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

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Abstract

This document specifies 3 additional OPTIONAL operations for use with the Internet Printing Protocol/1.0 (IPP) [RFC2565, RFC2566], IPP/1.1 [ipp-mod, ipp-pro], and future versions. The end user, operator, and administrator Set-Job-Attributes and Set-Printer-Attributes operations are used to modify IPP Job objects and Printer objects, respectively. The third Get-Printer-Supported-Values operation returns values that the IPP Printer will accept for setting its "xxx-supported" attributes. The first is the Set-Printer-Attributes operation that operators/administrators may perform on a Printer object to change Printer attribute values. The second is the Set-Job-Attributes operation that end-users may perform on their jobs and operators/administrators may perform on any job, depending on circumstances. The operation changes the Job attribute values. The third is the Get-Printer-Supported-Values operation that operators/administrators may perform on a Printer object in order to determine acceptable values for setting "xxx-supported" attributes using the Set-Printer-Attributes operation.

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

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

38 Two operation attributes: "printer-message-from-operator" (text) and "job-message-from-operator" (text)
39 are defined to set the corresponding IPP/1.1 Printer and Job Description attributes with the same names. A
40 new out-of-band value 'any-value' is added which may be used with any attribute syntax if an attribute
41 definition allows. The 'any-value' value used with the 'name' attribute syntax can be (one of) the values of
42 "xxx-supported" attributes whose attribute syntaxes include both 'keyword' and 'name'. The 'any-value'
43 value with the 'name' attribute syntax matches any name supplied by the client during validation.

44 Six Printer Description attributes are defined:
45   printer-settable-attributes-supported (1setOf type2 keyword)
46   job-settable-attributes-supported (1setOf type2 keyword)
47   document-format-varying-attributes (1setOf type2 keyword)
48   printer-message-time (integer(MIN:MAX))
49   printer-message-date-time (dateTime)
50   printer-xri-supported (1setOf collection)

51 A new status code is defined: 'client-error-attributes-not-settable'.

52 A 'delete-attribute' out-of-band attribute value is defined for use by the client in the Set-Job-Attributes
53 request to indicate explicitly that the Printer is to remove the specified attribute from the Job object.

54 Finally, the 'not-settable' out-of-band attribute value is defined for returning in the Set-Printer-Attributes
55 and Set-Job-Attributes operation responses.

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

61 The full set of IPP documents includes:

62   Design Goals for an Internet Printing Protocol [RFC2567]
63   Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
64   Internet Printing Protocol/1.1: Model and Semantics (this document)
65   Internet Printing Protocol/1.1: Encoding and Transport [IPP-PRO]
66   Internet Printing Protocol/1.1: Implementer's Guide [IPP-IIG]
67   Mapping between LPD and IPP Protocols [RFC2569]
68

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

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

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

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

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

Table of Contents

140

Table of Tables

157

158

1   Introduction

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

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

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

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

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

2   Terminology

This section defines terminology used throughout this document.

2.1   Conformance Terminology

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

The following specialization of these terms apply to this document:

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

191 **2.2 Other terminology**

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

196   READ-ONLY: used in an attribute definition to indicate that the attribute MUST NOT be settable
197   using an IPP protocol Set operation. In other words, the attribute is not settable by definition.
198   not-settable: an implementation does not support setting an attribute (whether or not the attribute's
199   definition is READ-ONLY).

200 **3   Requirements and Use Cases**

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

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

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

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

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

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

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

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

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

218 **4   Definition of the Set operations**

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

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

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

230 The Set Printer operations are summarized in Table 1:

231   **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

232 **4.1   Set-Printer-Attributes Operation**

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

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

239   1. The number of attributes supplied by the client MUST NOT exceed the maximum number that the
240   Printer supports in a Set-Printer-Attributes request. A Printer MUST accept at least one attribute,
241   but SHOULD accept a reasonable number in a single Set-Printer-Attributes request. If a Printer
242   supports setting the three "parallel" Printer Description attributes ("printer-uri-supported", "uri-
243   authentication-supported", and "uri-security-supported" (see [ipp-mod] sections 4.4.1 through
244   4.4.3), then the Printer MUST accept at least three attributes in a Set-Printer-Attributes request.

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

247   2. The Printer MUST support the attribute.

248   3. The attribute MUST NOT be READ-ONLY, i.e., the definition of the attribute MUST NOT indicate
249   that the attribute is READ-ONLY (see Appendix A for an indication of which IPP/1.1 attributes are
250   READ-ONLY).

251   4. The attribute MUST be settable in this implementation.

252   5. The Printer MUST support the value according to the rules defined in Appendix A.

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

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

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

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

273   **4.1.1   Settable and READ-ONLY Printer Description attributes**

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

275   all Job Template Default ("xxx-default") attributes
276   all Job Template Supported ("xxx-supported") attributes
277   all Job Template Ready ("xxx-ready") attributes

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

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

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

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

289   For example, if the "operations-supported" Printer Description attribute (see [ipp-mod] section
290   4.4.15) is settable in a particular implementation, then changing its value with a Set-Printer-
291   Attributes operation MUST affect the operations that the implementation accepts or rejects. Such
292   an implementation will need to be able to reject values for operations that it contains no code
293   support for (see section 5). If the "operations-supported" Printer Description attribute is not settable
294   in a particular implementation, then that implementation MUST reject an attempt to set it with a
295   Set-Printer-Attributes operation, return the 'client-error-attributes-not-settable' status code (see
296   section 7.1), and return the "operations-supported" attribute with the out-of-band 'not-settable' value
297   in the Unsupported Attributes Group.

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

303 **4.1.2   Set-Printer-Attributes Request**

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

305 Group 1: Operation Attributes

306   Natural Language and Character Set:
307   The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]
308   section 3.1.4.1.
309
310   Target:
311   The "printer-uri" (uri) operation attribute which is the target for this operation as described in [ipp-
312   mod] section 3.1.5.
313
314   Requesting User Name:
315   The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as
316   described in [ipp-mod] section 8.3.
317
318   "document-format" (mimeMediaType):
319   The client OPTIONALLY supplies this attribute. The Printer object MUST support this attribute.
320   This attribute is useful for a client to select the document-format to which the attribute modification
321   should be applied. A Printer implementation MAY allow some attributes to have different values
322   for each document format that it supports. See [ipp-mod] section 3.2.5.1 "Get-Printer-Attributes
323   Request".
324

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

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

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

343 Group 2: Printer Attributes

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

4.1.3   Set-Printer-Attributes Response

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

356 Group 1: Operation Attributes

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

362 Natural Language and Character Set:
363 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]
364 section 3.1.4.2.

366   Group 2: Unsupported Attributes

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

368

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

374   1. The number of attributes supplied by the client exceeds the maximum number that the
375   Printer supports in a Set-Printer-Attributes request: return the 'client-error-request-entity-
376   too-large' (see [ipp-mod] section 13.1.4.9).

377   2. The Printer doesn't support the attribute: return the attribute with the "out-of-band" value
378   'unsupported' (see [ipp-mod] section 3.1.7 and [ipp-pro]) and the 'client-error-attributes-or-
379   values-not-supported (see [ipp-mod] section 13.1.4.12).

380   3. The attribute is either READ-ONLY (in its definition) or is not-settable in this
381   implementation: return the attribute with the "out-of-band" value 'not-settable' (see section
382   8.1) and the 'client-error-attributes-not-settable' status code (see section 7.1).

383   4. The Printer doesn't support the value: if the attribute in the operation has a single value
384   return it. If the attribute in the operation is multi-valued, return only those values in a 1setOf
385   that are not supported. Return the 'client-error-attributes-or-values-not-supported' status
386   code (see [ipp-mod] section 13.1.4.12).

387   5. The values of some of the supplied attributes conflict with one another and/or other Printer
388   attribute values not being set: if the conflicting attribute in the operation has a single value
389   return the attribute and the value. If the attribute in the operation is multi-valued, return only
390   the attribute and those values in a 1setOf that are conflicting with other attributes. Return
391   the 'client-error-conflicting-attributes' status code (see [ipp-mod] section 13.1.4.15).

392   **4.2   Set-Job-Attributes Operation**

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

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

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

405 If the client supplies a job attribute with the "out-of-band" value 'delete-attribute' (see section 8.2), then the
406 Printer MUST remove the attribute and all of its values from the Job object, if present. The semantic effect
407 of the client supplying the 'delete-attribute' value in a Set-Job-Attributes operation MUST be the same as if
408 the attribute had not been supplied with the Job object in the Job Creation operation, i.e., the Printer applies
409 its default attribute or behavior with lower precedence that the PDL (see the beginning of [ipp-mod] section
410 4.2 and [ipp-mod] 3.2.1.1). Any subsequent query of the Job object using Get-Job-Attributes or Get-Jobs
411 MUST NOT return any attribute that has been deleted using the 'delete-attribute' out-of-band value.
412 However, a client can re-establish such a deleted Job attribute with any supported value(s) using a
413 subsequent Set-Job-Attributes operation.

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

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

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

432 **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'

433

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

438 **4.2.1   Settable and READ-ONLY Job Description attributes**

439 If the Printer supports the "job-message-from-operator" Job Description attribute (see [ipp-mod] section
440 4.3.16) and the client explicitly supplies a new value for the "job-message-from-operator" in the Set-Job-
441 Attributes request, then the Printer MUST set the "job-message-from-operator" Job attribute to this new
442 value.

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

444   all Job Template job ("xxx") attributes

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

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

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

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

4.2.2   Set-Job-Attributes Request

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

458 Group 1: Operation Attributes

459   Natural Language and Character Set:
460   The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod]
461   section 3.1.4.1.
462

463   Target:
464   Either (1) the "printer-uri" (uri) plus "job-id" (integer(1:MAX)) or (2) the "job-uri" (uri) operation
465   attribute(s) which define the target for this operation as described in [ipp-mod] section 3.1.5.
466

467   Requesting User Name:
468   The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as
469   described in [ipp-mod] section 8.3.
470

471 Group 2: Job Attributes

472   The client MUST supply a set of Job attributes with one or more values (including explicitly
473   allowed out-of-band values) as defined in [ipp-mod] section 4.2 Job Template Attributes ("xxx"
474   attributes), section 4.3 Job Description Attributes, and any attribute extensions supported by the
475   Printer. The value(s) of each Job attribute supplied in Group 2 replaces the value(s) of the
476   corresponding Job attribute on the target Job object. For attributes that can have multiple values
477   (1setOf), all values supplied by the client replace all values of the corresponding Job object
478   attribute.
479

480   If the client supplies an "xxx" attribute with the 'delete-attribute' out-of-band value (see section 8.2),
481   the Printer MUST remove the "xxx" attribute from the Job object, if present.
482

4.2.3   Set-Job-Attributes Response

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

485 Group 1: Operation Attributes

486   Status Message:
487   In addition to the REQUIRED status code returned in every response, the response OPTIONALLY
488   includes a "status-message" (text(255)) and/or a "detailed-status-message" (text(MAX)) operation
489   attribute as described in [ipp-mod] sections 13 and 3.1.6.
490

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

Group 2: Unsupported Attributes

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

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

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

> 2. The Printer doesn't support the attribute: return the attribute with the "out-of-band" value 'unsupported' (see [ipp-mod] section 3.1.7 and [ipp-pro]) and the 'client-error-attributes-or-values-not-supported (see [ipp-mod] section 13.1.4.12).

> 3. The attribute is READ-ONLY (in its definition) or is not-settable in this implementation: return the attribute with the "out-of-band" value 'not-settable' (see section 8.1) and the 'client-error-attributes-not-settable' status code (see section 7.1).

> 4. The Printer doesn't support the value: if the attribute in the operation has a single value return it. If the attribute in the operation is multi-valued, return only those values in a 1setOf that are not supported. Return the 'client-error-attributes-or-values-not-supported' status code (see [ipp-mod] section 13.1.4.12).

> 5. The values of some of the supplied attributes conflict with one another and/or other Job attribute values not being set: if the conflicting attribute in the operation has a single value return the attribute and the value. If the attribute in the operation is multi-valued, return only the attribute and those values in a 1setOf that are conflicting with other attributes. Return the 'client-error-conflicting-attributes' status code (see [ipp-mod] section 13.1.4.15).

4.3   Get-Printer-Supported-Values Operation

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

528   1. The Get-Printer-Supported-Values operation supports only "xxx-supported" attributes.

529   2. The Get-Printer-Attributes operation returns the current value of specified attributes while the Get-
530   Printer-Supported-Values operation returns values that permit a client to determine what values of
531   "xxx-supported" attributes the Printer supports in the Set-Printer-Attributes operation.

532   3. If an implementation does not support setting an attribute that is requested, it MUST NOT return
533   that attribute in the Printer Attributes Group of the Get-Printer-Supported-Values response.
534   Furthermore, in such a case, as in the Get-Printer-Attributes response, the Unsupported Attributes
535   Group of the response NEED NOT contain the "requested-attributes" operation attribute with any
536   supplied values (attribute keywords) that were requested by the client but are not supported or are
537   not settable by the IPP Printer.

538   4. The Get-Printer-Supported-Values operation does not return any 'name' attribute syntax values for
539   any "xxx-supported" attributes. Instead, if the Set-Printer-Attributes operation will accept (any)
540   name value for an "xxx-supported" attribute, then the Get-Printer-Supported-Values operation
541   MUST return the 'any-value' out-of-band attribute value with the 'name' attribute syntax (see section
542   8.3) as one of the values of the "xxx-supported" attribute. In other words, the 'any-value' out-of-
543   band attribute value used in combination with the 'name' attribute syntax indicates that the Printer
544   implementation supports clients setting 'name' attribute syntax values for "xxx-supported" attributes
545   that are defined with the 'name' attribute syntax.

546   For example, if the Get-Printer-Supported-Values operation returns several keywords as the value of the
547   "media-supported" attribute, then the Set-Printer-Attributes operation MUST accept any of these keywords
548   as values for the "media-supported" attribute. If the Get-Printer-Supported-Values operation returns an
549   'any-value' out-of-band attribute value with the 'name' attribute syntax as one of the values of the "media-
550   supported" attribute, then the Set-Printer-Attributes operation MUST accept any value whose attribute
551   syntax is 'name' as values for the "media-supported" attribute.

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

555   media-supported
556   job-hold-until-supported
557   job-sheets-supported

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

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

5   New Operation attributes

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

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

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

Pause-Printer
Resume-Printer
Purge-Jobs

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

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

In addition, the Printer automatically copies:

1. the value of its "printer-up-time" attribute (see [ipp-mod] section 4.4.29) to its "printer-message-time" attribute,

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

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

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

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

598 **5.2   "job-message-from-operator" (text(127))**

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

601   Cancel-Job
602   Hold-Job
603   Release-Job
604   Restart-Job

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

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

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

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

619 The "job-message-from-operator" operation attribute MUST NOT be supported as an operation attribute for
620 the Set-Job-Attributes operation. If the operator wants to set the Job's "job-message-from-operator" Job
621 Description attribute when issuing the Set-Job-Attributes operation, the client MUST supply the "job-
622 message-from-operator" with its new value as one of the Job Description attributes in Group 2 in the
623 request. Otherwise, the Printer leaves the value of the Job's "job-message-from-operator" Job Description
624 attribute unchanged by not explicitly setting the attribute.   If the client does not explicitly supply the "job-
625 message-from-operator" with its new value in the Set-Job-Attributes request, the Printer leaves the value of
626 the Job's "job-message-from-operator" Job Description attribute unchanged.

627 **6   New Printer Description Attributes**

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

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

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

Standard keyword values are:

'none': There are no settable Printer attributes.
'xxx':   Where 'xxx' is any of the keyword attribute names allowed by section 4.1.1

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

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

Standard keyword values are:

'none': There are no settable Job attributes.
'xxx':   Where 'xxx' is any of the keyword attribute names allowed by section 4.2.1.

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

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

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

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

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

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

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

6.5   printer-message-date-time (dateTime)

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

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

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

6.6   printer-xri-supported (1setOf collection)

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

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

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

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

695   **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

696 Each collection value MUST contain a single unique value for the "xri-uri" member attribute. However,
697 the other two member attributes are multi-valued, so that a single URI can support more than one
698 authentication scheme and/or more than one security scheme. Other than the uniqueness and the cardinality
699 requirements, the semantics of these three member attributes is given in [ipp-mod] sections 4.4.1, 4.4.2, and
700 4.4.3, respectively.

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

702   1. the three IPP/1.1 attribute names: "printer-uri-supported", "uri-authentication-supported", "uri-
703   security-supported" and getting back the parallel values OR

704   2. the single attribute name: "printer-xri-supported" and getting back the 1setOf collection which
705   contains the same information semantically, but in a different form.

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

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

716
```
717    "printer-xri-supported =
718        {   "printer-xri-supported-uri" = ipp://abc.com/p1
719            "printer-xri-supported-authentication" = basic, digest
720            "printer-xri-supported-security" = tls
721        },
722        {   "printer-xri-supported-uri" = http://abc.com/pq
723            "printer-xri-supported-authentication" = none
724            "printer-xri-supported-security" = none
725        }
```
726

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

729
730   "printer-uri-supported" = { ipp://abc.com/p1, ipp://abc.com/p1,
731   http://abc.com/pq }
732   "uri-authentication-supported" = { basic, digest, none }
733   "uri-security-supported" = { tls, tls, none }
734

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

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

741 **7   Additional status codes**

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

743 **7.1   'client-error-attributes-not-settable' (0x0413)**

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

750 **8   Additional out-of-band values**

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

754 **8.1   'not-settable' out-of-band value**

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

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

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

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

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

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

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

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

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

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

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

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

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

782

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

784 The encoding of the 'any-value' out-of-band attribute value is 0x17 (see [ipp-pro]). This out-of-band value
785 REQUIRES a non-zero length and an attribute value which identifies an attribute syntax type. The attribute
786 value is either (1) a one-octet attribute syntax tag as defined in [ipp-pro] (value length = 1) or (2) a 0x7F
787 code followed by a 4-octets of an extended attribute syntax type code as allocated in [ipp-pro] (value length
788 = 5).

ISSUE 01 - Ok to define the 'any-value' out-of-band value to have an actual value, consisting of the attribute syntax code?

9   Conformance Requirements

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

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

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

1.   the Get-Printer-Supported-Values operation (see section 5), if any "xxx-supported" attributes are settable.

2.   the "printer-settable-attributes-supported" Printer Description attribute (see section 6.1)

3.   the 'not-settable' out-of-band value in responses (see section 8.1)

4.   the 'client-error-not-settable' status code (see section 7.1)

5.   If "printer-message-from-operator" Printer Description attribute is supported (see [ipp-mod] section 4.4.25), then it MUST be settable.

6.   the Get-Printer-Supported-Values operation (see section 4.3), if any "xxx-supported" attributes are settable.

7.   If a client can set a value with the 'name' attribute syntax for one or more "xxx-supported" attributes, then the 'any-value' out-of-band attribute value (see section 8.3) MUST be supported in the Get-Printer-Supported-Values response with the 'name' attribute syntax for each such settable attribute (see section 4.3)

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

1.   the "job-settable-attributes-supported " Printer Description attribute (see section 6.2)

2.   the 'not-settable' out-of-band value in responses (see section 8.1)

3.   the 'delete-attribute' out-of-band value in requests (see section 8.2)

4.   the 'client-error-not-settable' status code (see section 7.1)

819   5. If the "job-message-from-operator" Printer Description attribute is supported (see [ipp-mod]
820   4.3.16), then it MUST be settable.

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

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

827 **10   IANA Considerations**

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

832 **11   Internationalization Considerations**

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

834 **12   Security Considerations**

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

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

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

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

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

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

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15 Change History

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

1.115.1   Changes to the March 1, 2000 version to make the March 8, 2000 version

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

1. Added the "printer-xri-supported" (1setOf collection) attribute so that the three parallel IPP/1.1 "printer-uri-supported", "uri-authentication-supported", and "uri-security-supported" attributes could be set as one atomic attribute. Consequently, changed the three parallel attributes to be READ-ONLY and removed the requirement that three attributes MUST be set in a single request if the three parallel IPP/1.1 "printer-uri-supported", "uri-authentication-supported", and "uri-security-supported" were settable.

2. Clarified Get-Printer-Supported-Values so that if an implementation does not support setting a settable attribute, it MUST NOT return the attribute in the Printer Attribute group and it NEED NOT return the attribute in the Unsupported Attributes group, same as in a Get-Printer-Attributes response for unsupported attributes. Same clarification when unsupported attributes are requested.

3. Fixed "printer-message-date-time" (dateTime) attribute to be OPTIONAL.

4. Added note as to why the "printer-current-time" Printer Description attribute is settable (to fix an incorrect time or time zone).

5. Added "xri-authentication-supported" (1setOf type2 keyword) and "xri-security-supported" (1setOf type2 keyword) attributes to the table of attributes that can be queried with Get-Printer-Supported-Values. Added a note that these two attributes are NOT queriable with Get-Printer-Attributes, since the client queries either (1) the three "printer-uri-supported" (1setOf uri), "uri-authentication-supported" (1setOf type2 keyword), "uri-security-supported" (1setOf type2 keyword) attributes, or (2) the single "printer-xri-supported" (1setOf collection) attribute.

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

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

1. Clarified that this extension may be used with any IPP version, including 1.0, 1.1, and future versions.

2. Added "READ-ONLY" and "not-settable" terms to the terminology section. READ-ONLY is by definition, and "not-settable" is by implementation.

3. Assigned the "operation-id" values 0x0013, 0x0014, and 0x0015, respectively, for the Set-Printer-Attributes, Set-Job-Attributes, and Get-Printer-Supported-Values operations.

4. Clarified that the Set-Printer-Attributes operation while a Printer SHOULD accept a reasonable number of attribute, the Printer need only support setting one attribute in a request, unless it supports setting the three "parallel" attributes, ("printer-uri-supported", "uri-authentication-supported", and "uri-security-

supported" (see [ipp-mod] sections 4.4.1 through 4.4.3), in which case it MUST support setting at least three attributes in a single request.

5. Clarified that for the Set-Printer-Attributes operation the Printer MUST validate all of the supplied attributes in combination with each other, as well as with all of the existing attribute of the Printer object Set-Printer-Attributes.

6. Changed the requirements for accepting the Set-Printer-Attributes operation when the Printer is in the 'stopped' state from MUST to SHOULD, since some implementations may not be able to accept requests when stopped.

7. Clarified that setting certain Printer attributes with Set-Printer-Attributes MAY require more access rights than other attributes, i.e., System Administrator rights to set policy and only Operator rights to set the configuration attributes to reflect the current hardware setup.

8. Clarified the order of error checking and what is returned in each case in the Set-Printer-Attributes response.

9. Changed the 'default' out-of-band value to 'delete-attribute' out-of-band value so that the effect is to actually remove the Job attribute entirely in the Set-Job-Attribute operation.

10. Clarified that removing a Job attribute that is not present is not an error.

11. Clarified the validation of the Set-Job-Attributes request and what is returned for each error.

12. Changed the 'any-name' out-of-band attribute value to a more general 'any-value' out-of-band attribute value which in combination with an attribute syntax represents any value of that attribute syntax. The 'any-value' value can be used with the 'name' attribute syntax in a Get-Printer-Supported-Values response to indicate whether or not a Set-Printer-Attributes will accept any name to be set for particular "xxx-supported" (1setOf name | ...) Printer attributes.

13. Clarified that "printer-message-from-operator" and "job-message-from-operator" both REQUIRE that the Printer accept zero-length messages and the 'no-value' out-of-band value is synonymous with removing any value from these Printer attributes.

14. Clarified that the Get-Printer-Supported-Values is REQUIRED only if the Set-Printer-Attributes operation will accept setting some "xxx-supported" Printer attributes.

15. Changed the IANA Considerations to indicate that the operations, attributes, status codes, and out-of-band-values won't be registered and published by IANA, since this document is intended to be standards track.

16. Added security considerations for denial of service and sabotage because of the Set operations.

986   **15.3   Changes to the January 20, 2000 version to make the January 30, 2000 version**

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

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

992   2.   Renamed the Get-Reset-Printer-Attributes operation to Get-Printer-Supported-Values, so that it only
993   returns "xxx-supported" values. Relegate obtaining reset values to another operation to be paired with
994   the Reset-Printer operation in the Set2 [ipp-set2] document.

995   3.   Added "-supported" to the names of the "printer-settable-attributes" and "job-settable-attributes" Printer
996   Description attributes, so that they could be returned in Get-Printer-Supported-Values and could be set
997   by Set-Printer-Attributes.

998   4.   Deleted "authentication-methods-supported" (1setOf type2 keyword) and "security-methods-supported"
999   (1setOf type2 keyword) and clarified that "uri-authentication-supported" (1setOf type2 keyword) and
1000   "uri-security-supported" (1setOf type2 keyword) can return multiple keywords of the same value in a
1001   Get-Printer-Supported-Values operation.

1002   **15.4   Changes to the January 4, 2000 version to make the January 20, 2000 version**

1003   The following changes to the January 4, 2000 version to make the January 4, 2000 version as a result of the
1004   IPP WG telecons and mailing list discussion:

1005   1.   Replaced the "factory-settings" operation attribute proposed to be added to the Get-Printer-Attributes
1006   operation with the Get-Rest-Printer-Attributes operation which returns the reset values and the possible
1007   "xxx-supported" values.

1008   2.   Added the out-of-band 'any-name' value to be used with "xxx-supported" attributes with attribute syntax
1009   'type3 keyword | name' to indicate that any name will be accepted in a Job Creation operation for
1010   configurations that support such a concept.

1011   3.   Added authentication-methods-supported (1setOf type2 keyword) and security-methods-supported
1012   (1setOf type2 keyword) Printer Description attributes so that clients can discover the possible values for
1013   use in Set-Printer-Attributes to set "uri-authentication-supported" and "uri-security-supported"
1014   attributes, since the Reset-Printer operation doesn't change them.

1015   4.   Added validation rules that the Printer MUST use to validate a Set-Printer-Attributes request.

1016   5.   Clarified that the Set-Printer-Attributes operation MUST NOT have any side effects on other attributes,
1017   unless explicitly specified in this document.

1018   6.   Moved the specification of the attributes that MUST be READ-ONLY to Appendix A.

7. Added the "document-format-varying-attributes" (1setOf type2 keyword)

8. Added the REQUIRED "document-format-varying-scope" operation attribute to Set-Printer-Attributes in order to control whether one or all document formats are affected for those attributes that vary by document format.

9. Clarified that the Printer returns the 'client-error-attributes-not-settable' status code in a Set-Printer-Attributes response whether the attribute is READ-ONLY, the attribute is not supported, or the value is not supported.

10. Added the out-of-band 'default' value for use with Set-Job-Attributes and Job Creation operations.

11. Deleted the "printer-message-operation" Printer Description attribute.

12. Made the "Get-Reset-Printer-Attributes" operation, along with the "authentication-methods-supported" and the "security-methods-supported" Printer Description attributes REQUIRED, if the Set-Printer-Attributes operation is supported.

13. Made the 'not-settable' out-of-band value and the 'client-error-not-settable' status code REQUIRED, if the Set-Printer-Attributes operation is supported.

14. Made the 'default' out-of-band value REQUIRED, if the Set-Job-Attributes operation is supported.

15. Removed the requirement that "xxx-supported" Printer Description attributes that contain only one value be read-only.

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

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

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

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

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

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

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

1046 **16 Appendix A: Allowed Values for Set-Printer-Attributes**

1047 This appendix is a normative part of this document and contains a table of all IPP/1.1 attributes. Each row
1048 contains

1049   An attribute and
1050

1051   The values allowed in the Set-Printer-Attributes operation for the attribute. The entry in each cell is
1052   the name (first few words) of each item below 1, 2, 3, 4a-g, and 5.

1053 The allowed values include the following cases:

1054   1. READ-ONLY: the Set-Printer-Attributes operation MUST NOT change this attribute

1055   2. Any of "*xxx*-supported": the Set-Printer-Attributes operation accepts values that are allowed
1056   according to the IPP/1.1 rules for the "xxx-supported" attribute (see section 3.1.2.3 of the "Internet
1057   Printing Protocol/1.1: Implementer's Guide" [ipp-iig]). The 'xxx-supported' attribute value is
1058   obtained from a 'Get-Printer-Attributes' response.

1059   3. From Get-Printer-Supported-Values: the Set-Printer-Attributes operation accepts values that are
1060   allowed according to the IPP/1.1 rules for the "xxx-supported" attribute (see section 3.1.2.3 of the
1061   "Internet Printing Protocol/1.1: Implementer's Guide" [ipp-iig]). The "xxx-supported" attribute value
1062   is obtained from a Get-Printer-Supported-Values response (see Appendix B: Attributes returned
1063   from Get-Printer-Supported-Values below).

1064   4. Any value of the proper attribute syntax: the Set-Printer-Attributes accepts any value of the
1065   specified attribute syntax. The attribute syntaxes supported are enumerated below.

1066   a. Any text(127)
1067   b. Any name(127)
1068   c. Any uri
1069   d. Any boolean
1070   e. Any positive integer
1071   f. Any dateTime
1072   g. 1setOf any uri

1073   5. Combination of 'Any of "*xxx*-supported"' or 'Any name'.

1074 If a Printer implementation doesn't want to allow setting values indicated in this Appendix as "any xxx", it
1075 can make the value be read-only. For example, for a monochrome printer the attribute "color-supported" is
1076 "false" and MUST be read-only. Otherwise an administrator could set it to "true" because the value can
1077 have "any boolean" according to the rules in Table 7 below.

1078   **Table 4 - Values allowed for Job Template Attributes in the Set-Job-Attributes Operation**

Job Template Attributes	Values allowed for Set
job-priority (integer(1:100))	Any of "xxx-supported"
job-hold-until (type3 keyword | name (MAX))	Any of "xxx-supported"
job-sheets (type3 keyword | name(MAX))	Any of "xxx-supported"

Job Template Attributes	Values allowed for Set
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"

1079

1080   **Table 5 - Values allowed for Job Description Attributes in the Set-Job-Attributes Operation**

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

Job Description Attributes	Values allowed for Set
job-media-sheets-completed (integer(0:MAX))	READ-ONLY
attributes-charset (charset)	READ-ONLY
attributes-natural-language (naturalLanguage)	READ-ONLY

1081

1082 **Table 6 - Values allowed for Printer Job Template Attributes in the Set-Printer-Attributes Operation**

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

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1084 **Table 7 - Values allowed for Printer Description Attributes in the Set-Printer-Attributes Operation**

Printer Description Attributes	Values allowed for Set
printer-uri-supported (1setOf uri)	READ-ONLYFrom Get-Printer-Supported-Values

Printer Description Attributes	Values allowed for Set
uri-authentication-supported (1setOf type2 keyword)	READ-ONLYFrom Get-Printer-Supported-Values
uri-security-supported (1setOf type2 keyword)	READ-ONLYFrom Get-Printer-Supported-Values
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"
charset-supported (1setOf charset)	From Get-Printer-Supported-Values
natural-language-configured (naturalLanguage)	Any of "xxx-supported", use generated-natural-language-supported
generated-natural-language-supported (1setOf naturalLanguage)	From Get-Printer-Supported-Values
document-format-default (mimeMediaType)	Any of "xxx-supported"
document-format-supported (1setOf mimeMediaType)	From Get-Printer-Supported-Values
printer-is-accepting-jobs (boolean)	READ-ONLY
queued-job-count (integer(0:MAX))	READ-ONLY
printer-message-from-operator (text(127))	Any text(127)
color-supported (boolean)	From Get-Printer-Supported-Values
reference-uri-schemes-supported (1setOf uriScheme)	From Get-Printer-Supported-Values
pdl-override-supported (type2 keyword)	From Get-Printer-Supported-Values
printer-up-time (integer(1:MAX))	READ-ONLY
printer-current-time (dateTime)	Any dateTime **
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

Printer Description Attributes	Values allowed for Set
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

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

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

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

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

Table 8 - Printer Job Template Attributes returned from Get-Printer-Supported-Values

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

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

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

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

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

Table 10 - Printer Description Attributes returned from Get-Printer-Supported-Values

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

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

1105

1106 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be one or
1107 more integers and rangeOfInteger values, such that the integer values described by these integers and
1108 rangeOfInteger is the same as or a subset of the integers described by the integers and rangeOf Integer of
1109 value returned by the Get-Printer-Supported-Values operation.

1110 **Table 11 - Printer Job Template Attributes returned from Get-Printer-Supported-Values**

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

1111

1112 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be one or
1113 more values, where each such value matches a value returned by the Get-Printer-Supported-Values
1114 operation. A keyword, enum, boolean, charset, naturalLanguage, uriScheme, mimeMediaType or resolution
1115 value matches if it is equal. A name matches the 'any-name' out-of-band value.

1116 **Table 12 - Printer Job Template Attributes returned from Get-Printer-Supported-Values**

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

1117

1118 The following table has the same criteria as the last, but is for Printer Description attributes. Note that the
1119 first two attributes in the table below follow the rules for allowed values in the Set-Printer-Attributes, but
1120 unlike other attributes, there can be more than one occurrence of each value because the i-th value of these
1121 attributes specifies the authentication or security for the i-th printer in "printer-uri-supported".

1122   **Table 13 - Printer Description Attributes returned from Get-Printer-Supported-Values**

Printer Description Attributes	Values allowed for Set
printer-uri-supported (1setOf uri)	READ-ONLY - MUST NOT be returned
uri-authentication-supported (1setOf type2 keyword)	READ-ONLY - MUST NOT be returned1setOf type2 keyword
uri-security-supported (1setOf type2 keyword)	READ-ONLY - MUST NOT be returned1setOf type2 keyword
xri-authentication-supported (1setOf type2 keyword) **	1setOf type2 keyword
xri-security-supported (1setOf type2 keyword) **	1setOf type2 keyword
ipp-versions-supported (1setOf type2 keyword)	1setOf type2 keyword
operations-supported (1setOf type2 enum)	1setOf type2 keyword
multiple-document-jobs-supported (boolean)	1setOf boolean
charset-supported (1setOf charset)	1setOf charset
generated-natural-language-supported (1setOf naturalLanguage)	1setOf naturalLanguage
document-format-supported (1setOf mimeMediaType)	1setOf mimeMediaType
color-supported (boolean)	1setOf boolean
reference-uri-schemes-supported (1setOf uriScheme)	1setOf uriScheme
compression-supported (1setOf type3 keyword)	1setOf type3 keyword
printer-settable-attributes-supported (1setOf type2 keyword)	1setOf type2 keyword
job-settable-attributes-supported (1setOf type2 keyword)	1setOf type2 keyword

1123 ** Note: there is no corresponding "xri-authentication-supported" (1setOf type2 keyword) and "xri-
1124 security-supported" (1setOf type2 keyword) Printer Description attributes that can be queried using the Get-
1125 Printer-Attributes operation. Instead, the client queries either: (1) the three "printer-uri-supported" (uri),
1126 "uri-authentication-supported" (1setOf type2 keyword) and "uri-security-supported" (1setOf type2 keyword)
1127 attributes or (2) the single "priner-xri-supported" (1setOf collection) attribute.

1128 For the following attributes, the value allowed by the Set-Printer-Attributes operation MUST be a single
1129 value that matches one of the values returned by the Get-Printer-Supported-Values operation. A keyword,
1130 enum, boolean, charset, naturalLanguage, uriScheme, mimeMediaType or resolution value matches if it is
1131 equal. A name matches the 'any-name' out-of-band value.

1132

1133   **Table 14 - Printer Description Attributes returned from Get-Printer-Supported-Values**

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

1134

1135 For the following attributes, the Set-Printer-Attributes operation MUST NOT return a value. The IPP
1136 Model document [ipp-mod] document specifies the allowed values.

1137

1138   **Table 15 - Printer Description Attributes returned from Get-Printer-Supported-Values**

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

1139

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