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9 Internet Printing Protocol/1.1: Set Operations

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21 Abstract

22 This document specifies 2 additional OPTIONAL operations for use with the Internet Printing Protocol/1.0
23 (IPP) [RFC2565, RFC2566] and IPP/1.1 [ipp-mod, ipp-pro]. These operations are the Set-Printer-
24 Attributes operation that operators/administrators may perform on a Printer object and the Set-Job-
25 Attributes operation that end-users may perform on their jobs and operators/administrators may perform on
26 any job, depending on circumstances.

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

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

32 New Printer Description attributes are added:

- 33 printer-settable-attributes (1setOf type2 keyword)
- 34 job-settable-attributes (1setOf type2 keyword)
- 35 printer-message-time (integer(MIN:MAX))
- 36 printer-message-date-time (dateTime)
- 37 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 t

49 The full set of IPP documents includes:

- 50 Design Goals for an Internet Printing Protocol [RFC2567]
- 51 Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
- 52 Internet Printing Protocol/1.1: Model and Semantics (this document)
- 53 Internet Printing Protocol/1.1: Encoding and Transport [IPP-PRO]
- 54 Internet Printing Protocol/1.1: Implementer's Guide [IPP-IIG]
- 55 Mapping between LPD and IPP Protocols [RFC2569]

56

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

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

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

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

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

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123 1 Introduction

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

130 2 Terminology

131 This section defines terminology used throughout this document.

132 2.1 Conformance Terminology

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

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

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

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

141 2.2 Other terminology

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

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

145 3 Requirements and Use Cases

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

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

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

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

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

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

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

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

160 4 New objects and new relationships of existing objects

161 This section defines the new Interpreter object.

162 4.1 Interpreter object

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

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

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

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

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

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

199 5 New Operation attributes

200 This section defines new operation attributes for use with the IPP/1.1 and the Set operations as shown in
 201 Table 1..

202

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

203

204 5.1 "printer-message-from-operator" (text(127))

205 The client **OPTIONALLY** supplies this attribute. The Printer object **SHOULD** supports this operation
 206 attribute if it supports the corresponding Printer Description attribute. The value of this attribute is a
 207 message from the operator about the Printer object on which the operator is performing the operation. If
 208 this operation attribute is supported, the Printer copies the value to its "printer-message-from-operator"
 209 Printer Description attribute (see [ipp-mod] section 4.4.25). In addition, the Printer automatically copies:

- 210 1. the value of its "printer-up-time" attribute (see [ipp-mod] section 4.4.29) to its "printer-message-
 211 time" attribute,
- 212 2. the value of its printer-current-time" (dateTime) attribute (see [ipp-mod] section 4.4.30) to its
 213 "printer-message-date-time" attribute, if supported, and
- 214 3. the value of the operation-id value of this operation (see [ipp-mod] section 4.4.15) to its "printer-
 215 message-operation" attribute.

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

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

224 The "printer-message-from-operator" operation attribute **MUST NOT** be supported as an operation attribute
 225 for the Set-Printer-Attributes operation. If the operator wants to set the Printer's "printer-message-from-
 226 operator" Printer Description attribute when issuing the Set-Printer-Attributes operation, the client supplies
 227 the "printer-message-from-operator" explicitly with its new value as one of the Printer Description
 228 attributes in Group 2 in the request. The Printer also updates its "printer-message-time", "printer-message-
 229 date-time", and "printer-message-operation" Printer Description attributes. If the client does not explicitly
 230 supply the "printer-message-from-operator" with its new value, the Printer leaves the value of the Printer's
 231 "printer-message-from-operator" Printer Description attribute unchanged.

232 5.2 "job-message-from-operator" (text(127))

233 The client **OPTIONALLY** supplies this attribute. The Printer object **SHOULD** supports this operation
 234 attribute if it supports the corresponding Job Description attribute. The value of this attribute is a message
 235 from the operator about the Job object on which the operator has just performed an operation. If supported,

236 the Printer copies the value to the Job's "job-message-from-operator" Job Description attribute (see [ipp-
237 mod] section 4.3.16).

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

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

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

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

252 5.3 "factory-settings" (boolean) - new operation attribute for Get-Printer-Attributes:

253 The client OPTIONALLY supplies this attribute. The Printer object OPTIONALLY supports this attribute,
254 if it supports the Set-Printer-Attributes operation. If the client omits this attribute or supplies the 'false'
255 value, the Printer returns the current values of the requested attributes that are settable, i.e., the values that
256 have been set by previous Set-Printer-Attributes. If the client supplies the 'true' value, the Printer returns
257 the factory settings, i.e., the inherent values supported by the implementation as shipped from the
258 manufacturer or established at install time. This operation attribute allows an operator to determine which
259 values are supported in an implementation after having modified a settable attribute. Attributes that are not
260 settable are not affected by this operation attribute, so that the Printer returns the same values for non-
261 settable attribute when either the 'true' or 'false' value has been supplied. If this operation attribute is
262 supported, both 'true' and 'false' values MUST be supported.

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

268 6 New Printer Description Attributes

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

271 6.1 printer-settable-attributes (1setOf type2 keyword)

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

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

283 Standard keyword values are:

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

285 'xxx': Where 'xxx' is any of the keyword attribute names allowed by section 9.1.1

286 6.2 job-settable-attributes (1setOf type2 keyword)

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

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

296 Standard keyword values are:

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

298 'xxx': Where 'xxx' is any of the keyword attribute names allowed by section 9.2.1

299 6.3 printer-message-time (integer(MIN:MAX))

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

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

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

311 6.4 printer-message-date-time (dateTime)

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

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

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

321 6.5 printer-message-operation (type2 enum)

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

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

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

330 7 Additional status codes

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

332 7.1 'client-error-attributes-not-settable' (0x0413)

333 In a Set-Printer-Attributes or Set-Job-Attributes request, if all the client-supplied attributes are supported,
334 but the Printer object does not support one or more attributes as settable, the Printer object MUST return

335 this status code. The Printer object MUST also return in the Unsupported Attributes Group (see [ipp-mod]
 336 section 3.1.7) all the attributes supplied by the client that are not settable with the values changed to the out-
 337 of-band 'not-settable' value (see section 8.1). For example, if the request indicates 'job-state', all
 338 implementations MUST reject the request. As another example, if the request indicates an attribute that is
 339 supported, but not settable by this implementation, such as, say, "printer-name", the implementation rejects
 340 the request.

341 8 Additional out-of-band values

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

344 8.1 'not-settable' out of band value

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

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

351 9 Definition of the Set operations

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

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

361 The Set Printer operations are summarized in Table 2:

362 **Table 2 - 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

363

364 9.1 Set-Printer-Attributes Operation

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

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

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

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

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

386 9.1.1 Settable and READ-ONLY Printer Description attributes

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

- 388 all Job Template Default ("xxx-default") attributes
- 389 all Job Template Supported ("xxx-supported") attributes
- 390 all Job Template Ready ("xxx-ready") attributes

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

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

394 printer-state
395 printer-state-reasons
396 printer-state-message
397 printer-is-accepting-jobs - see Enable-Printer/Disable-Printer
398 queued-job-count
399 printer-up-time

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

402 printer-message-time - see Set-Printer-Attributes when setting "printer-message-from-operator"
403 printer-message-date-time - see Set-Printer-Attributes when setting "printer-message-from-operator"
404 printer-message-operation - see Set-Printer-Attributes when setting "printer-message-from-operator"

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

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

413 For example, if the "operations-supported" Printer Description attribute (see [ipp-mod] section
414 4.4.15) is settable in a particular implementation, then changing its value with a Set-Printer-
415 Attributes operation MUST affect the operations that the implementation accepts or rejects. Such
416 an implementation will need to be able to reject values for operations that it contains no code
417 support for. If the "operations-supported" Printer Description attribute is not settable in a particular
418 implementation, then that implementation MUST reject an attempt to set it with a Set-Printer-
419 Attributes operation and return the 'client-error-attributes-not-settable' status code (see section 7.1).

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

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

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

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

431 9.1.2 Set-Printer-Attributes Request

432 The following sets of attributes are part of the Set-Printer-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

438 Target:

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

441

442 Requesting User Name:

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

445

446 "document-format" (mimeType):

447 The client SHOULD supply this attribute. The Printer object MUST support this attribute. This
448 attribute is useful for a client to select the Interpreter object to which the attribute modification
449 should be applied. Each Printer object is modeled to contain one or more Interpreter objects. Those
450 Printer attributes whose values vary from Interpreter to Interpreter, are modeled as Interpreter object
451 attributes, while those that do not are Printer object attributes. Thus the target of a Get-Printer-
452 Attributes or Set-Printer-Attributes operation is both the Printer object and the Interpreter object
453 identified by the "document-format" operation attribute supplied by the client. Except for Get-
454 Printer-Attributes and Set-Printer-Attributes, there are no other operations with the Interpreter object
455 as a target. See [ipp-mod] section 3.2.5.1 "Get-Printer-Attributes Request".

456

457 If the client omits this "document-format" operation attribute, the Printer object MUST respond as if
458 the attribute had been supplied with the value of the Printer object's "document-format-default"
459 attribute. It is recommended that the client always supply a value for "document-format", since the
460 Printer object's "document-format-default" may be 'application/octet-stream', in which case the set
461 attributes and values are for the union of the document formats that the Printer can automatically
462 sense. For more details, see the description of the 'mimeType' attribute syntax in [ipp-mod]
463 section 4.1.9.

464

465 If a client wants to set an attribute for all of the Interpreter objects to the same value, it can query the
466 Printer's "document-format-supported" Printer Description attribute and perform separate Set-
467 Printer-Attributes for each document format supported.

468

469 If the Printer object does not distinguish between different sets of supported values for each
470 different document format when validating jobs in the create and Validate-Job operations, it MUST
471 NOT distinguish between different document formats in the Set-Printer-Attributes operation. If the
472 Printer object does distinguish between different sets of supported values for each different

473 document format specified by the client, this specialization applies only to the same Printer
474 attributes as the Get-Printer-Attributes operation (see [ipp-mod] section 3.2.5.1).

475
476 If the client supplies a value for the "document-format" Operation attribute that is not supported by
477 the Printer, i.e., is not among the values of the Printer object's "document-format-supported"
478 attribute, the Printer object MUST reject the operation and return the 'client-error-document-format-
479 not-supported' status code.
480

481 Group 2: Printer Attributes

482 The client MUST supply a set of Printer attributes as defined in [ipp-mod] section 4.2 Job Template
483 Attributes ("xxx-default", "xxx-supported", and "xxx-ready" attributes), section 4.4 Printer
484 Description Attributes, and any attribute extensions supported by the Printer. Each Printer attribute
485 supplied in Group 2 replaces the value(s) of the corresponding Printer attribute on the target Printer
486 object. For attributes that can have multiple values (1setOf), all values supplied by the client
487 replace all values of the corresponding Printer object attribute. If a Printer object attribute had not
488 been configured yet and so had the 'no-value' out-of-band value (see [ipp-mod] 4.1), the supplied
489 value(s) replace the 'no-value' value.
490

491 9.1.3 Set-Printer-Attributes Response

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

493 Group 1: Operation Attributes

494 Status Message:

495 In addition to the REQUIRED status code returned in every response, the response OPTIONALLY
496 includes a "status-message" (text(255)) and/or a "detailed-status-message" (text(MAX)) operation
497 attribute as described in [ipp-mod] sections 13 and 3.1.6.
498

499 Natural Language and Character Set:

500 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]
501 section 3.1.4.2.
502

503 Group 2: Unsupported Attributes

504 See [ipp-mod] section 3.1.7 for details on returning Unsupported Attributes.
505

506 If all the client-supplied attributes are supported, but one or more are not settable by the
507 implementation, i.e., are not among the values of the Printer's "printer-settable-attributes" Printer
508 Description attribute (see section 6.1), the Printer object MUST reject the operation, return the
509 'client-error-attributes-not-settable' status code, and return the client-supplied attribute(s) with a
510 substituted out-of-band value of 'not-settable' (see section 8.1). This value's syntax type is "out-of-
511 band" and its encoding is defined by special rules for "out-of-band" values in the "Encoding and

512 Transport" document [IPP-PRO]. Its value indicates that the attribute is supported, but is not
513 settable.
514

515 9.2 Set-Job-Attributes Operation

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

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

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

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

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

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

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

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

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

545 The IPP object MUST accept or reject the request based on the job's current state and transition the job to
546 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, 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'

547 9.2.1 Settable and READ-ONLY Job Description attributes

548 If the Printer supports the "job-message-from-operator" Job Description attribute (see [ipp-mod] section
549 4.3.16) and the client explicitly supplies a new value for the "job-message-from-operator" in the request,
550 then the Printer MUST set the "job-message-from-operator" Job attribute to this new value.

551 If the Printer supports the Set-Job-Attributes operation, then it SHOULD support setting of:
552 all Job Template job ("xxx") attributes (see [ipp-mod] section 4.2 and extensions)
553 that the implementation supports.

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

556 job-uri
557 job-id
558 job-printer-uri
559 job-more-info
560 job-originating-user-name - set in create operation
561 job-state
562 job-state-reasons
563 job-state-message
564 number-of-documents
565 output-device-assigned
566 time-at-creation
567 time-at-processing
568 time-at-completed
569 job-printer-up-time
570 date-time-at-creation
571 date-time-at-processing
572 date-time-at-completed
573 number-of-intervening-jobs
574 job-k-octets
575 job-k-octets-processed
576 job-impressions-completed
577 job-media-sheets-completed
578 attributes-charset - set in Job Creation operation
579 attributes-natural-language - set in Job Creation operation

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

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

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

588 9.2.2 Set-Job-Attributes Request

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

590 Group 1: Operation Attributes

591 Natural Language and Character Set:

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

594 Target:

595 Either (1) the "printer-uri" (uri) plus "job-id" (integer(1:MAX)) or (2) the "job-uri" (uri) operation
596 attribute(s) which define the target for this operation as described in [ipp-mod] section 3.1.5.
597
598

599 Requesting User Name:

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

602

603

604 Group 2: Job Attributes

605 The client MUST supply a set of Job attributes as defined in [ipp-mod] section 4.2 Job Template
606 Attributes ("xxx" attributes), section 4.3 Job Description Attributes, and any attribute extensions
607 supported by the Printer. Each Job attribute supplied in Group 2 replaces the value(s) of the
608 corresponding Job attribute on the target Job object. For attributes that can have multiple values
609 (1setOf), all values supplied by the client replace all values of the corresponding Job object
610 attribute.

611

612 9.2.3 Set-Job-Attributes Response

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

614 Group 1: Operation Attributes

615 Status Message:

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

619

620 Natural Language and Character Set:

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

623

624 Group 2: Unsupported Attributes

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

626

627 If all the client-supplied attributes are supported, but one or more are not settable by the
628 implementation, i.e., are not among the values of the Printer's "job-settable-attributes" Printer
629 Description attribute (see section 6.1), the Printer object MUST reject the operation, return the
630 'client-error-attributes-not-settable' status code, and return the client-supplied attribute(s) with a
631 substituted out-of-band value of 'not-settable' (see section 8.1). This value's syntax type is "out-of-
632 band" and its encoding is defined by special rules for "out-of-band" values in the "Encoding and
633 Transport" document [IPP-PRO]. Its value indicates that the attribute is supported, but is not
634 settable.

635

636 10 Conformance Requirements

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

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

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

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

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

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

652 11 IANA Considerations

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

655 [ftp.isi.edu/iana/assignments/ipp/operations/set.txt](ftp://ftp.isi.edu/iana/assignments/ipp/operations/set.txt)

656 12 Internationalization Considerations

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

658 13 Security Considerations

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

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691

692 15 References

693 [ipp-mod]

694 R. deBry, T. Hastings, R. Herriot, S. Isaacson, P. Powell, "Internet Printing Protocol/1.0: Model and
695 Semantics", <draft-ietf-ipp-model-v11-04.txt>, June 23, 1999.

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697 Herriot, R., Butler, S., Moore, P., Tuner, R., "Internet Printing Protocol/1.1: Encoding and
698 Transport", draft-ietf-ipp-protocol-v11-03.txt, June 23, 1999.

699 [RFC2566]

700 R. deBry, T. Hastings, R. Herriot, S. Isaacson, P. Powell, "Internet Printing Protocol/1.0: Model and
701 Semantics", RFC 2566, April 1999.

702 16 Change History

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

705 16.1 Changes to the December 8, 1999 version to make the January 4, 2000 version

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

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

715 17 Appendix A: Full Copyright Statement

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