the IPP WG meeting, there was general agreement that the protocol
558   should support the ability to "unset" values.

559 ISSUE 05 - There is no need to be able to remove a particular attribute value from a (multi-valued)
560 attribute, is there?

561 ISSUE 06 - Removing an attribute from a Printer is not needed, correct?

562 ISSUE 07 - Is it OK that Set-Job-Attributes validates independently from how the "ipp-attribute-fidelity"
563 operation attribute had been supplied in the Job Creation operation? Its not currently stored with the Job
564 object.

565 ISSUE 08 - For simplicity, is it OK that we don't have an "ipp-attribute-fidelity" operation attribute for the
566 Set-Job-Attributes operation, so that the behavior is as if it were supplied with the 'true' value?

567 The IPP object MUST accept or reject the request based on the job's current state and transition the job to
568 the indicated new state as follows:

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, and/or implementationetc.
'processing-stopped'	'processing-stopped'	'successful-ok' or 'client-error-not-possible' depending on implemenation, including the attributes being set, whether the job has started marking media, and/or implementationetc.
'completed'	'completed'	'client-error-not-possible'
'canceled'	'canceled'	'client-error-not-possible'
'aborted'	'aborted'	'client-error-not-possible'

569 9.2.1   Settable and READ-ONLY Job Description attributes

570 If the Printer supports the "job-message-from-operator" Job Description attribute (see [ipp-mod] section
571 4.3.16) and the client explicitly supplies a new value for the "job-message-from-operator" in the request,
572 then the Printer MUST set the "job-message-from-operator" Job attribute to this new value.

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

574   all Job Template job ("xxx") attributes (see [ipp-mod] section 4.2 and extensions)

575 that the implementation supports.

576 The following Job Description attributes (see [ipp-mod] section 4.3) MUST NOT be settable, i.e., they are
577 READ-ONLY:

578   job-uri
579   job-id
580   job-printer-uri
581   job-more-info
582   job-originating-user-name - set in create operation
583   job-state
584   job-state-reasons
585   job-state-message
586   number-of-documents
587   output-device-assigned
588   time-at-creation
589   time-at-processing
590   time-at-completed
591   job-printer-up-time
592   date-time-at-creation
593   date-time-at-processing
594   date-time-at-completed
595   number-of-intervening-jobs
596   job-k-octets
597   job-k-octets-processed
598   job-impressions-completed
599   job-media-sheets-completed
600   attributes-charset - set in Job Creation operation
601   attributes-natural-language - set in Job Creation operation

602   The following Set2 Job Description attributes are READ-ONLY:

603   original-requesting-user-name - set in Job Creation operation

604   The remaining Job Description attributes MAY be settable using the Set-Job-Attributes operation,
605   depending on implementation.

606   Note: From now on, all extensions that define new object attributes will indicate whether or not they are
607   READ-ONLY, by including the "READ-ONLY" adjective in their descriptions. If "READ-ONLY" is
608   omitted, it is assumed that the attribute MAY be settable by the appropriate Set-Xxx operation.

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

612   9.2.2   Set-Job-Attributes Request

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

614   Group 1: Operation Attributes

615   Natural Language and Character Set:
616   The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]
617   section 3.1.4.1.
618

619 Target:
620   Either (1) the "printer-uri" (uri) plus "job-id" (integer(1:MAX)) or (2) the "job-uri" (uri) operation
621   attribute(s) which define the target for this operation as described in [ipp-mod] section 3.1.5.
622
623 Requesting User Name:
624   The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as
625   described in [ipp-mod] section 8.3.
626
627
628 Group 2: Job Attributes

629   The client MUST supply a set of Job attributes as defined in [ipp-mod] section 4.2 Job Template
630   Attributes ("xxx" attributes), section 4.3 Job Description Attributes, and any attribute extensions
631   supported by the Printer. Each Job attribute supplied in Group 2 replaces the value(s) of the
632   corresponding Job attribute on the target Job object. For attributes that can have multiple values
633   (1setOf), all values supplied by the client replace all values of the corresponding Job object
634   attribute.
635

636 9.2.3   Set-Job-Attributes Response

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

638 Group 1: Operation Attributes

639 Status Message:
640   In addition to the REQUIRED status code returned in every response, the response OPTIONALLY
641   includes a "status-message" (text(255)) and/or a "detailed-status-message" (text(MAX)) operation
642   attribute as described in [ipp-mod] sections 13 and 3.1.6.
643
644 Natural Language and Character Set:
645   The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]
646   section 3.1.4.2.
647

648 Group 2: Unsupported Attributes

649   See [ipp-mod] section 3.1.7 for details on returning Unsupported Attributes.
650
651   In the case ofIf all the client-supplied attributes that are supported, but one or more are not settable
652   by the implementation, i.e., are not among the values of the Printer's "job-settable-attributes" Printer
653   Description attribute (see section 6.1), the Printer object MUST reject the operation, returns the
654   'client-error-attributes-not-settable' status code, and return the client-supplied attribute(s) with a
655   substituted out-of-band value of 'not-settable' (see section 8.1). This value's syntax type is "out-of-
656   band" and its encoding is defined by special rules for "out-of-band" values in the "Encoding and
657   Transport" document [IPP-PRO]. Its value indicates that the attribute is supported, but is not
658   settable.

659

10   Conformance Requirements

661 Both the Set-Job-Attributes and the Set-Printer-Attributes operations defined in the document are
662 OPTIONAL for an IPP object to support. Either one MAY be supported without the other or both MAY be
663 supported.

664 If the Set-Printer-Attributes operation is supported, then the "printer-settable-attributes" Printer Description
665 attribute MUST be supported.

666 If the Set-Job-Attributes operation is supported, then the "job-settable-attributes" Printer Description
667 attribute MUST be supported.

668 If the Set-Printer-Attributes operation and the "printer-message-from-operator" Printer Description attribute
669 are supported, then the latter MUST be settable.

670 If the Set-Job-Attributes operation and the "job-message-from-operator" Printer Description attribute are
671 supported, then the latter MUST be settable.

672 It is OPTIONAL for the Printer object to support the "printer-message-time" (integer), "printer-message-
673 date-time" (dateTime) and "printer-message-operation" (type2 enum). If both the "printer-message-time"
674 (integer) and the "printer-current-time" (dateTime) (see [ipp-mod] section 4.4.30) Printer Description
675 attributes are supported, then the "printer-message-date-time" (dateTime) attribute MUST be supported.

11   IANA Considerations

677 The operations and attributes in this registration proposal will be published by IANA according to the
678 procedures in RFC 2566 [rfc2566] section 6.4 for operations with the following URL:

679   ftp.isi.edu/iana/assignments/ipp/operations/set2.txt

12   Internationalization Considerations

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

13   Security Considerations

683 The IPP Model and Semantics document [ipp-mod] discusses high level security requirements (Client
684 Authentication, Server Authentication and Operation Privacy). Client Authentication is the mechanism by
685 which the client proves its identity to the server in a secure manner. Server Authentication is the mechanism
686 by which the server proves its identity to the client in a secure manner. Operation Privacy is defined as a
687 mechanism for protecting operations from eavesdropping.

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716   15   References

717   [ipp-mod]
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719   Semantics", <draft-ietf-ipp-model-v11-043.txt>, June 23, 1999.

720   [ipp-pro]
721   Herriot, R., Butler, S., Moore, P., Tuner, R., "Internet Printing Protocol/1.1: Encoding and
722   Transport", draft-ietf-ipp-protocol-v11-03.txt, June 23, 1999.

723   [RFC2566]
724   R. deBry, T. Hastings, R. Herriot, S. Isaacson, P. Powell, "Internet Printing Protocol/1.0: Model and
725   Semantics", RFC 2566, April 1999.

726   16   Change History

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

729   1.116.1   Changes to the November 16December 8, 1999 version to make the December 8, 1999January 4,
730   2000 version

731   The following changes to the December 8November 16, 1999 version to make the January 4,
732   2000December 8, 1999 version as a result of the IPP WG telecons and mailing list discussion:

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

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

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

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

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

740   17   Appendix A: Full Copyright Statement