

1 Internet Printing Protocol WG
2 INTERNET-DRAFT
3 <draft-ietf-ipp-job-printer-set-ops-054.txt>
4 Updates: RFC 2910 and 2911
5 [Target Category: standards track]
6 Expires: ~~February 28~~~~January 17~~, 2002

T. Hastings
R. Herriot
Xerox Corporation
Carl Kugler
H. Lewis
IBM Corporation
~~August 28~~~~July 17~~, 2001

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

11 Copyright (C) The Internet Society (2001). All Rights Reserved.

12 Status of this Memo

13 This document is an Internet-Draft and is in full conformance with all provisions of Section 10 of
14 [RFC2026]. Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its
15 areas, and its working groups. Note that other groups may also distribute working documents as
16 Internet-Drafts.

17 Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced,
18 or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference
19 material or to cite them other than as "work in progress".

20 The list of current Internet-Drafts can be accessed at <http://www.ietf.org/ietf/1id-abstracts.txt>
21 The list of Internet-Draft Shadow Directories can be accessed as <http://www.ietf.org/shadow.html>.

22 Abstract

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

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

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

33 Nine Printer Description attributes are defined:

- 34 printer-settable-attributes-supported (1setOf type2 keyword)
- 35 job-settable-attributes-supported (1setOf type2 keyword)
- 36 document-format-varying-attributes (1setOf type2 keyword)
- 37 printer-message-time (integer(MIN:MAX))
- 38 printer-message-date-time (dateTime)

39 printer-xri-supported (1setOf collection)
40 xri-uri-scheme-supported (1setOf uriScheme)
41 xri-authentication-supported (1setOf type2 keyword)
42 xri-security-supported (1setOf type2 keyword)
43

44

44 **Table of Contents**

45	1 Introduction	6
46	2 Terminology.....	6
47	2.1 Conformance Terminology	6
48	2.2 Other terminology	7
49	3 Requirements and Use Cases	7
50	4 Definition of the Set operations	8
51	4.1 Set-Printer-Attributes Operation.....	8
52	4.1.1 Settable and READ-ONLY Printer Description attributes	9
53	4.1.2 Set-Printer-Attributes Request.....	11
54	4.1.3 Set-Printer-Attributes Response.....	12
55	4.2 Set-Job-Attributes Operation.....	13
56	4.2.1 Settable and READ-ONLY Job Description attributes	15
57	4.2.2 Set-Job-Attributes Request	15
58	4.2.3 Set-Job-Attributes Response.....	16
59	4.3 Get-Printer-Supported-Values Operation.....	17
60	4.3.1 Definition of the usage of the 'admin-define' out-of-band attribute value.....	18
61	5 New Operation attributes	19
62	5.1 printer-message-from-operator (text(127))	19
63	5.2 job-message-from-operator (text(127)).....	20
64	6 New Printer Description Attributes.....	21
65	6.1 printer-settable-attributes-supported (1setOf type2 keyword)	21
66	6.2 job-settable-attributes-supported (1setOf type2 keyword).....	21
67	6.3 document-format-varying-attributes (1setOf type2 keyword).....	22
68	6.4 printer-message-time (integer(MIN:MAX))	22
69	6.5 printer-message-date-time (dateTime).....	22
70	6.6 printer-xri-supported (1setOf collection).....	23
71	6.7 xri-uri-scheme-supported (1setOf uriScheme).....	25
72	6.8 xri-authentication-supported (1setOf type2 keyword)	25
73	6.9 xri-security-supported (1setOf type2 keyword).....	25
74	7 Additional status codes.....	25
75	7.1 client-error-attributes-not-settable (0x0413)	25
76	8 Additional out-of-band values.....	26
77	8.1 'not-settable' out-of-band value	26
78	8.1.1 Encoding of the 'not-settable' out-of-band attribute value.....	26
79	8.2 'delete-attribute' out-of-band value.....	26
80	8.2.1 Encoding of the 'delete-attribute' out-of-band value	27

81	8.3 'admin-define' out-of-band attribute value	27
82	8.3.1 Encoding of the 'admin-define' out-of-band attribute value	28
83	9 New Values for Existing Printer Description Attributes	28
84	9.1 operations-supported (1setOf type2 enum)	28
85	10 Conformance Requirements.....	28
86	11 IANA Considerations	30
87	11.1 Operation Registrations	30
88	11.2 Additional Enum Attribute Value Registrations for the "operations-supported" Printer Attribute.....	30
89	11.3 Attribute Registrations.....	30
90	11.4 Status code Registrations.....	31
91	11.5 Out-of-band Attribute Value Registrations.....	31
92	12 Internationalization Considerations	32
93	13 Security Considerations	32
94	14 Author's Addresses.....	32
95	15 References.....	34
96	15.1 Normative References	34
97	15.2 Informative References	34
98	16 Appendix A: Allowed Values for Set-Printer-Attributes and Set-Job-Attributes requests	36
99	17 Appendix B: Attributes returned from Get-Printer-Supported-Values	42
100	18 Appendix C: Description of the Base IPP Documents.....	45
101	19 Appendix D: Full Copyright Statement	46

102

103 Table of Tables

104	Table 1 - Operation-Id assignments	8
105	Table 2 - Job State Transition Table for the Set-Job-Attributes operation	14
106	Table 3 - Member attributes of "printer-xri-supported" (1setOf collection)	23
107	Table 4 - Operation-id assignments.....	28
108	Table 5 - Validation rules for 'Any of "xxx-supported" '.....	36
109	Table 6 - Validation rules for 'From Get-Printer-Supported-Values'	37
110	Table 7 - Values allowed for Job Template Attributes in the Set-Job-Attributes Operation.....	38
111	Table 8 - Values allowed for Job Description Attributes in the Set-Job-Attributes Operation	39
112	Table 9 - Values allowed for Printer Job Template Attributes in the Set-Printer-Attributes Operation.....	40
113	Table 10 - Values allowed for Printer Description Attributes in the Set-Printer-Attributes Operation.....	41
114	Table 11 - Printer Job Template Attributes returned from Get-Printer-Supported-Values.....	43
115	Table 12 - Printer Job Template Attributes returned from Get-Printer-Supported-Values.....	43

116 Table 13 - Printer Description Attributes returned from Get-Printer-Supported-Values..... 43
117 Table 14 - Printer Job Template Attributes returned from Get-Printer-Supported-Values..... 43
118 Table 15 - Printer Job Template Attributes returned from Get-Printer-Supported-Values..... 44
119 Table 16 - Printer Description Attributes returned from Get-Printer-Supported-Values..... 45
120
121
122

122 **1 Introduction**

123 This document is an OPTIONAL extension to IPP/1.0 [RFC2565, RFC2566] and IPP/1.1 [RFC2911,
124 RFC2910]. For a description of the base IPP documents see section 18.

125 The Internet Printing Protocol (IPP) is an application level protocol that can be used for distributed
126 printing using Internet tools and technologies. IPP version 1.1 [RFC2911, RFC2910] focuses on end
127 user functionality with a few administrative operations included. This document defines additional
128 OPTIONAL end user, operator, and administrator Set-Job-Attributes and Set-Printer-Attributes
129 operations used to modify IPP Job objects and Printer objects, respectively. It also defines a third Get-
130 Printer-Supported-Values administrator operation that returns values that the IPP Printer will accept for
131 setting its "xxx-supported" attributes. The Get-Printer-Supported-Values operation MUST be
132 supported, if the implementation supports setting any "xxx-supported" Printer attributes using the Set-
133 Printer-Attributes operation.

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

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

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

145 **2 Terminology**

146 This section defines terminology used throughout this document.

147 **2.1 Conformance Terminology**

148 Capitalized terms, such as MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, MAY,
149 NEED NOT, and OPTIONAL, have special meaning relating to conformance as defined in RFC 2119
150 [RFC2119] and [RFC2911] section 12.1. If an implementation supports the extension defined in this
151 document, then these terms apply; otherwise, they do not. These terms define conformance to *this*
152 *document only*; they do not affect conformance to other documents, unless explicitly stated otherwise.

153 2.2 Other terminology

154 This document uses terms such as Job object (or Job), IPP Printer object (or Printer), "operation",
155 "request", response", "attributes", "keywords", and "support". These terms have special meaning and
156 are defined in the model terminology [RFC2911] section 12.2. The following additional terms are
157 introduced in this document:

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

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

163 3 Requirements and Use Cases

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

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

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

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

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

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

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

181 The system administrator is remotely configuring the IPP Printer after installing it, and so is
182 replacing the Printer Description attributes that have the out-of-band 'no-value' value (see
183 [RFC2911] section 4.1) with the proper values.

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

186 4 Definition of the Set operations

187 The Set-Printer-Attributes operation (as are all Printer operations) are directed at Printer objects. A
 188 client MUST always supply the "printer-uri" operation attribute in order to identify the correct target of
 189 the operation. These descriptions assume all of the common semantics of IPP/1.1 Model and Semantics
 190 document [RFC2911] section 3.1.

191 The Set-Job-Attributes operation (as are all Job operations) are directed at Job objects. A client MUST
 192 always supply some means of identifying the Job object in order to identify the correct target of the
 193 operation. That job identification MAY either be a single Job URI or a combination of a Printer URI
 194 with a Job ID as defined in [RFC2911]. The IPP object implementation MUST support both forms of
 195 identification for every job. If possible, a client SHOULD use the Printer URI with a Job ID rather than
 196 a Job URI, since the 32-bit "job-id" is more readily translated to and from other print protocols that
 197 MAY be serving as gateways into or out of the IPP implementation.

198 The Set Printer operations are summarized in Table 1:

199 **Table 1 - Operation-Id assignments**

Operation Name	Operation-Id	Brief description
Set-Printer-Attributes	0x0013	Sets attribute values of the target Printer object
Set-Job-Attributes	0x0014	Sets attribute values of the target Job object
Get-Printer-Supported-Values	0x0015	Gets values that are valid for setting "xxx-supported" attributes using the Set-Printer-Attributes operation

200 4.1 Set-Printer-Attributes Operation

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

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

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

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

- 212 2. The Printer MUST support the attribute.

- 213 3. The attribute MUST NOT be READ-ONLY, i.e., the definition of the attribute MUST NOT
214 indicate that the attribute is READ-ONLY (see Appendix A for an indication of which IPP/1.1
215 attributes are READ-ONLY).
- 216 4. The attribute MUST be settable in this implementation.
- 217 5. The Printer MUST support the value according to the rules defined in Appendix A, i.e., each value
218 of each supplied "xxx" attribute MUST be validated against a value of a corresponding "xxx-
219 supported" Printer attribute. One of those rules permits an administrator to set arbitrary 'name'
220 values to those "xxx-supported" Printer attributes that include the 'name' attribute syntax if the
221 implementation supports the 'admin-define' out-of-band value for that "xxx-supported" attribute
222 (see section 16 and 8.3).
- 223 6. The attribute's values MUST NOT conflict with the values of other Printer attributes, including
224 ones being set in this same operation.

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

229 The Printer MUST accept this operation when its READ-ONLY "printer-state" attribute (see
230 RFC2911] section 4.4.11) is 'idle' or 'stopped', and SHOULD accept it when the value is 'processing'.
231 The Printer MUST accept this operation for any of the values of the Printer object's READ-ONLY
232 "printer-state-reasons" and "printer-is-accepting-jobs" attributes, unless explicitly defined otherwise in
233 the definition of these attributes' values.

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

243 4.1.1 Settable and READ-ONLY Printer Description attributes

244 If the Printer supports the Set-Printer-Attributes operation, then it SHOULD support setting of:
245 all Job Template Default ("xxx-default") attributes
246 all Job Template Supported ("xxx-supported") attributes
247 all Job Template Ready ("xxx-ready") attributes
248 that the implementation supports (see [RFC2911] section 4.2 and extensions).

249 Some Printer Description attributes (see [RFC2911] section 4.4) MUST NOT be settable, i.e., they are
250 defined to be READ-ONLY. An attribute marked as "READ-ONLY" in the Printer Description
251 attribute table in Appendix A is such an attribute. The Printer attributes that are not marked as "READ-
252 ONLY" MAY be settable using the Set-Printer-Attributes operation, depending on implementation.

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

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

262 For example, if the "operations-supported" Printer Description attribute (see [RFC2911] section
263 4.4.15) is settable in a particular implementation, then changing its value with a Set-Printer-
264 Attributes operation MUST affect the operations that the implementation accepts or rejects. Such an
265 implementation will need to be able to reject values for operations that it contains no code support
266 for (see section 4.3). If the "operations-supported" Printer Description attribute is not settable in a
267 particular implementation, then that implementation MUST reject an attempt to set it with a Set-
268 Printer-Attributes operation, return the 'client-error-attributes-not-settable' status code (see section
269 7.1), and return the "operations-supported" attribute with the out-of-band 'not-settable' value in the
270 Unsupported Attributes Group.

271 As another example, consider an implementation in which the "media-default" and "media-
272 supported" are settable. If a client supplies a Set-Printer-Attributes request that contains the "media-
273 default" attribute with a value that is not a member of the Printer's "media-supported" attribute, the
274 Printer MUST reject the request and return the "client-error-conflicting-attributes" status code with
275 the "media-default" and "media-supported" attributes and their values (see [RFC2911] section 3.1.7).

276 As a third example, if a client supplies a Set-Printer-Attributes request that contains both the "media-
277 default" and the "media-supported" attributes, but includes a value in the "media-default" that is not a
278 member of the supplied "media-supported" attribute, the Printer MUST reject the request and return
279 the "client-error-conflicting-attributes" status code with the "media-default" and "media-supported"
280 attributes and their values (see [RFC2911] section 3.1.7).

281 *Access Rights:* The authenticated user (see [RFC2911] section 8.3) performing this operation must be
282 an operator or administrator of the Printer object (see [RFC2911] Sections 1 and 8.5). Most Printer
283 attributes will require administrator access rights to set, such as "xxx-supported", while some will
284 require operator access rights only, such as "media-ready" and "printer-message-from-operator". Which
285 attributes require which access rights depends on implementation and MAY depend on site policy.

286 4.1.2 Set-Printer-Attributes Request

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

288 Group 1: Operation Attributes

289 Natural Language and Character Set:

290 The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911]
291 section 3.1.4.1.

292
293 Target:

294 The "printer-uri" (uri) operation attribute which is the target for this operation as described in
295 [RFC2911] section 3.1.5.

296
297 Requesting User Name:

298 The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as
299 described in [RFC2911] section 8.3.

300
301 "document-format" (mimeType):

302 The client OPTIONALLY supplies this attribute. The Printer object MUST support this
303 attribute. This attribute is useful for a client to select the document-format to which the
304 attribute modification should be applied. A Printer implementation MAY allow some
305 attributes to have different values for each document format that it supports. See [RFC2911]
306 section 3.2.5.1 "Get-Printer-Attributes Request".

307
308 If the client includes this attribute, the Printer MUST change the supplied attributes for the
309 document format specified by this attribute. If a supplied attribute is a member of the
310 "document-format-varying-attributes" (i.e., the attribute varies by document format, see
311 section 6.3), the Printer MUST change the supplied attribute for the document format specified
312 by this attribute, but not for other document formats. If a supplied attribute isn't a member of
313 the "document-format-varying-attributes" (i.e. it doesn't vary by document format), the Printer
314 MUST change the supplied attribute for all document formats.

315
316 If the client omits this attribute, the Printer MUST change the supplied attributes for all
317 document formats whether or not they vary by document-format.

318
319 If the client supplies a value for the "document-format" Operation attribute that is either
320 'application/octet-stream' or not supported by the Printer, i.e., is not among the values of the
321 Printer object's "document-format-supported" attribute, the Printer object MUST reject the
322 operation and return the 'client-error-document-format-not-supported' status code. Note: the
323 document-format 'application/octet-stream' is the union of several document-formats (see
324 [RFC2911] section 3.2.5.1, Get-Printer-Attributes) and is not a true document-format.

325 Group 2: Printer Attributes

326

327 The client MUST supply a set of Printer attributes with one or more values (including
328 explicitly allowed out-of-band values) as defined in [RFC2911] section 4.2 Job Template
329 Attributes ("xxx-default", "xxx-supported", and "xxx-ready" attributes), section 4.4 Printer
330 Description Attributes, and any attribute extensions supported by the Printer. The value(s) of
331 each Printer attribute supplied in Group 2 replaces the value(s) of the corresponding Printer
332 attribute on the target Printer object. For attributes that can have multiple values (1setOf), all
333 values supplied by the client replace all values of the corresponding Printer object attribute. If
334 a Printer object attribute had not been configured yet and so had the 'no-value' out-of-band
335 value (see [RFC2911] section 4.1), the supplied value(s) replace the 'no-value' value.
336

337 4.1.3 Set-Printer-Attributes Response

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

340 Group 1: Operation Attributes

341 Status Message:

342 In addition to the REQUIRED status code returned in every response, the response
343 OPTIONALLY includes a "status-message" (text(255)) and/or a "detailed-status-message"
344 (text(MAX)) operation attribute as described in [RFC2911] sections 13 and 3.1.6.
345

346 Natural Language and Character Set:

347 The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911]
348 section 3.1.4.2.
349

350 Group 2: Unsupported Attributes

351 See [RFC2911] section 3.1.7 for details on returning Unsupported Attributes.
352

353 If some of the attributes in the operation fail to validate, the Printer MUST reject the
354 operation, MUST NOT change any Printer attributes, and MUST return the indicated status
355 code below. In this group, the Printer MUST also return all attributes that fail to validate.
356 The following are the reasons that an attribute fails to validate and the value returned for the
357 attribute, along with the indicated status code and order of detection:
358

- 359 1. The number of attributes supplied by the client exceeds the maximum number that the
360 Printer supports in a Set-Printer-Attributes request: return the 'client-error-request-entity-
361 too-large' (see [RFC2911] section 13.1.4.9).
- 362 2. The Printer doesn't support the attribute: return the attribute with the "out-of-band" value
363 'unsupported' (see [RFC2911] section 3.1.7 and [RFC2910]) and the 'client-error-
364 attributes-or-values-not-supported' (see [RFC2911] section 13.1.4.12).

- 365 3. The attribute is either READ-ONLY (in its definition) or is not-settable in this
366 implementation: return the attribute with the "out-of-band" value 'not-settable' (see section
367 8.1) and the 'client-error-attributes-not-settable' status code (see section 7.1).
- 368 4. The Printer doesn't support the value: if the attribute in the operation has a single value
369 return it. If the attribute in the operation is multi-valued, return only those values in a
370 1setOf that are not supported. Return the 'client-error-attributes-or-values-not-supported'
371 status code (see [RFC2911] section 13.1.4.12).
- 372 5. The values of some of the supplied attributes conflict with one another and/or other Printer
373 attribute values not being set: if the conflicting attribute in the operation has a single value
374 return the attribute and the value. If the attribute in the operation is multi-valued, return
375 only the attribute and those values in a 1setOf that are conflicting with other attributes.
376 Return the 'client-error-conflicting-attributes' status code (see [RFC2911] section
377 13.1.4.15).

378 4.2 Set-Job-Attributes Operation

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

383 This operation is almost identical to the Set-Printer-Attributes operation and follows the same rules for
384 validation (see section 4.1). The only differences are that the Set-Job-Attributes operation is directed at
385 a Job object rather than a Printer object, there is no "document-format" operation attribute used when
386 setting a Job object, the operation can add an attribute to the (Job) object, the 'delete-attributes' out-of-
387 band value is permitted to remove an attribute, and the validation is the same as the Job Creation
388 operations (Print-Job, Print-URI, and Create-Job), i.e., depends on the "xxx-supported" Printer
389 Description attributes (see [RFC2911] section 3.1). Using the Set-Printer-Attributes operation, the
390 administrator can set arbitrary 'name' values to those "xxx-supported" Printer attributes that include the
391 'name' attribute syntax if the implementation supports the 'admin-define' out-of-band value for that "xxx-
392 supported" attribute (see section 16 and 8.3). However, the Set-Job-Attributes cannot be used to add
393 unsupported names to the Job object.

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

396 If the client supplies a job attribute with the "out-of-band" value 'delete-attribute' (see section 8.2), then
397 the Printer MUST remove the attribute and all of its values from the Job object, if present. The
398 semantic effect of the client supplying the 'delete-attribute' value in a Set-Job-Attributes operation
399 MUST be the same as if the attribute had not been supplied with the Job object in the Job Creation
400 operation, i.e., the Printer applies its default attribute or behavior with lower precedence than the PDL
401 (see the beginning of [RFC2911] section 4.2 and [RFC2911] 3.2.1.1). Any subsequent query of the Job
402 object using Get-Job-Attributes or Get-Jobs MUST NOT return any attribute that has been deleted

403 using the 'delete-attribute' out-of-band value. However, a client can re-establish such a deleted Job
 404 attribute with any supported value(s) using a subsequent Set-Job-Attributes operation.

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

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

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

424 **Table 2 - Job State Transition Table for the Set-Job-Attributes operation**

Current "job-state"	New "job-state"	IPP object's response status code and "action":
'pending'	'pending'	'successful-ok'
'pending'	'pending-held'	'successful-ok' - needed resources are not ready
'pending-held'	'pending-held'	'successful-ok'
'pending-held'	'pending'	'successful-ok' - needed resources are ready
'processing'	'processing'	'successful-ok' or 'client-error-not-possible' depending on implementation, including the attributes being set, whether the job has started marking media, etc.
'processing-stopped'	'processing-stopped'	'successful-ok' or 'client-error-not-possible' depending on implementation, including the attributes being set, whether the job has started marking media, etc.
'completed'	'completed'	'client-error-not-possible'
'canceled'	'canceled'	'client-error-not-possible'
'aborted'	'aborted'	'client-error-not-possible'

425

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

430 **4.2.1 Settable and READ-ONLY Job Description attributes**

431 If the Printer supports the "job-message-from-operator" Job Description attribute (see [RFC2911]
432 section 4.3.16) and the client explicitly supplies a new value for the "job-message-from-operator" in the
433 Set-Job-Attributes request, then the Printer MUST set the "job-message-from-operator" Job attribute to
434 this new value.

435 If the Printer supports the Set-Job-Attributes operation, then it SHOULD support setting of:
436 all Job Template job ("xxx") attributes
437 that the implementation supports (see [RFC2911] section 4.2 and extensions).

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

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

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

448 **4.2.2 Set-Job-Attributes Request**

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

450 Group 1: Operation Attributes

451 Natural Language and Character Set:

452 The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911]
453 section 3.1.4.1.

454 Target:

455 Either (1) the "printer-uri" (uri) plus "job-id" (integer(1:MAX)) or (2) the "job-uri" (uri)
456 operation attribute(s) which define the target for this operation as described in [RFC2911]
457 section 3.1.5.
458
459

460 Requesting User Name:

461 The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as
462 described in [RFC2911] section 8.3.

463

464 Group 2: Job Attributes

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

472

473 If the client supplies an "xxx" attribute with the 'delete-attribute' out-of-band value (see section
474 8.2), the Printer MUST remove the "xxx" attribute from the Job object, if present.

475

476 **4.2.3 Set-Job-Attributes Response**

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

478 Group 1: Operation Attributes

479 Status Message:

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

483

484 Natural Language and Character Set:

485 The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911]
486 section 3.1.4.2.

487

488 Group 2: Unsupported Attributes

489 See [RFC2911] section 3.1.7 for details on returning Unsupported Attributes.

490

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

496

- 497 1. The number of attributes supplied by the client exceeds the maximum number that the
498 Printer supports in a Set-Printer-Attributes request: return the 'client-error-request-entity-
499 too-large' (see [RFC2911] section 13.1.4.9).

- 500 2. The Printer doesn't support the attribute: return the attribute with the 'unsupported' out-of-
501 band attribute value (see [RFC2911] section 3.1.7 and [RFC2910]) and the 'client-error-
502 attributes-or-values-not-supported' (see [RFC2911] section 13.1.4.12).
- 503 3. The attribute is READ-ONLY (in its definition) or is not-settable in this implementation:
504 return the attribute with the 'not-settable' out-of-band attribute value (see section 8.1) and
505 the 'client-error-attributes-not-settable' status code (see section 7.1).
- 506 4. The Printer doesn't support the value: if the attribute in the operation has a single value
507 return it. If the attribute in the operation is multi-valued, return only those values in a
508 1setOf that are not supported. Return the 'client-error-attributes-or-values-not-supported'
509 status code (see [RFC2911] section 13.1.4.12).
- 510 5. The values of some of the supplied attributes conflict with one another and/or other Job
511 attribute values not being set: if the conflicting attribute in the operation has a single value
512 return the attribute and the value. If the attribute in the operation is multi-valued, return
513 only the attribute and those values in a 1setOf that are conflicting with other attributes.
514 Return the 'client-error-conflicting-attributes' status code (see [RFC2911] section
515 13.1.4.15).

516 **4.3 Get-Printer-Supported-Values Operation**

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

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

527 This operation has identical request/response attributes to the Get-Printer-Attributes operation in
528 IPP/1.1 [RFC2911]. The operation also behaves identically to the Get-Printer-Attributes operation in
529 IPP/1.1 [RFC2911] with the following exceptions:

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

- 536 3. The Get-Printer-Attributes operation returns the current values of requested attributes while the
537 Get-Printer-Supported-Values operation returns the values that are inherently supported by the
538 implementation code, i.e., the values that an administrative client can set in a Set-Printer-Attributes
539 request.
- 540 4. The Get-Printer-Attributes operation returns the current values of requested "xxx-supported"
541 attributes that the Printer is configured to accept in Job Creation operations, including additional
542 values defined by the administrator, while the Get-Printer-Supported-Values operation returns only
543 the values of "xxx-supported" attributes that are inherently supported by the implementation and
544 does not return any additional values defined by the administrator where the implementation
545 supports the 'admin-define' out-of-band value.
- 546 5. The Get-Printer-Attributes never returns the 'admin-define' out-of-band attribute value, while the
547 Get-Printer-Supported-Attributes operation does, if the implementation allows the administrator to
548 define name values by setting that "xxx-supported" attribute with any 'name' value(s).
- 549 6. The Get-Printer-Attributes operation only requires end-user access rights, while the Get-Printer-
550 Supported-Values requires administrator access rights.

551 *Access Rights:* The authenticated user (see [RFC2911] section 8.3) performing this operation must be
552 an administrator of the Printer object (see [RFC2911] Sections 1 and 8.5).

553 4.3.1 Definition of the usage of the 'admin-define' out-of-band attribute value

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

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

568 The Get-Printer-Supported-Values MAY return the 'admin-define' out-of-band attribute value for any
569 IPP/1.1 or extension Job Template attribute if the implementation supports allowing the System
570 Administrator to add values to the "xxx-supported" attribute using the Set-Printer-Attributes operation.
571 In this case, the Printer MUST accept any 'name' value of the correct attribute syntax in a Set-Printer-
572 Attributes operation that is setting that attribute. For "xxx-supported" attributes that are defined with a
573 choice of attribute syntaxes, such as 'keyword | name', it is the 'name' attribute syntax that the System

574 Administrator can use to add new values, not the 'keyword' attribute syntax. For IPP/1.1 this
575 requirement includes the following Job Template attributes:

576 media-supported
577 job-hold-until-supported
578 job-sheets-supported

579
580 Implementations that support additional Job Template attributes that include the 'name' attribute syntax,
581 MAY use the 'admin-define' out-of-band value with them.

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

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

588 **5 New Operation attributes**

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

592 **5.1 printer-message-from-operator (text(127))**

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

595 Pause-Printer
596 Resume-Printer
597 Purge-Jobs

598
599 The client OPTIONALLY supplies this attribute in the above operations. The value of this attribute is a
600 message from the operator about the Printer object on which the operator is performing the operation.
601 If this operation attribute is supported, the Printer copies the value to its "printer-message-from-
602 operator" Printer Description attribute (see [RFC2911] section 4.4.25) even if this Operation attribute is
603 a zero-length text value or consists solely of white space.

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

608 from-operator" Printer attribute, the Printer returns the attribute with the zero-length value or the 'no-
609 value' value, respectively.

610 In addition, the Printer automatically copies:

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

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

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

626 **5.2 job-message-from-operator (text(127))**

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

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

633
634 The client OPTIONALLY supplies this attribute in the above operations. The value of this attribute is a
635 message from the operator about the Job object on which the operator has just performed an operation.
636 If supported, the Printer copies the value to the Job's "job-message-from-operator" Job Description
637 attribute (see [RFC2911] section 4.3.16) (even if this Operation attribute is a zero-length text value or
638 consists solely of white space).

639 If the Printer supports this operation attribute, it MUST support both a zero-length text value and the
640 'no-value' out-of-band value (see [RFC2911] section 4.1) to indicate that the operator has sent no
641 message. In this case, the Printer sets the value of the "job-message-from-operator" to the zero-length
642 value or 'no-value' out-of-band value, respectively. If the client queries the "job-message-from-

643 operator" Job attribute, the IPP object returns the attribute with the zero-length value or the 'no-value'
644 value, respectively.

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

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

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

658 **6 New Printer Description Attributes**

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

661 **6.1 printer-settable-attributes-supported (1setOf type2 keyword)**

662 This **REQUIRED READ-ONLY** Printer attribute identifies the Printer object attributes that are settable
663 in this implementation, i.e., that are settable using the Set-Printer-Attributes operations (see section
664 4.1). This attribute **MUST** be supported if the Set-Printer-Attributes operations is supported. The
665 Printer **MUST** reject attempts to set any Printer attributes that are not one of the values of this attribute,
666 returning the 'client-error-attributes-not-settable' status code (see section 7.1). The value of this
667 attribute **MAY** depend on the value of the "document-format" operation attribute supplied in the Get-
668 Printer-Attributes operation (see [RFC2911] section 3.2.5.1).

669 Standard keyword values are:

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

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

672 **6.2 job-settable-attributes-supported (1setOf type2 keyword)**

673 This **REQUIRED READ-ONLY** Printer attribute identifies the Job object attributes that are settable in
674 this implementation, i.e., that are settable using the Set-Job-Attributes operation (see section 4.2). This
675 attribute **MUST** be supported if the Set-Job-Attributes operations is supported. The Printer **MUST**

676 reject attempts to set any Job attributes that are not one of the values of this attribute, returning the
677 'client-error-attributes-not-settable' status code (see section 7.1).

678 Standard keyword values are:

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

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

681 **6.3 document-format-varying-attributes (1setOf type2 keyword)**

682 This OPTIONAL READ-ONLY Printer Description attribute contains a set of attribute name
683 keywords. This attribute SHOULD be supported by a Printer object, if the Printer object has Printer
684 attributes whose value vary depending on document format (see [RFC2911] Get-Printer-Attributes
685 operation). This attribute specifies which attribute values can vary by document-format. If an
686 attribute's name "xxx" is a member of this attribute and the value of attribute "xxx" is changed with the
687 Set-Printer-Attributes operation that included the "document-format" operation attribute, then the
688 Printer MUST change the value for the specified document format and no other document formats (see
689 section 4.1.2). If an attribute's name "xxx" is not a member of this attribute and the value of attribute
690 "xxx" is changed with the Set-Printer-Attributes operation, then the attribute is changed for all
691 document formats (whether or not the client supplied the "document-format" operation attribute).

692 **6.4 printer-message-time (integer(MIN:MAX))**

693 This OPTIONAL READ-ONLY Printer Description attribute contains the time that the Printer's
694 "printer-message-from-operator" was changed by the operator using any operation where the client
695 supplied the "printer-message-from-operator" operation attribute (see section 5.1) or was explicitly set
696 using the Set-Printer-Attributes operation (see section 4.1). This attribute allows the users to know
697 when the "printer-message-from-operator" attribute was last set.

698 The Printer sets the value of this attribute by copying the value of the Printer's "printer-up-time"
699 attribute (see [RFC2911] section 4.3.14). If the Printer resets its "printer-up-time" attribute to 1 on
700 power-up, then it MUST change the value of the "printer-message-time" to 0 or a negative number as
701 specified in [RFC2911] section 4.3.14.

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

704 **6.5 printer-message-date-time (dateTime)**

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

710 This attribute MUST be supported if the Printer supports both the "printer-message-time" and the
711 "printer-current-time" (dateTime) attributes (see [RFC2911] section 4.4.30).

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

714 6.6 printer-xri-supported (1setOf collection)

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

718 printer-uri-supported (1setOf uri) - see [RFC2911] section 4.4.1
719 uri-authentication-supported (1setOf type2 keyword) - see [RFC2911] section 4.4.2
720 uri-security-supported (1setOf type2 keyword) - see [RFC2911] section 4.4.3
721

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

726 An IPP Printer MUST NOT provide any other way using IPP to set these three IPP/1.1 READ-ONLY
727 Printer Description attributes, since they are READ-ONLY and MUST have consistent values at all
728 times. Note: The "~~xri~~-printer-xri-supported" (1setOf collection) attribute can be put into a directory
729 schema that requires a single text string value, such as [could be used with SLPv2](#)
730 [\[RFC2608\],\[RFC2609\]](#) or [LDAPv3 PA \[RFC2251\],\[RFC2252\],\[RFC2926\]](#), by using suitable
731 delimiting characters to separate member attributes of the collection and/or terminating collection
732 values. See [\[svrloc-printer\]](#) and [\[ldap-printer\]](#).

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

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

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

735
736 Each collection value MUST contain a single unique value for the "xri-uri" member attribute. However,
737 the other two member attributes are multi-valued, so that a single URI can support more than one
738 authentication scheme and/or more than one security scheme. Other than the uniqueness and the
739 cardinality requirements, the semantics of these three member attributes is given in [RFC2911] sections
740 4.4.1, 4.4.2, and 4.4.3, respectively.

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

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

746 A client can query what member attribute values can be set by supplying the three attribute names: "xri-
747 uri-scheme-supported", "xri-authentication-supported", and "xri-security-supported" in a Get-Printer-
748 Supported-Values request and getting back the uriScheme and type2 keyword values that can be set.
749 Since the "printer-xri-supported", "uri-authentication-supported", and "uri-security-supported"
750 attributes are READ-ONLY, they are not queriable with the Get-Printer-Supported-Values operation
751 (see section 4.3). See Table 16.

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

```
757     "printer-xri-supported" =
758         { "xri-uri" = ipp://abc.com/p1
759           "xri-authentication" = basic,digest
760           "xri-security" = tls
761         },
762         { "xri-uri" = ipp://abc.com/p2
763           "xri-authentication" = digest
764           "xri-security" = tls
765         },
766         { "xri-uri" = ipphttp://abc.com/p3
767           "xri-authentication" = none
768           "xri-security" = none
769         }
770
```

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

```
773     "printer-uri-supported" = { ipp://abc.com/p1, ipp://abc.com/p21,
774                               ipphttp://abc.com/p3 }
775     "uri-authentication-supported" = { basic, digest, none }
776     "uri-security-supported" = { tls, tls, none }
777
```

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

782 **6.7 xri-uri-scheme-supported (1setOf uriScheme)**

783 This OPTIONAL READ-ONLY Printer Description attribute identifies the URI schemes that the
784 implementation supports for use in the "printer-uri-supported" (1setOf uri) Printer Description attribute
785 (see [RFC2911] section 4.4.1) and the "xri-uri" member attribute of the "~~xri~~-printer-xri-supported"
786 (1setOf collection) Printer Description attribute (see section 6.6).

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

789 **6.8 xri-authentication-supported (1setOf type2 keyword)**

790 This OPTIONAL READ-ONLY Printer Description attribute identifies the Client Authentication
791 mechanisms that the implementation supports for use in the "uri-authentication-supported" (1setOf
792 type2 keyword) Printer Description attribute (see [RFC2911] section 4.4.2) and the "xri-authentication"
793 member attribute of the "~~xri~~-printer-xri-supported" (1setOf collection) Printer Description attribute (see
794 section 6.6).

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

797 **6.9 xri-security-supported (1setOf type2 keyword)**

798 This OPTIONAL READ-ONLY Printer Description attribute identifies the URI schemes that the
799 implementation supports for use in the "uri-security-supported" (1setOf type2 keyword) Printer
800 Description attribute (see [RFC2911] section 4.4.3) and the "xri-security" member attribute of the "~~xri~~-
801 printer-xri-supported" (1setOf collection) Printer Description attribute (see section 6.6).

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

804 **7 Additional status codes**

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

806 **7.1 client-error-attributes-not-settable (0x0413)**

807 The Set-Printer-Attributes or Set-Job-Attributes operation failed because one or more of the specified
808 attributes cannot be set either because the attribute is defined to be READ-ONLY or the attribute is not
809 settable in this implementation (see sections 4.1.3 and 4.2.3), the Printer MUST return this error code
810 and the attribute keyword name(s) and the 'not-settable' out-of-band value (see section 8.1) in the
811 Unsupported Attributes Group(see [RFC2911] section 3.1.7) for all of the attributes that could not be

812 set. When the Printer returns this status, it MUST NOT change any of the attributes supplied in the
813 operation.

814 **8 Additional out-of-band values**

815 This section defines additional out-of-band values. As with all out-of-band values, a client or a Printer
816 MUST NOT use an out-of-band value unless the definition of the attribute in an operation request
817 and/or response explicitly allows such usage. See the beginning of [RFC2911] section 4.1.

818 **8.1 'not-settable' out-of-band value**

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

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

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

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

834 **8.1.1 Encoding of the 'not-settable' out-of-band attribute value**

835 The encoding of the 'not-settable' out-of-band value is 0x15 (see [RFC2910]). The value-length MUST
836 be 0 and the value empty.

837 **8.2 'delete-attribute' out-of-band value**

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

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

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

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

853 **8.2.1 Encoding of the 'delete-attribute' out-of-band value**

854 The encoding of the 'delete-attribute' out-of-band value is 0x16 (see [RFC2910]). The value-length
855 MUST be 0 and the value empty.

856 **8.3 'admin-define' out-of-band attribute value**

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

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

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

874 An IPP Printer MUST support the 'admin-define' out-of-band value, if it supports a client setting
875 arbitrary 'name' values of an "xxx-supported" Printer attribute using the Set-Printer-Attributes
876 operation. A client MUST NOT supply the 'admin-define' out-of-band value in any request. An IPP
877 object MUST NOT support the 'admin-define' out-of-band value in other operations, unless the
878 operations' definition document explicitly defines such usage. If a Printer receives this out-of-band
879 value in any operation request, the Printer MUST either (1) reject the entire request and return the

880 'client-error-bad-request' status code or (2) ignore the attribute and return it with the 'unsupported' out-
881 of-band value.

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

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

891 8.3.1 Encoding of the 'admin-define' out-of-band attribute value

892 The encoding of the 'admin-define' out-of-band attribute value is 0x17 (see [RFC2910]). The value-
893 length MUST be 0 and the value empty.

894 9 New Values for Existing Printer Description Attributes

895 This section contains those attributes for which additional values are added.

896 9.1 operations-supported (1setOf type2 enum)

897 The following "operation-id" values are added in order to support the new operations defined in this
898 document:

899 **Table 4 – Operation-id assignments**

Value	Operation Name
0x0013	Set-Printer-Attributes
0x0014	Set-Job-Attributes
0x0015	Get-Printer-Supported-Values

900 10 Conformance Requirements

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

902 Both the Set-Job-Attributes and the Set-Printer-Attributes operations defined in the document are
903 OPTIONAL for an IPP object to support. Either one MAY be supported without the other or both
904 MAY be supported. However, if the Set-Printer-Attributes operation is supported, then the Get-

905 Printer-Supported-Values operation MUST be supported if any "xxx-supported" attributes are settable.
906 Otherwise, the Get-Printer-Supported-Values operation is OPTIONAL for an IPP Printer to support.

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

- 909 1. the Get-Printer-Supported-Values operation (see section 5), if any "xxx-supported" attributes
910 are settable.
- 911 2. the "printer-settable-attributes-supported" Printer Description attribute (see section 6.1)
- 912 3. the 'not-settable' out-of-band value in responses (see section 8.1)
- 913 4. the 'client-error-not-settable' status code (see section 7.1)
- 914 5. If "printer-message-from-operator" Printer Description attribute is supported (see [RFC2911]
915 section 4.4.25), then it MUST be settable.
- 916 6. the Get-Printer-Supported-Values operation (see section 4.3), if any "xxx-supported" attributes
917 are settable.
- 918 7. If a client can set a value with the 'name' attribute syntax for one or more "xxx-supported"
919 attributes, then the 'admin-define' out-of-band attribute value (see section 8.3) MUST be
920 supported in the Get-Printer-Supported-Values response for each such settable attribute (see
921 section 4.3)

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

- 924 1. the "job-settable-attributes-supported" Printer Description attribute (see section 6.2)
- 925 2. the 'not-settable' out-of-band value in responses (see section 8.1)
- 926 3. the 'delete-attribute' out-of-band value in requests (see section 8.2)
- 927 4. the 'client-error-not-settable' status code (see section 7.1)
- 928 5. If the "job-message-from-operator" Printer Description attribute is supported (see [RFC2911]
929 4.3.16), then it MUST be settable.

930 It is OPTIONAL for the Printer object to support the "printer-message-time" (integer) and "printer-
931 message-date-time" (dateTime) Printer Description attributes. If both the "printer-message-time"
932 (integer) and the "printer-current-time" (dateTime) (see [RFC2911] section 4.4.30) attributes are
933 supported, then the "printer-message-date-time" (dateTime) Printer Description attribute MUST be
934 supported.

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

938 11 IANA Considerations

939 This section contains registration information for IANA to add to the various IPP Registries according
 940 to the procedures defined in RFC 2911 [RFC2911] section 6.

941
 942 *Note to RFC Editors: Replace RFC NNNN below with the RFC number for this document, so that it*
 943 *accurately reflects the content of the information for the IANA Registry.*

944 11.1 Operation Registrations

945 The following table lists all of the operations defined in this document. These are to be registered
 946 according to the procedures defined in RFC 2911 [RFC2911] section 6.4.

947	Operations:	Ref.	Section:
948	Set-Printer-Attributes	RFC NNNN	4.1
949	Set-Job-Attributes	RFC NNNN	4.2
950	Get-Printer-Supported-Values	RFC NNNN	4.3
951			

952
 953 The resulting operation registrations will be published in the
 954 <ftp://ftp.iana.org/in-notes/iana/assignments/ipp/operations/>
 955 area.

956 11.2 Additional Enum Attribute Value Registrations for the “operations-supported” Printer 957 Attribute

958 The following table lists all the new enum attribute values defined in this document as additional type2
 959 enum values for use with the “operations-supported” Printer Description attribute. These are to be
 960 registered according to the procedures defined in RFC 2911 [RFC 2911] section 6.1.

961	Enum Attribute Values:	Value	Ref.	Section:
962	Set-Printer-Attributes	0x0013	RFC NNNN	4
963	Set-Job-Attributes	0x0014	RFC NNNN	4
964	Get-Printer-Supported-Values	0x0015	RFC NNNN	4
965				

966
 967 The resulting enum attribute value registrations will be published in the
 968 <ftp://ftp.iana.org/in-notes/iana/assignments/ipp/attribute-values/operations-supported/>
 969 area.

970 11.3 Attribute Registrations

971 The following table lists all of the attributes defined in this document. These are to be registered
 972 according to the procedures in RFC 2911 [RFC2911] section 6.2.

973			
974	Operation attributes:	Ref.	Section:
975	printer-message-from-operator (text(127))	RFC NNNN	5.1
976	job-message-from-operator (text(127))	RFC NNNN	5.2
977			
978	Printer Description attributes:	Ref.	Section:
979	printer-settable-attributes-supported (1setOf type2 keyword)	RFC NNNN	6.1
980			
981	job-settable-attributes-supported (1setOf type2 keyword)	RFC NNNN	6.2
982			
983	document-format-varying-attributes (1setOf type2 keyword)	RFC NNNN	6.3
984			
985	printer-message-time (integer(MIN:MAX))	RFC NNNN	6.4
986	printer-message-date-time (dateTime)	RFC NNNN	6.5
987	printer-xri-supported (1setOf collection)	RFC NNNN	6.6
988	xri-uri-scheme-supported (1setOf uriScheme)	RFC NNNN	6.7
989	xri-authentication-supported (1setOf type2 keyword)	RFC NNNN	6.8
990	xri-security-supported (1setOf type2 keyword)	RFC NNNN	6.9

991
992 The resulting attribute registrations will be published in the
993 <ftp://ftp.iana.org/in-notes/iana/assignments/ipp/attributes/>
994 area.
995

996 11.4 Status code Registrations

997 The following table lists the status code defined in this document. This is to be registered according to
998 the procedures in RFC 2911 [RFC2911] section 6.6.

999			
000	Status codes:	Ref.	Section:
001	client-error-attributes-not-settable (0x0413)	RFC NNNN	7.1
002			

003 The resulting status code registration will be published in the
004 <ftp://ftp.iana.org/in-notes/iana/assignments/ipp/status-codes/>
005 area.
006

007 11.5 Out-of-band Attribute Value Registrations

008 The following table lists all of the out-of-band attribute values defined in this document. These are to
009 be registered according to the procedures in RFC 2911 [RFC2911] section 6.7.

010			
011	Out-of-band Attribute Values:	Ref.	Section:
012	'not-settable' out-of-band value	RFC NNNN	8.1
013	'delete-attribute' out-of-band value	RFC NNNN	8.2
014	'admin-define' out-of-band attribute value	RFC NNNN	8.3
015			

016 The resulting out-of-band attribute value registrations will be published in the
017 <ftp.iana.org/in-notes/iana/assignments/ipp/out-of-band-attribute-value-tags/>

018 area.

019 **12 Internationalization Considerations**

020 This document has the same localization considerations as the [RFC2911].

021 **13 Security Considerations**

022 The IPP Model and Semantics document [RFC2911 section 8] discusses high level security
023 requirements (Client Authentication, Server Authentication and Operation Privacy). Client
024 Authentication is the mechanism by which the client proves its identity to the server in a secure manner.
025 Server Authentication is the mechanism by which the server proves its identity to the client in a secure
026 manner. Operation Privacy is defined as a mechanism for protecting operations from eavesdropping.

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

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

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

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

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

044 **14 Author's Addresses**

045 Carl Kugler
046 IBM
047 P.O. Box 1900
048 Boulder, CO 80301-9191
049

050 Phone: (303) 924-5060
051 FAX:
052 e-mail: kugler@us.ibm.com

053
054 Tom Hastings
055 Xerox Corporation
056 737 Hawaii St. ESAE 231
057 El Segundo, CA 90245

058
059 Phone: 310-333-6413
060 Fax: 310-333-5514
061 e-mail: hastings@cp10.es.xerox.com

062
063 Robert Herriot
064 Xerox Corp.
065 3400 Hill View Ave, Building 1
066 Palo Alto, CA 94304

067
068 Phone: 650-813-7696
069 Fax: 650-813-6860
070 e-mail: robert.herriot@pahv.xerox.com

071
072 Harry Lewis
073 IBM
074 P.O. Box 1900
075 Boulder, CO 80301-9191

076
077 Phone: (303) 924-5337
078 FAX:
079 e-mail: harryl@us.ibm.com

080
081 IPP Web Page: <http://www.pwg.org/ipp/>
082 IPP Mailing List: ipp@pwg.org

083
084 To subscribe to the ipp mailing list, send the following email:

- 085 1) send it to majordomo@pwg.org
086 2) leave the subject line blank
087 3) put the following two lines in the message body:
088 subscribe ipp
089 end

090
091 Implementers of this specification document are encouraged to join the IPP Mailing List in order to
092 participate in any discussions of clarification issues and review of registration proposals for additional
093 attributes and values. In order to reduce spam the mailing list rejects mail from non-subscribers, so you
094 must subscribe to the mailing list in order to send a question or comment to the mailing list.

095 15 References

096 15.1 Normative References

097 [ipp-coll]

098 deBry, R., , Hastings, T., Herriot, R., "Internet Printing Protocol (IPP): The Collection Attribute
099 Syntax", <draft-ietf-ipp-collection-05.txt>, work in progress, July 17, 2001.

100 [~~ipp-set2~~]

101 ~~— Kugler, C, Hastings, T., Lewis, H., "Internet Printing Protocol/1.1: Job and Printer Administrative
102 Operations", <draft-ietf-ipp-ops-set2-02.txt>, July 19, 2000.~~

103 [~~ldap-printer~~]

104 ~~— Fleming, P., Jones, K., Lewis, H., McDonald, I., "Internet Printing Protocol (IPP): LDAP Schema
105 for Printer Services", <draft-ietf-ipp-ldap-printer-schema-04.txt>, work in progress, December 20,
106 2000.~~

107 [RFC2565]

108 Herriot, R., Butler, S., Moore, P., Tuner, R., "Internet Printing Protocol/1.0: Encoding and
109 Transport", RFC 2565, April 1999.

110 [RFC2566]

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

113 [RFC2910]

114 Herriot, R., Butler, S., Moore, P., Turner, R., "Internet Printing Protocol/1.1: Encoding and
115 Transport", RFC 2910, September 2000.

116 [RFC2911]

117 R. deBry, T. Hastings, R. Herriot, S. Isaacson, P. Powell, "Internet Printing Protocol/1.0: Model and
118 Semantics", RFC 2911, September 2000.

119 [~~svrloc-printer~~]

120 ~~— St. Pierre, P., Isaacson, S., McDonald, I., "Definition of the Printer Abstract Service Type v2.0",
121 <draft-ietf-svrloc-printer-scheme-06.txt>, work in progress, March 8, 2000.~~

122 15.2 Informative References

123 [ipp-iig]

124 Hastings, T., Manros, C., "Internet Printing Protocol/1.1: draft-ietf-ipp-implementers-guide-v11-
125 03.txt, work in progress, July 17, 2001.

126 [RFC2251]

127 Wahl, Howes, Kille. Lightweight Directory Access Protocol (v3), RFC 2251, December 1997.

128

[RFC2252]

129

Wahl, Coulbeck, Howes, Kille. Lightweight Directory Access Protocol (v3): Attribute Syntax

130

Definitions, RFC 2252, December 1997.

131

[RFC2608]

132

E. Guttman, C. Perkins, J. Veizades, M. Day. Service Location Protocol, Version 2, RFC 2608,

133

June 1999. (Updates RFC 2165)

134

[RFC2609]

135

E. Guttman, C. Perkins, J. Kempf. Service Templates and service: Schemes, RFC 2609, June 1999.

136

(Updates RFC 2165)

137

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

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

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

The allowed values include the following cases:

1. **READ-ONLY:** the Set-Printer-Attributes or Set-Job-Attributes operation **MUST NOT** change this attribute and **MUST** reject the entire operation (see section 7.1).
2. **Any of "xxx-supported":** the Set-Printer-Attributes or Set-Job-Attributes operation accepts values that are allowed according to the IPP/1.1 rules for validating the value(s) of an "xxx" Printer or Job attribute against the value(s) of the corresponding "xxx-supported" Printer attribute. Table 5 summarizes those validation rules depending on each attribute syntax and value of an "xxx" attribute supplied in the request and that of the corresponding "xxx-supported" Printer attribute. The "xxx-supported" attribute syntax type and value(s) are obtained from a Get-Printer-Supported-Values response (see the tables in this Appendix).

Table 5 - Validation rules for 'Any of "xxx-supported" '

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

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

3. **From Get-Printer-Supported-Values:** the Set-Printer-Attributes operation accepts values that are allowed according to the IPP/1.1 rules for validating the value(s) of an "xxx" Printer attribute against the value(s) of the corresponding "xxx-supported" Printer attribute. Table 6 summarizes those validation rules depending on each attribute syntax and value of an "xxx" attribute supplied in the request and that of the corresponding "xxx-supported" Printer attribute. The "xxx-supported"

165 attribute syntax type and attribute value(s) are obtained from a Get-Printer-Supported-Values
 166 response (see Appendix B: Attributes returned from Get-Printer-Supported-Values below).

167 **Table 6 - Validation rules for 'From Get-Printer-Supported-Values'**

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

168
 169 For additional non-normative explanatory information see section 3.1.2.3 of the "Internet Printing
 170 Protocol/1.1: Implementer's Guide" [ipp-iig]).

- 171 4. Any value of the proper attribute syntax: the Set-Printer-Attributes or Set-Job-Attributes operation
 172 accepts any value of the specified attribute syntax. The attribute syntaxes supported are
 173 enumerated below.
- 174 a. Any text(127)
 - 175 b. Any name(127)
 - 176 c. Any uri
 - 177 d. Any boolean
 - 178 e. Any positive integer
 - 179 f. Any dateTime
 - 180 g. 1setOf any uri
- 181
 182 5. Combination of 'Any of "xxx-supported"' or 'Any name'.

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

185

Table 7 - Values allowed for Job Template Attributes in the Set-Job-Attributes Operation

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

186

187

Table 8 - Values allowed for Job Description Attributes in the Set-Job-Attributes Operation

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

188

189
190**Table 9 - Values allowed for Printer Job Template Attributes in the Set-Printer-Attributes Operation**

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

191
192
193**Table 10 - Values allowed for Printer Description Attributes in the Set-Printer-Attributes Operation**

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

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

194

195

196

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

197

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

198

199

This Appendix is a normative part of this document and lists all the attributes that are possible for an implementation to return in a Get-Printer-Supported-Values response, i.e., all the "xxx-supported"

200 attributes that can be supplied in a Set-Printer-Attributes request. READ-ONLY attributes MUST
 201 NOT be returned in a Get-Printer-Supported-Values response and are indicated in the tables as "READ-
 202 ONLY - MUST NOT be returned."

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

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

Printer Job Template Attributes	Values Returned
job-priority-supported (integer(1:100))	rangeOfInteger(1:100)

207
 208 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be a
 209 single rangeOfInteger value whose bounds do not exceed those of the range specified by the value
 210 returned by the Get-Printer-Supported-Values operation.

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

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

212
 213 The following table has the same criteria as the last, but is for Printer Description attributes.

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

Printer Description Attributes	Values allowed for Set
job-k-octets-supported (rangeOfInteger(0:MAX))	rangeOfInteger(0:MAX)
job-impressions-supported (rangeOfInteger(0:MAX))	rangeOfInteger(0:MAX)
job-media-sheets-supported (rangeOfInteger(0:MAX))	rangeOfInteger(0:MAX)

215
 216 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be one or
 217 more integers and rangeOfInteger values, such that the integer values described by these integers and
 218 rangeOfInteger is the same as or a subset of the integers described by the integers and rangeOf Integer
 219 of value returned by the Get-Printer-Supported-Values operation.

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

Printer Job Template Attributes	Values Returned
number-up-supported (1setOf (integer(1:MAX) rangeOfInteger(1:MAX)))	1setOf (integer(1:MAX) rangeOfInteger(1:MAX))

221

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

228 **Table 15 - Printer Job Template Attributes returned from Get-Printer-Supported-Values**

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

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

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

232

Table 16 - Printer Description Attributes returned from Get-Printer-Supported-Values

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

233

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

234

235

18 Appendix C: Description of the Base IPP Documents

236

The base set of IPP documents includes:

237

Design Goals for an Internet Printing Protocol [RFC2567]

238

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

239

Internet Printing Protocol/1.1: Model and Semantics [RFC2911]

240

Internet Printing Protocol/1.1: Encoding and Transport [RFC2910]

241

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

242 Mapping between LPD and IPP Protocols [RFC2569]

243

244 The "Design Goals for an Internet Printing Protocol" document takes a broad look at distributed
245 printing functionality, and it enumerates real-life scenarios that help to clarify the features that need to
246 be included in a printing protocol for the Internet. It identifies requirements for three types of users:
247 end users, operators, and administrators. It calls out a subset of end user requirements that are satisfied
248 in IPP/1.0 [RFC2566, RFC2565]. A few OPTIONAL operator operations have been added to IPP/1.1
249 [RFC2911, RFC2910].

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

254 The "Internet Printing Protocol/1.1: Model and Semantics" document describes a simplified model with
255 abstract objects, their attributes, and their operations. The model introduces a Printer and a Job. The
256 Job supports multiple documents per Job. The model document also addresses how security,
257 internationalization, and directory issues are addressed.

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

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

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

270 **19 Appendix D: Full Copyright Statement**

271 Copyright (C) The Internet Society (1998,1999,2000,2001). All Rights Reserved

272 This document and translations of it may be copied and furnished to others, and derivative works that
273 comment on or otherwise explain it or assist in its implementation may be prepared, copied, published
274 and distributed, in whole or in part, without restriction of any kind, provided that the above copyright
275 notice and this paragraph are included on all such copies and derivative works. However, this
276 document itself may not be modified in any way, such as by removing the copyright notice or references
277 to the Internet Society or other Internet organizations, except as needed for the purpose of developing
278 Internet standards in which case the procedures for copyrights defined in the Internet Standards process
279 must be followed, or as required to translate it into languages other than English.

280 The limited permissions granted above are perpetual and will not be revoked by the Internet Society or
281 its successors or assigns.

282 This document and the information contained herein is provided on an "AS IS" basis and THE
283 INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIMS ALL
284 WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY
285 WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY
286 RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A
287 PARTICULAR PURPOSE.

288 **Acknowledgement**

289 Funding for the RFC Editor function is currently provided by the Internet Society.