Printer Working Group (PWG):

Semantic Model

IEEE-ISTO Printer Working Group

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Abstract

This document is a high level overview of the Semantic Model defined by the PWG. This document briefly describes the semantic elements defined in various PWG documents and PWG documents submitted to the IETF. The Semantic Model also incorporates additions made by other groups addressing print systems. With every semantic element included a reference is provided to the document and section that details the semantic definition.

The Semantic Model contains a high level description of the Actions that operate on the objects and attributes in the model. This document does not describe the mapping of the semantics onto a specific protocol or network environment.

32 Title: Printer Working Group (PWG): Semantic Model

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1 Introduction

148

149   This document is a high level overview of the Semantic Model defined by the PWG. This
150   document briefly describes the semantic elements defined in various PWG documents and PWG
151   documents submitted to the IETF. The Semantic Model also incorporates additions made by other
152   groups addressing print systems. With every semantic element included a reference is provided to
153   the document and section that details the semantic definition.

154   The Semantic Model contains a high level description of the Actions that operate on the objects and
155   attributes in the model. This document does not describe the mapping of the semantics onto a
156   specific protocol or network environment.

2 Terminology

Action	A request that a Print Client makes to an object to perform some activity. The object returns a response to the Print Client that contains some information about the effect of the action on the object.
Data Class	A template for data describing an object and representing its state. Each attribute in the data class represents a semantic element of the associated object.
Document	An object containing descriptive and state information for a logical unit of information to be printed. The object may contain processing information. The document content is represented by a single data (e.g. PDL, image) file and contains Pages.
Document Processing Attributes	Document Attributes supplied by the Print Client to direct the printing of a Document that the Printer copies to the Document. Examples: Copies, Finishings, Media, NumberUp.
End User	A print client that has no special rights on the printer. The End User typically submits jobs. The End User is allowed to query the printer, jobs and documents and control jobs based on policy.
Impression	Everything printed on a single side of a media
Job	An object that represents the submission of work for the printer. It contains descriptive and state information as well as default Document Processing Attributes. Jobs contain one or more Documents
Job Description Attributes	Job Attributes supplied by the Print Client to describe the Job. Examples: JobName, RequestingUserName, JobRecipient
Job Processing Attributes	Job Attributes supplied by the Print Client to direct the printing of the Job as a whole that the Printer copies to the Job. Examples: JobHoldUntil, JobPriority, JobCopies, JobFinishings.
Object	A entity that instantiates a data class and implements the appropriate actions.
Operator	A print client that has special rights on the printer. The Operator typically oversees the printer. The Operator is allowed to query and control the printer, jobs and documents based on site policy.
MediaSheet	A sheet of paper, or other material, used for printing
Page	A logical entity that represents the information contained on a single side of a sheet of media. Note that this is the electronic form and that multiple pages can be rendered into a single impression through N-Up printing

PDL	(Page Description Language) A language that describes the content to be printed and how it will be laid out on a page (e.g. Adobe PostScript®, Hewlett Packard PCL®).
Print Client	An application or network entity that performs actions
Printer	An object that represents a printing device, set of printing devices, or a printing service and contains zero or more Jobs
Type 1 keyword	All the values are defined in the specification. Additional values require a new specification.
Type 2 keyword	An initial set of values is defined in the specification. This working group registers additional values after review. The initial versions of the specification will contain the values registered so far. After the specification is approved, this working group will register additional values after approval.
Type 3 keyword	An initial set of values is defined in the specification. Additional values are registered without working group review. The initial versions of the specification contain the values registered so far. After the specification is approved, this working group will register additional values without approval.

158

159   3   Model Overview

160   The Printer Working Group (PWG) has defined a simplified printing model. It represents printing
161   in either a client/server print paradigm or a peer-to-peer print paradigm. The PWG model describes
162   the device as a Printer object. A Printer object may represent one or more physical Printers.
163   Another object is the Job. A Printer can contain zero or more Jobs and a Job is contained in only
164   one Printer. Each Job can contain zero or more documents. A Job can contain zero or more
165   Documents and a Document is contained in only one Printer. The PWG model contains methods
166   that act upon these objects.
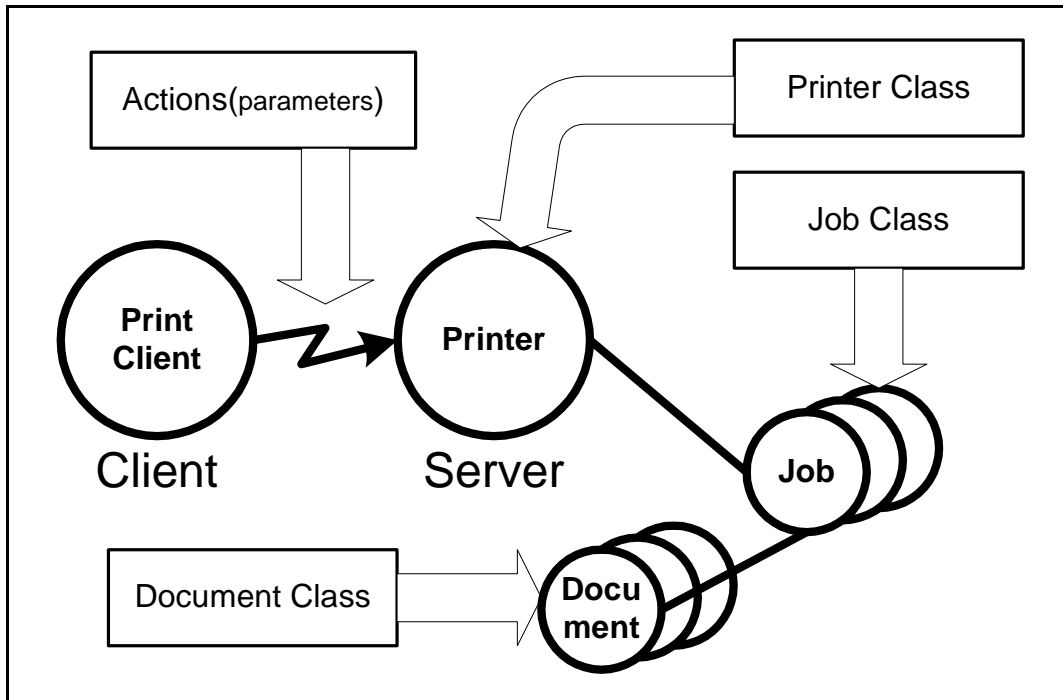
167

168   **Figure 1 Model Overview**

169 The objects are represented in the semantic model as data classes. The methods are represented as a
170 set of actions that act upon those data classes. The actions permit the creation and control of Jobs
171 and documents as well as the submission of Document data. The content of a Document is
172 included in the submission or can be accessed via a URL reference. There are also actions to query
173 a Printer, Job or Document to access their attributes or to list their contained objects.

174 The model uses a number of terms with specific meaning for a printer.

175 **4   Data Classes**

176   This section describes the data classes in the PWG semantic model. Some of the classes are taken
177   from the model and semantics of IPP [rfc2911].

178 **Figure 2** Shows the data classes, their attribute groups and the containment relationship between
179 the classes
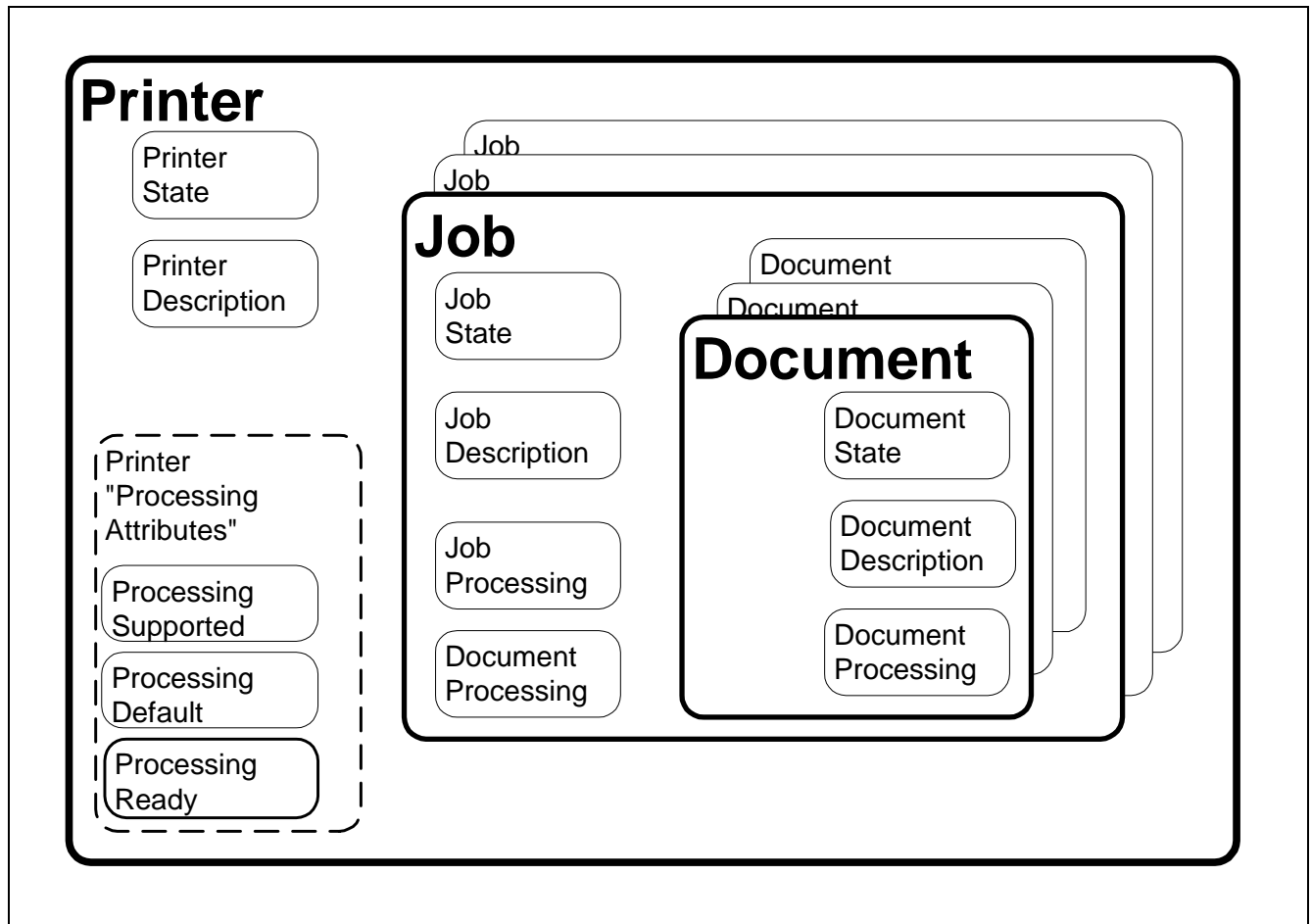
180
181

182   **Figure 2 Data Classes**

183 *4.1 Printer Object Class*

184   The Printer class is represented by a collection of attributes as shown in

185 **Figure 2**. The Printer Attributes are presented in detail in Table 6. The printer object also contains
186 attributes that describe the valid processing attribute values. (See section 4.3.2 for processing
187 attributes) The Printer class is the container for Jobs.

188 ### 4.1.1 Printer State Attributes

189 Figure 3 below shows the Printer State Attributes. These attributes represent the state of the printer
190 such as the number of jobs or existing error conditions. The values of th attributes in this group are
191 changed by automata. End Users cannot directly modify their values. The End User can affect the
192 values of these attributes through actions (e.g. PausePrinter can change the value of
193 PrinterIsAcceptingJobs"). The semantics of the attributes are summarized in Table 6.

194
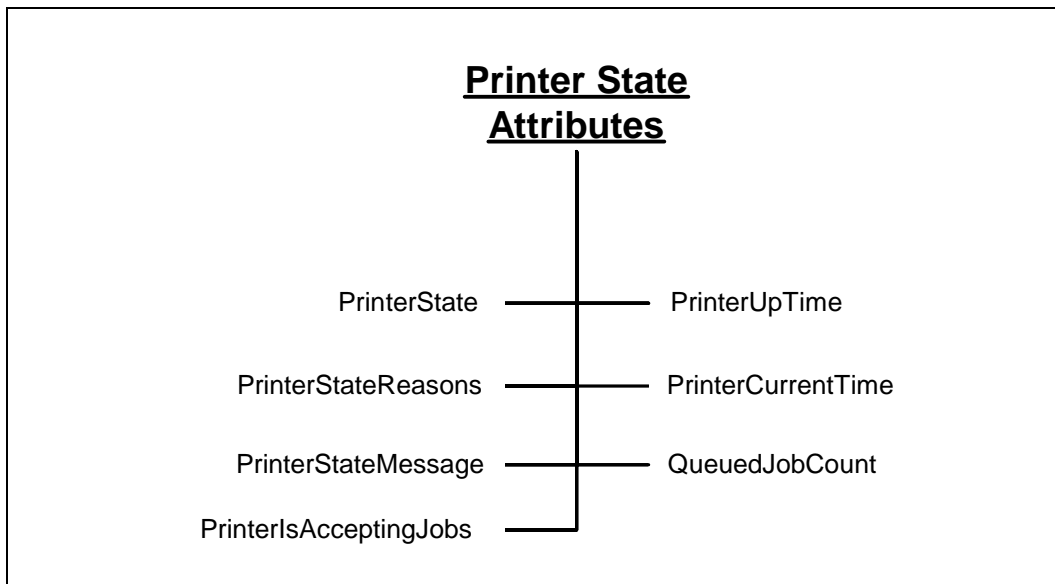
195

196 **Figure 3 Printer State Attributes**

197 The "PrinterState" attribute is one of the most important Printer Description attributes. Figure 4
198 shows the values of the "PrinterState" attribute and the Printer life cycle as affected by actions on
199 the Printer and job processing.

* lastDocument = true
** lastDocument = false

200
201
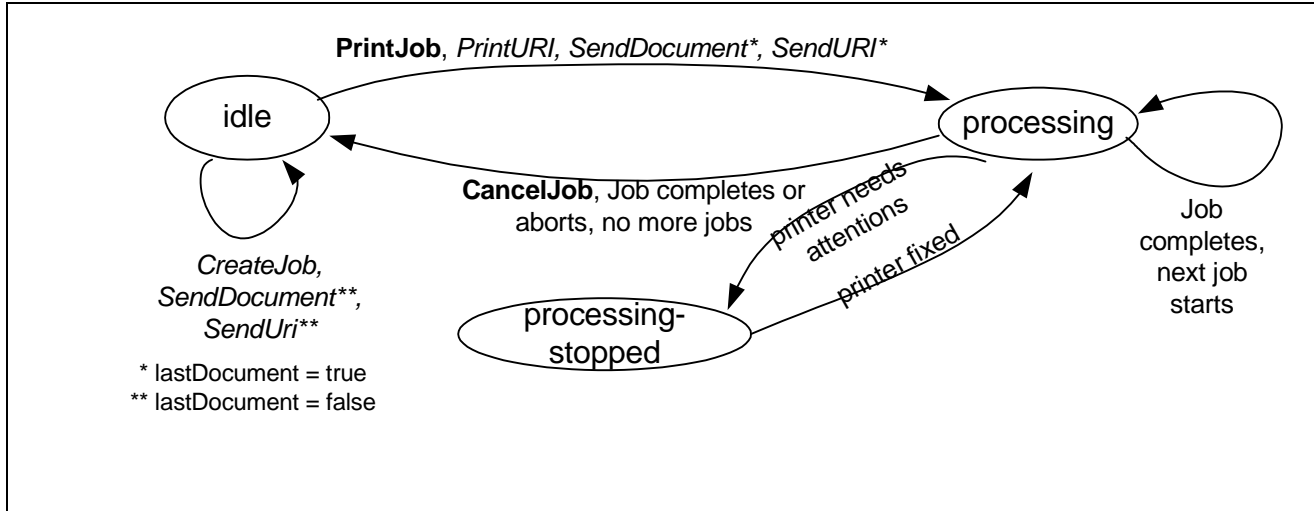
Figure 4 - The "PrinterState" attribute and the Printer Life Cycle

4.1.2 Printer Description Attributes

205 Figure 5 below shows the Printer Description Attributes. These attributes contain information that
206 describes the printer such as its make, where it's located and its speed. An automaton controls
207 some of the attributes in this group (e.g. "PagesPerMinute"). Others attributes in this group can be
208 modified by Operators or Administrators (e.g. "PrinterName"). The semantics of the attributes are
209 summarized in Table 6.

210
211
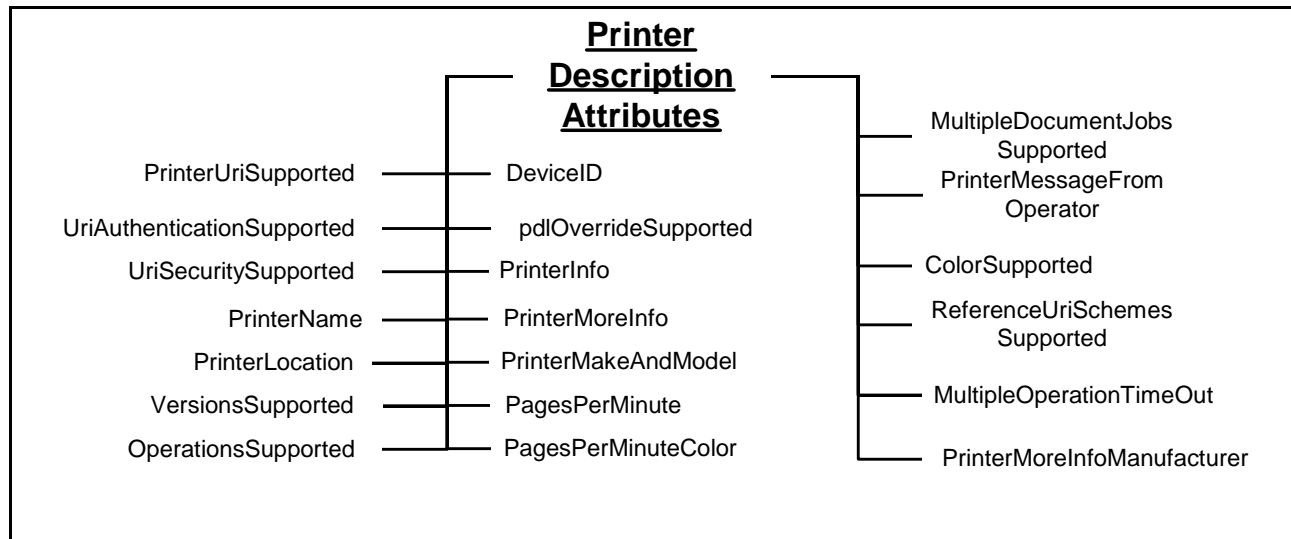
Figure 5 Printer Description Attributes

4.1.3 Printer Defaults, Supported and Ready Processing Attributes

214 See section 4.3.2 below for the attributes that may comprise these groups. Processing Attributes
215 are the union of Job Processing Attributes and Document Processing Attributes. If a Processing

216   attribute (e.g. Media) is supported, the Printer must have an associated Processing Supported
217   Attribute (e.g. MediaSupported) and Processing Default Attribute (e.g. MediaDefault) Printer
218   attribute. There may be an associated Processing Ready Attribute (e.g. MediaReady) Printer
219   attribute. By retrieving the Printer Processing attributes, a Client can determine all the Job and
220   Document Processing attributes and values that may be used in creating Jobs and Documents.

221   **4.1.3.1 Processing Supported Attributes**

222   These attributes list all the currently configured valid values for each Job Processing Attribute and
223   Document Processing Attribute. Though the Printer is configured to support the feature, human
224   intervention may be required to process the job (e.g. selected paper may have to be loaded into a
225   tray). The syntax for Processing Attributes Supported is multi-valued when the associated
226   processing attribute is a string. When syntax of the processing attribute is an integer, the syntax of
227   the corresponding Processing Supported Attribute is usually RangeOfInteger which indicates the
228   minimum and maximum values supported by the Printer. However, there are some exceptions as
229   indicated in Table 1.

230   **Table 1-Integer syntaxes whose ProcessingAttributeSupported syntax isn't RangeOfInteger**

"xxx" attribute name	"xxx" syntax	"xxxSupported" syntax
JobPriority	Integer	Integer (Max value)
Copies	Integer	Integer (Max value)
PageRanges	RangeOfInteger (multivalued)	Boolean (are PageRanges supported)

231   **4.1.3.2 Processing Default Attributes**

232   These attributes give the default value for the associated processing instruction if the Processing
233   Attribute of the job and document are not supplied and the instructions is not embedded in the
234   PDL. The syntax for the Processing Default Attributes is the same as the corresponding Processing
235   Attribute. The only exception is that the PageRanges attribute does not have a PageRangesDefault
236   attribute.

237   **4.1.3.3 Processing Ready Attributes**

238   These attributes give the features available without human intervention. The syntax for a
239   Processing Ready Attribute is the same as the corresponding Processing Attribute.

240   *### 4.2 Job Object Class*

241   The Job object class is represented by a collection of attributes divided into four groups as shown
242   in

243   **Figure 2**. The Job class also contains the document class

244   Job State Attributes – See Section 4.2.1
245   Job Description Attributes – See section 4.2.2.
246   Job Processing Attributes – See section 4.4.1
247   Document Processing Attributes – See section 4.4.2

248 **4.2.1 Job State Attributes**

249 **Figure 6** below shows the Job State Attributes. Automata primarily control the attributes in this
250 group. End Users cannot directly modify their values. The End User can affect the values of these
251 attributes through actions (e.g. CancelJob can change the value of JobStateReasons"). The
252 semantics of the attributes are summarized in Table 4.

253
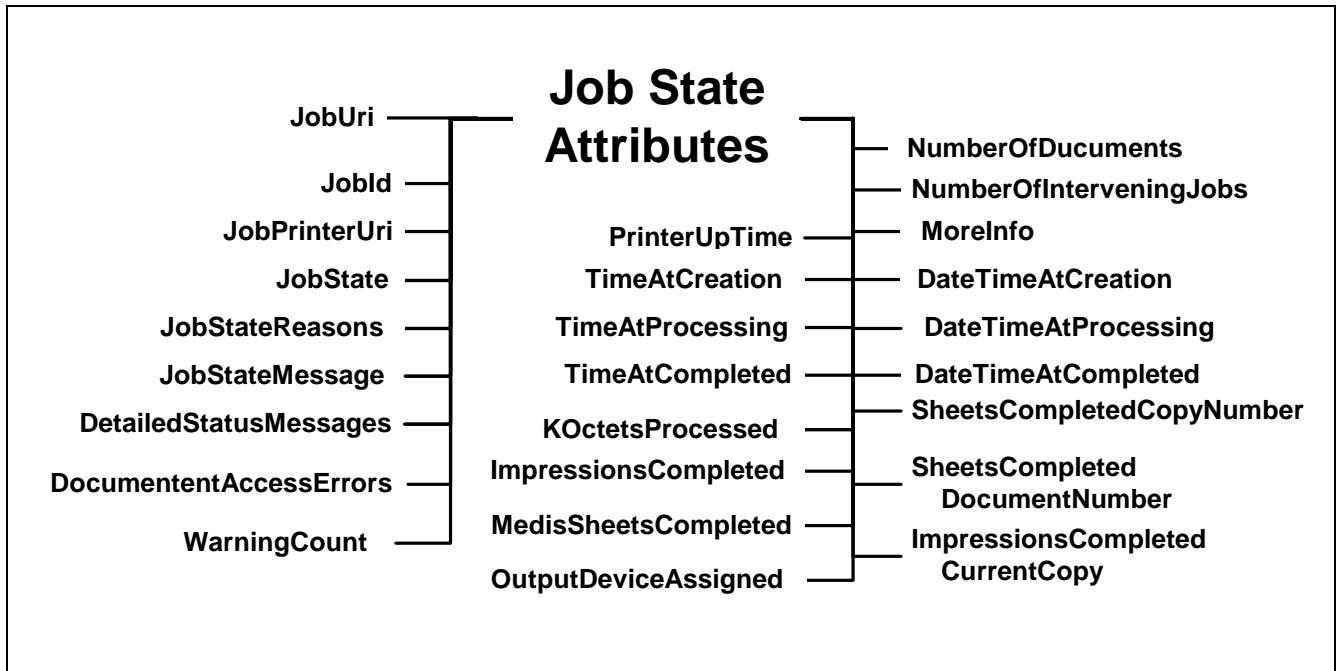
254
255

256   **Figure 6 Job State Attributes**

257 **4.2.1.1   The Job Life Cycle**

258 The "JobState" attribute is one of the most important Job State attributes. Figure 7 shows the values
259 of the "JobState" attribute and the Job life cycle as affected by actions on the Job, Printer, and job
260 processing.
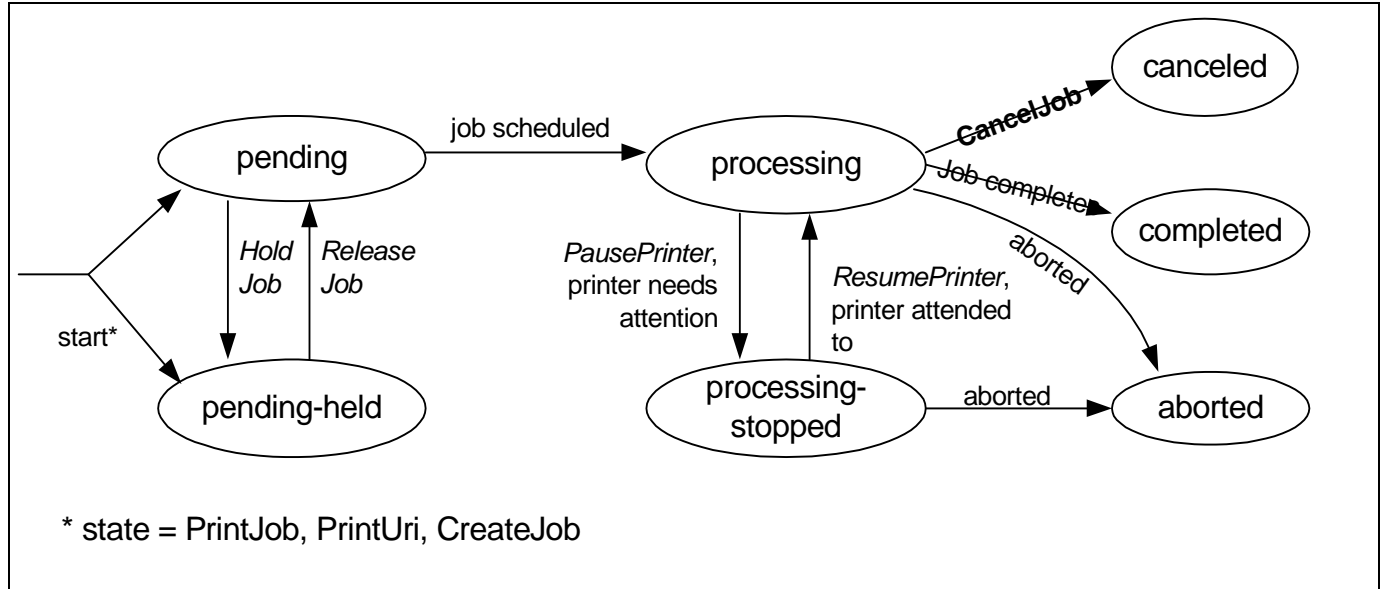
261
262

263 **Figure 7 The "JobState" Job Attribute and the Job object ;ife cycle**

264 **4.2.2 Job Description Attributes**

265 **Figure 8** below shows the Job Attributes. These attributes contain information from the End User
266 at Job creation that describes the Job such as its name. Automaton may modify the value of some
267 of the attributes in this group (e.g. "KOctets") if more reliable data is obtained. The semantics of
268 the attributes are summarized in Table 4.

269
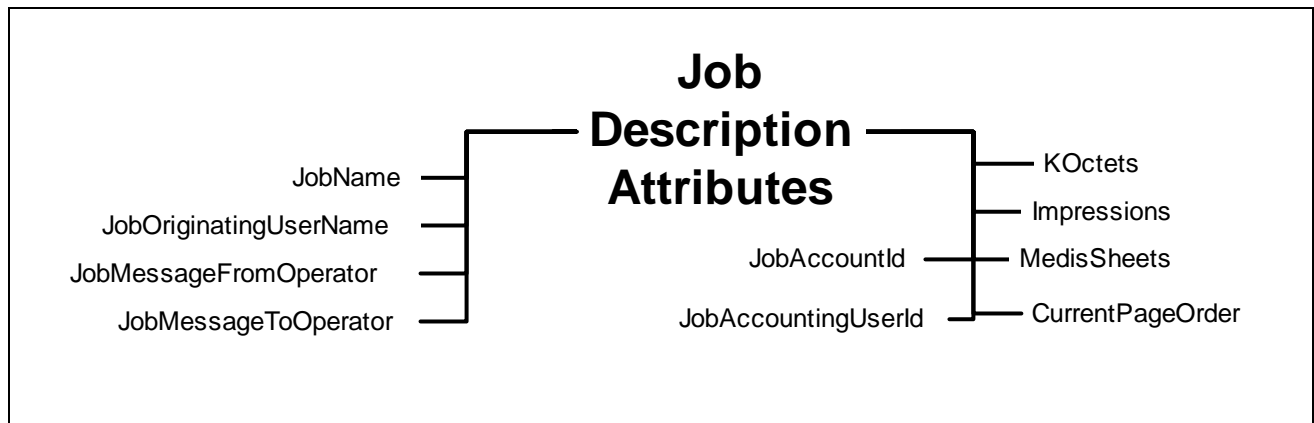
270
271

272 **Figure 8 Job Description Attributes**

273 ### *4.3 Document Object Class*

274 The Document object class is represented by a collection of attributes divided into Three groups as
275   shown in

276 **Figure 2**. The Document class contains the document class

277   Document State Attributes – See Section 4.3.1.
278   Document Description Attributes – See section 4.3.2.
279   Document Processing Attributes – See section 4.4.2

280 ### **4.3.1 Document State Attributes**

281

282 Figure 9 shows the Document State Attributes. Automata primarily control the attributes in this
283 group. End Users cannot directly modify their values. The End User can affect the values of these
284 attributes through actions (e.g. CancelDocument can change the value of DocumentsState"). The
285 semantics of the attributes are summarized Table 5
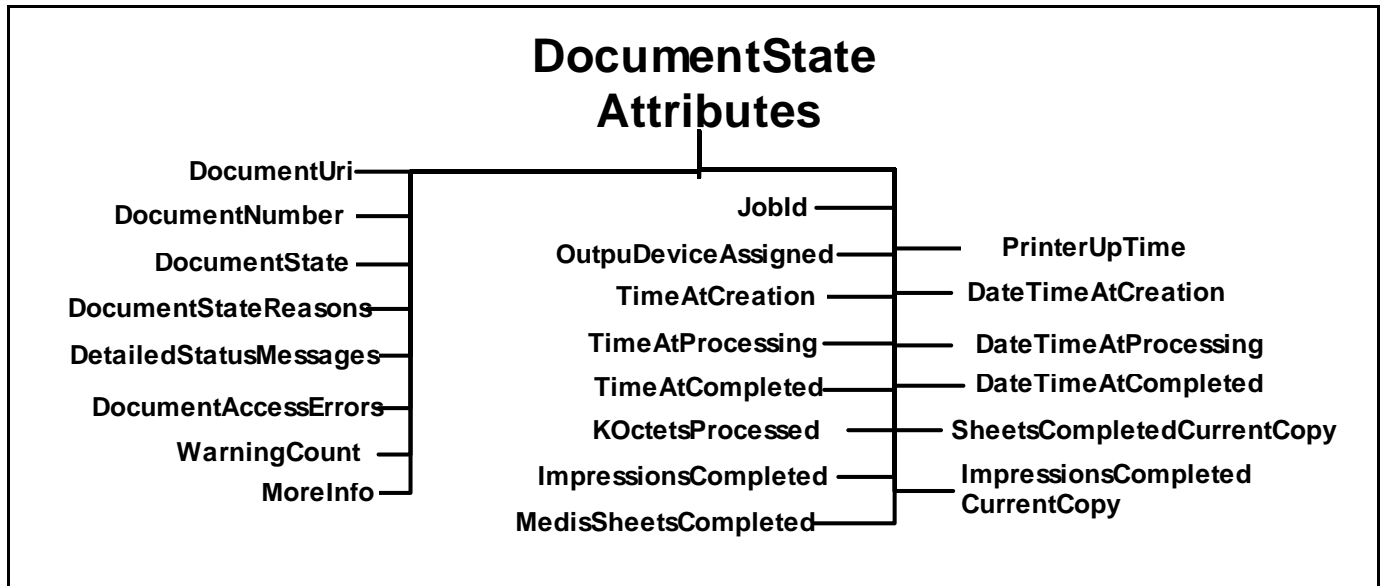
286
287

288   Figure 9 Document State Attributes

289 #### **4.3.1.1 The Document Life Cycle**

290 The "DocumentState" attribute is one of the most important Document State Attributes. Figure 10
291 shows the values of the "DocumentState" attribute and the Document life cycle as affected by
292 Actions and job processing. Documents are not active objects and their life cycle is closely tied to
293 the lifecycle of a Job. Documents basically have three states.   The first is waiting to be processed
294 by a Job (i.e., pending). The second state is from the time the Job first starts processing the
295 Document (i.e., processing) and until it reaches its terminating state. The last state for a Document
296 is its terminal state (i.e., completed, canceled, aborted)

298
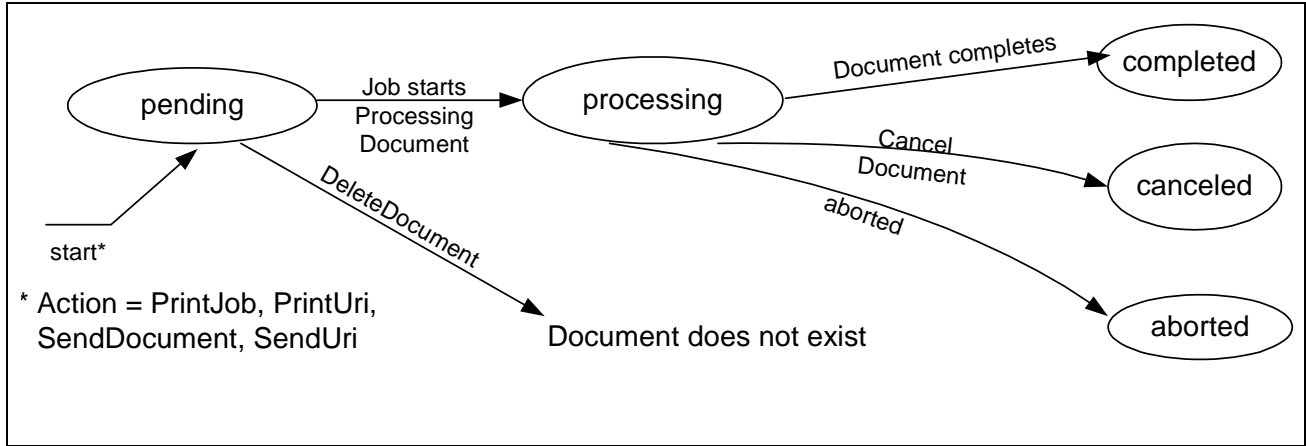
Figure 10 "DocumentState" Attribute and Document object life Cycle

4.3.2 Document Description Attributes

302 Figure 9 shows the Document Description Attributes. These attributes contain information from
303 the End User at Document creation that describes the document such as its size. Automaton may
304 modify the value of some of the attributes in this group (e.g. "KOctets") if more reliable data is
305 obtained. The semantics of the attributes are summarized in **Table 5**
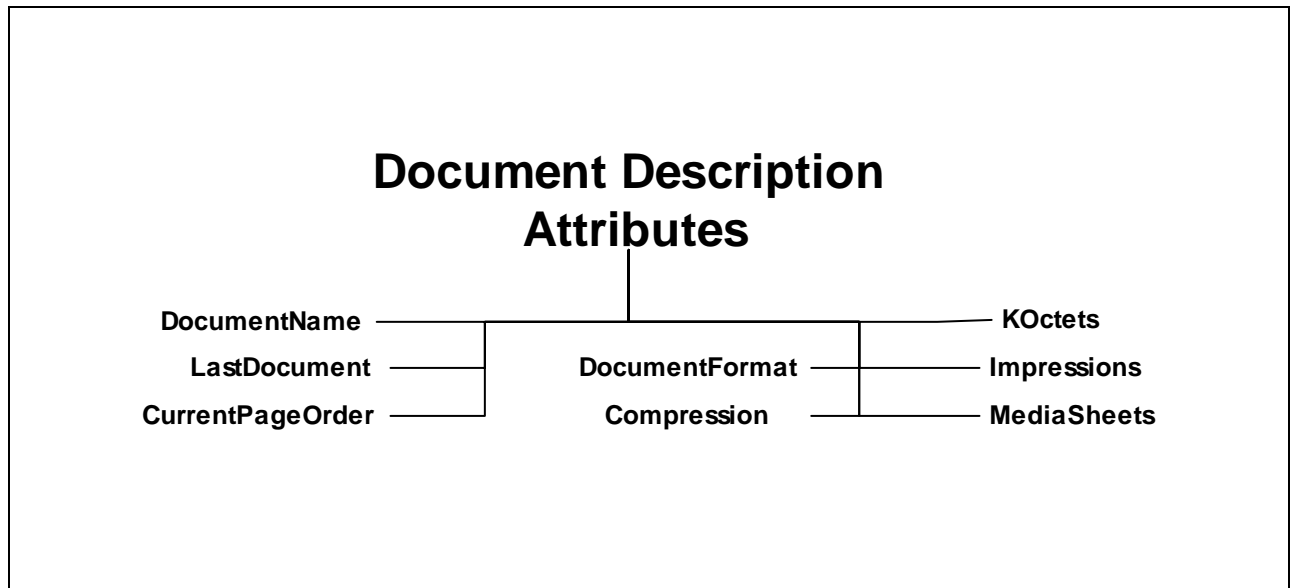
Figure 11 Document Description Attributes

310 ### *4.4 Processing Attributes*

311 Processing attributes are instructions to be applied to jobs and documents. They indicate such
312 things as the priority for scheduling a job or the number of copies for a document. A Printer should
313 support each Processing Attribute that represents a feature of the Printer. The Processing attributes
314 are split into two groups. One groups applies to Jobs and the other to Documents. The Document
315 Processing group contains three sub-groups. (See Figure 12)

316   1) Job Processing Attributes are processing instructions applied the Job level. See section
317   4.4.1.
318   2) Document Processing Attributes are specific to documents. See section 4.4.2.
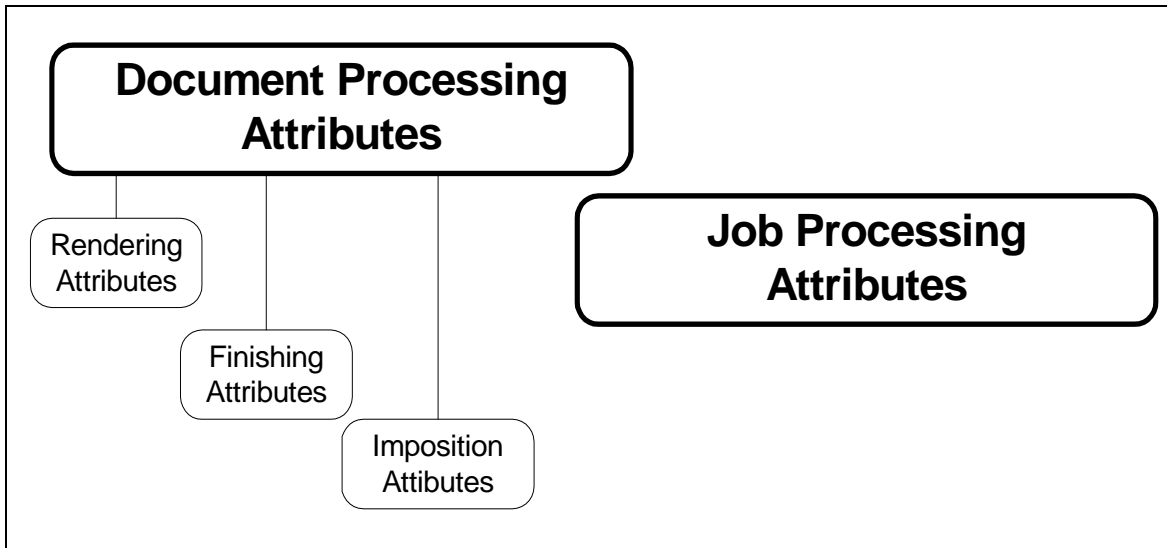
319

320 **Figure 12 - Processing Attribute Groups**

321 ### 4.4.1 Job Processing Attributes

322 Figure 13 shows the Job Processing Attributes. These attributes apply to the job as a whole as
323 opposed to each document in the job. The semantics of the attributes are summarized in Table 3
324 along with a brief description of each attribute.

325
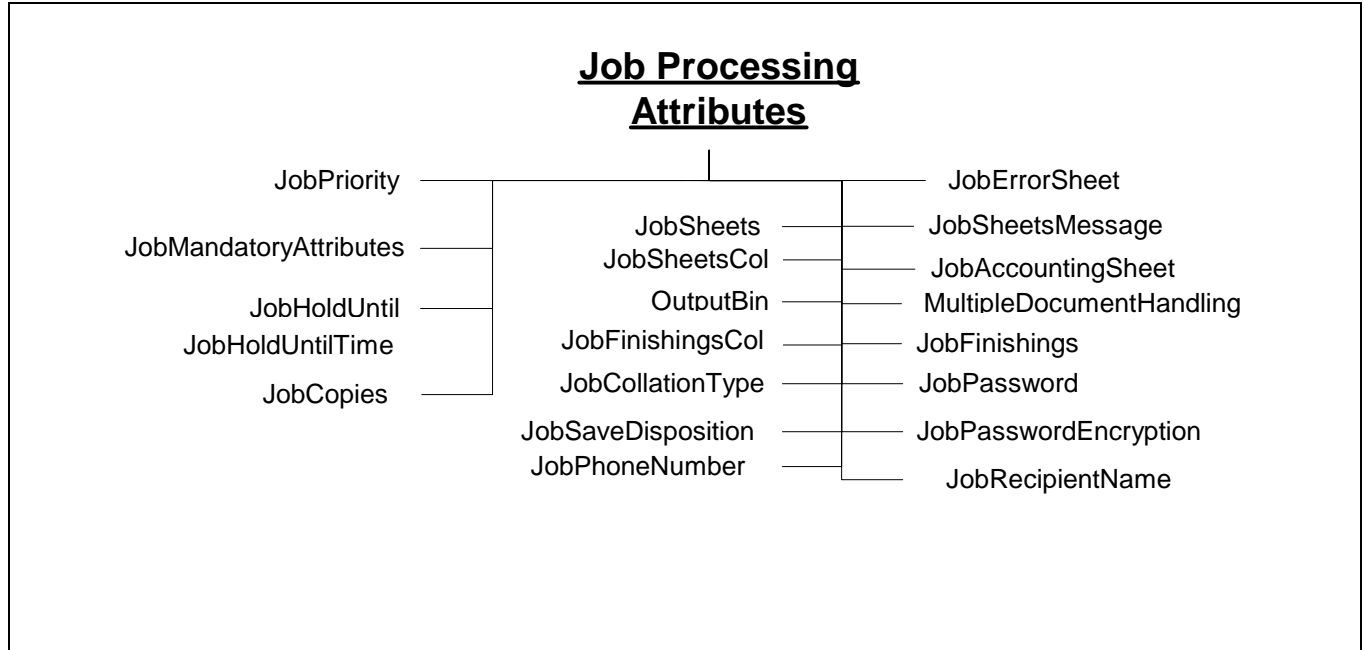
Figure 13 Job Processing Attributes

4.4.2 Document Processing Attributes

Document Processing Attributes are attributes that are applied to documents (e.g. "copies"). The Document Processing Attributes can be applied at the Job or Document level. If the attributes are applied at the Job level they are the default values for all the Documents in the Job. If the attributes are applied at the Document level they apply only to that Document. The semantics of the Processing attributes are summarized in Table 3. The Document Processing attributes are split into three groups as shown in Figure 12:

1) Finishing Attributes define how multiple physical sheets are manipulated to create final output products. See section 4.4.2.1.

2) Imposition Attributes identify how the logical pages look on the output media. See section 4.4.2.2.

3) Rendering Attributes determine the quality and resolution of how marks are made on the page. See section 4.4.2.3.

4.4.2.1 Finishing Attributes

Figure 14 shows the Finishing Attributes. Finishing Attributes define how multiple physical sheets are manipulated to create final output products. See Table 3 for summary of attribute semantics.

Finishing Attributes

Copies   CoverFront

Finishing   FinishingCol   CoverBack

Media   MediaCol   PagesPerSubset

FinishingTemplate   InsertSheet   Stitching

PageRanges   PageOverride   ForceFrontSide

SeparatorSheets   SeparatorSheetsCol   SheetCollate
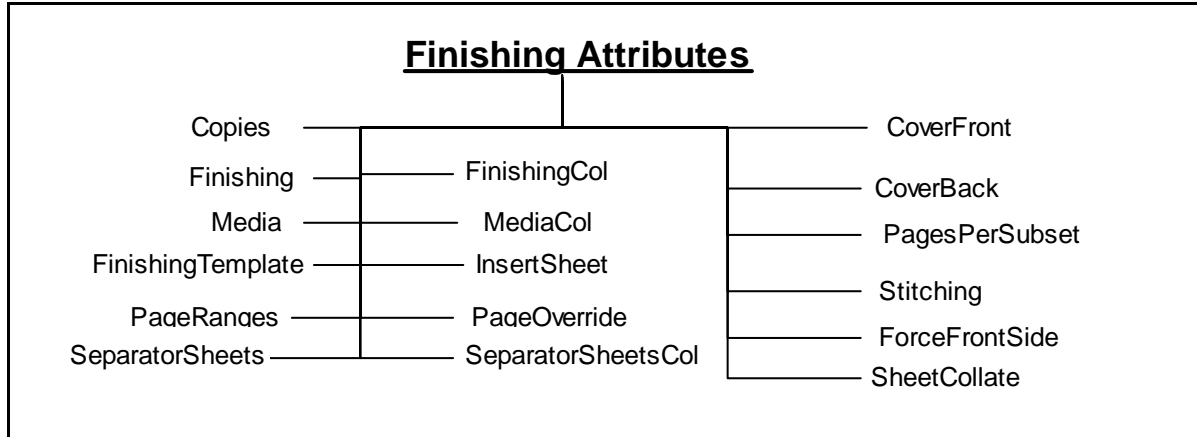
345

346   **Figure 14 Finishing Attributes**

347   **4.4.2.2   Imposition Attributes**

348   Figure 15 shows the Imposition Attributes. Imposition Attributes identify how the logical pages
349   look on the output media. See Table 3 for summary of attribute semantics.

Imposition Attributes

Sides   XImagePosition

NumberUp   XSide1ImageShift   YImagePosition

PageDelivery   YSide1ImageShift   XImageShift

OrientationRequested XSide2ImageShift   YImageShift

PresentationDirection YSide2ImageShift   ImpositionTemplate
NumberUp   PageOrderReceived
                     ForceFrontSide

FontNameRequested   FontSizeRequested   FeedOrientation
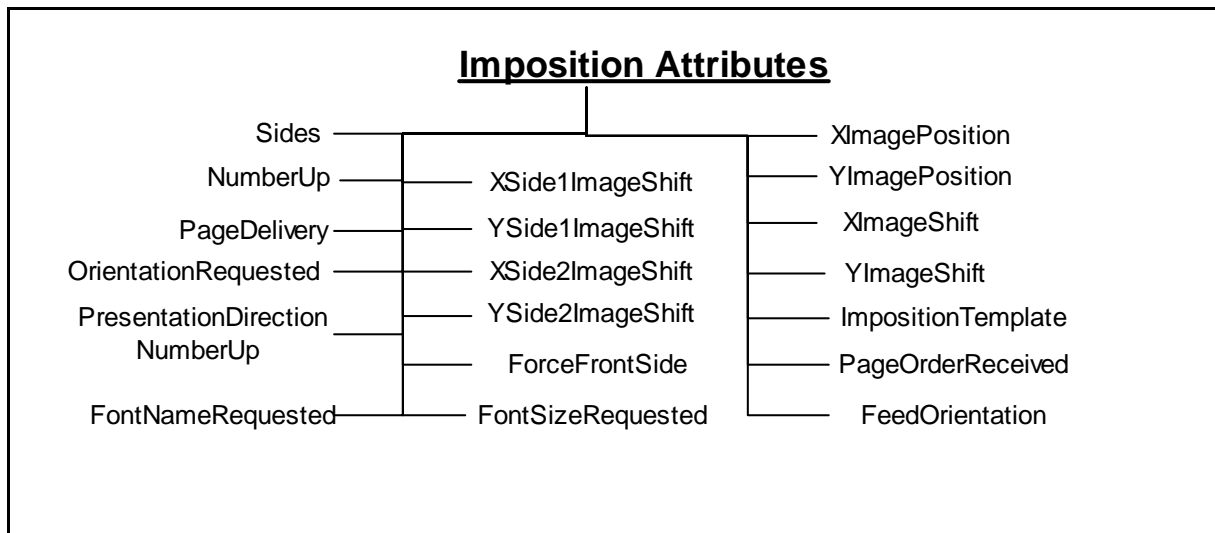
350

351   **Figure 15 Imposition Attributes**

352   **4.4.2.3   Rendering Attributes**

353   Figure 16 shows the Rendering Attributes. Rendering Attributes determine the quality and
354   resolution of how marks are made on the page. See Table 3 for summary of attribute semantics.
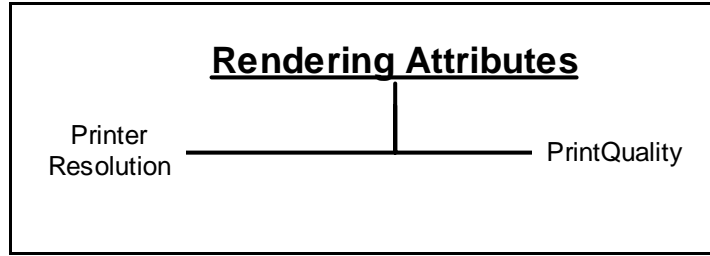
355

356

357 **Figure 16 Rendering Attributes**

358 5 Actions

359 The PWG has defined a number of operations that affect Printers, Jobs and their document. Below
360 is a description of the semantics of these Actions. Naturally different protocol bindings will use
361 differing subsets of the Actions or define new ones. Another difference will be the precise
362 parameters to the Actions. Below is an abstract definition of the Actions. Action Summary

363 This table summarizes the actions defined for the Job and Printer. See section 4.4.2 for more
364 details.

Job Creation and Document submission	Job and Document Control	Status and Information access	Printer Control
PrintJob	CancelJob	GetJobs	PausePrinter
PrintUri	HoldJob	GetPrinterAttributes	ResumePrinter
CreateJob	ReleaseJob	GetJobAttributes	PurgeJobs
SendDocument	RestartJob	GetDocuments	DisablePrinter
SendURI	SetJobAttributes	GetDocumentAttributes	EnablePrinter
ValidateJob	SetDocumentAttributes	GetPrinterSupportedValues	SetPrinterAttributes
ValidateDocument	CancelDocument		
	DeleteDocument		

365 **Table 2 - Summary of Actions**

366 *5.1 Job Creation and document submission Actions*

367 This section describes the Job Creation actions that create a Job and the ones that create add
368 Document to a Job. The Job Creation actions are: PrintJob, PrintUri, and CreateJob. The PrintJob
369 action also submits the Document. The PrintUri action submits a URI reference to the Document
370 which the Printer then retrieves when needed at a later time. The CreateJob action only creates the
371 job and the Client must issue subsequent SendDocument and SendUri actions in order to submit
372 document content or a URI reference, respectively, for a job.

373 Processing instructions and descriptive information contained in the arguments of the Job Creation
374 action are combined with Printer supplied information to create a Job instance.

375 The last action in this section is ValidateJob. This operation allows a Client to send a request with
376 all the information to create a Job, except the document content. The Printer does not create a Job
377 but informs the client whether a CreateJob, PrintJob or PrintUri with the same information would
378 have succeeded. This is useful for allowing a Client to verify the processing instructions before
379 sending a large PrintJob request.

380 A concept that is important in the PWG model is a set of instructions that can be applied to a print
381 job. Examples of these instructions include the number of copies and the media to use. These
382 instructions are referred to as Processing Attributes. The Processing Attributes are made up of the
383 Job Processing Attributes (see section 4.4.1) and the Document Processing Attributes (see section
384 4.4.2) sent in a Job or Document Creation Action.
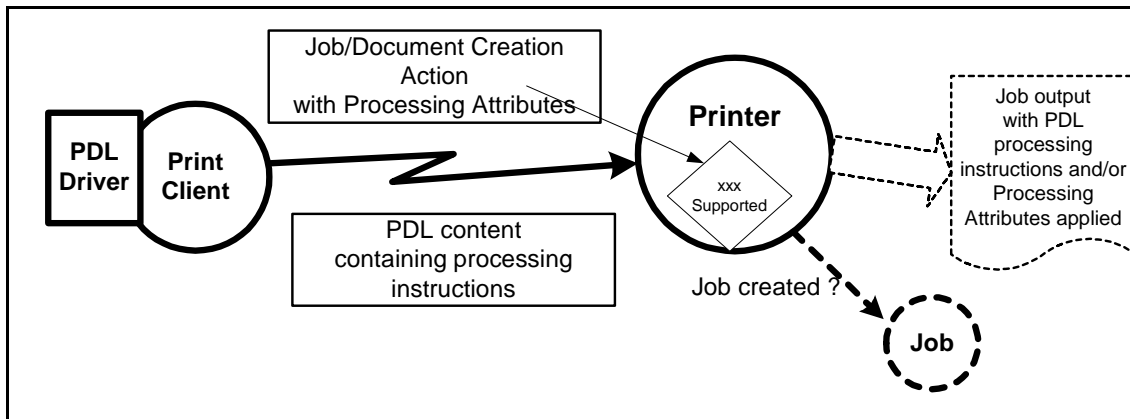
385

386 **Figure 17 Processing Instruction Processing**

387 In the real world, processing instructions are also contained in the document content for a job.
388 Page Description Languages (PDL) such as PostScript® and PCL® often contain processing
389 instructions. Some environments use a printer specific driver to generate the PDL stream based on
390 feature selections made through a user interface. Given that processing instructions can occur in
391 both the PDL and in an associated Job, the PWG model allows a Printer to declare its capability to
392 resolve this conflict. The Printer's attribute "PdlOverride" declares if an attempt will be made to
393 override the instructions in the PDL with the instructions in the Job.

394 There is a wide variety of capabilities in Printers. An instance of a Printer is to subject to changes
395 in its configured capabilities. An example would be an administrative change in the media the
396 Printer supports or disabling two-sided printing. Clients need not check the capabilities of a Printer
397 before creating their Job Processing Attributes and submitting a job. Since this is a client/server
398 paradigm, it is always possible that the capabilities could change after checking a Printer's
399 capabilities and before a Job is submitted. On the other hand, a client may use the Printer's
400 configured capabilities to create their Job Processing Attributes and submit a job.

401 The PWG model allows a client to control the Printer's acceptance of a job submission based on
402 the job request and the Printer's current configured capabilities as follows. When the client
403 supplies a 'true' value for the "AttributeFidelity" Job Processing attribute, the Printer must reject
404 the job unless the Printer supports *all* of the supplied Job Processing attributes and values. When
405 the client supplies a 'false' value or omits the attribute, the Printer must accept the job submission

406 and ignore or substitute attributes and values, respectively, that it does not support. Note that the
407 "AttributeFidelity" Job Processing attribute covers only the creation of the Job. It is
408 implementation specific how a Printer handles processing a job when the Printer encounters
409 unsupported processing instructions in the document content.

5.1.1 PrintJob

411 ([rfc2911] §3.2.1) Submit a print job with only one document and supply the document content
412 data. If the Printer accepts the job, it creates the Job object and returns a unique "JobId" attribute
413 for the Printer and a globally unique "JobUri" attribute. The Printer also sets the corresponding Job
414 attributes with these values.

5.1.2 PrintUri

416 ([rfc2911] §3.2.2) Identical to the PrintJob operation (see section 5.1.1) except that a client
417 supplies a URI reference to the document data.

5.1.3 CreateJob

419 ([rfc2911] §3.2.4) Similar to the PrintJob operation (see section 5.1.1), except that in the CreateJob
420 request the Client does not supply Document Data. The client supplies a single set of Job
421 Processing attributes that the Printer applies to the Output Document(s) of the job. The
422 "MultipleDocumentHandling" Job Processing attribute controls whether the Printer produces
423 separate Output Documents or combines the Input Documents into a single Output Document (see
424 section 21).

5.1.3.1   The "MultipleDocumentHandling" Job Processing attribute

426 When a client submits a job with more than one Input Document, the
427 "MultipleDocumentHandling" Job attribute allows the client to specify whether the Printer is to (1)
428 produce corresponding separate Output Documents or (2) combine the Input Documents into a
429 single Output Document. For example, the 'single-document' and 'single-document-new-sheet'
430 values allow the client to staple all of the Input Documents into a single Output Document, with the
431 latter value forcing each Input Document to start on a new sheet (useful when doing two-sided
432 printing). When requesting multiple Copies, the 'separate-document-uncollated-Copies' value
433 results in the Copies of each Input Document being together in an Output set, while the 'separate-
434 document-collated-Copies' value keeps a copy of each Input Document together in an Output set.
435 For example, a job with Input Documents A, B, C and "Copies" = 2 will result in A, A, B, B, C, C
436 or A, B, C, A, B, C, respectively. If the Printer supports multiple documents per job, the Printer
437 must support this Job Processing attribute with at least one value.

5.1.4 SendDocument

439 ([rfc2911] §3.3.1, [doc-obj] §3) Submits the entire Document Content for the next Input Document
440 of a job created by a previous CreateJob action (see section 5.1.3).

441 **5.1.5 SendUri**

442 ([rfc2911] §3.3.2, [doc-obj] §3) Identical to the SendDocument operation (see section 5.1.4)
443 except that a client supplies a URI reference to the Document Content data, instead of supplying
444 the document content.

445 **5.1.6 ValidateJob**

446 ([rfc2911] §3.2.3) This operation is used only to verify capabilities of a Printer object against
447 whatever attributes are supplied by the client in the ValidateJob request. By using the ValidateJob
448 action a client can validate that an identical PrintJob, PrintUri or CreateJob would be accepted.

449 *5.2 Job Control Actions*

450 This section describes the actions that allow a client to control a Job after it has been submitted:
451 CancelJob, HoldJob, ReleaseJob, and RestartJob.

452 **5.2.1 CancelJob**

453 ([rfc2911] §3.3.3) Allows a client to cancel a Print Job from the time the Job is created up to the
454 time it is completed, canceled, or aborted.

455 **5.2.2 HoldJob**

456 ([rfc2911] §3.3.5) Allows a client to hold a pending Job in the Printer so that it is not eligible for
457 scheduling.

458 **5.2.3 ReleaseJob**

459 ([rfc2911] §3.3.6) Release a previously held Job so that it is again eligible for scheduling.

460 **5.2.4 RestartJob**

461 ([rfc2911] §3.3.7) Restart a job that is retained in the Printer after processing has completed.

462 *5.3 Status and information Actions*

463 This section describes the actions that allow a client to obtain status and attributes of Jobs and
464 Printers: GetJobs, GetPrinterAttributes, GetJobAttributes and GetPrinterSupportedValues.

465 **5.3.1 GetJobs**

466 ([rfc2911] §3.3.4) Retrieve the list of Jobs belonging to the Printer. The Client may supply some
467 simple filters (e.g. "MyJobs, "Limit) to control which jobs will be returned. The Client may supply
468 a list of Job attribute and/or attribute group names to be returned in the response (See 5.3.3). A
469 group of Job attributes will be returned for each returned Job.

470 **5.3.2 GetPrinterAttributes**

471 ([rfc2911] §3.2.5) Returns the values of the requested printer attributes and/or attribute groups of a
472 Printer (i.e. Printer State, Printer Description, Processing Supported, Processing Default,
473 Processing Ready).

474 **5.3.3 GetJobAttributes**

475 ([rfc2911] §3.3.4) Returns the values of the requested job attributes and/or attribute groups of a
476 Job (i.e., Job Description, Job State, Job Processing and Document Processing).

477 **5.3.4 SetJobAttributes**

478 ([set-ops] §4.2) Set the values of the supplied Job Processing and Job Description attributes of the
479 indicated Job.

480 **5.3.5 GetPrinterSupportedValues**

481 ([set-ops] §4.3) Returns the possible values of the Printer Processing and Printer Description
482 attributes that may be set with the SetPrinterAttributes action.

483 **5.3.6 GetDocuments**

484 ([doc-obj] §3) Returns the requested Document attributes or attribute groups in all Documents in
485 the indicated Job.

486 **5.3.7 GetDocumentAttributes**

487 ([doc-obj] §3) Returns the requested Document attributes or attribute groups in the indicated
488 Document in the indicated Job.

489 **5.3.8 SetDocumentAttributes**

490 ([doc-obj] §3) Set the values of the supplied Document Processing and Document Description
491 attributes in the indicated Document in the indicated Job.

492 *5.4 Printer Control Actions*

493 This section describes actions which allow a client to control a Printer and may require operator
494 credentials: PausePrinter, ResumePrinter, PurgeJobs , DisablePrinter, EnablePrinter, and
495 SetPrinterAttributes.

496 **5.4.1 PausePrinter**

497 ([rfc2911] §3.2.7) Stops the Printer object from scheduling jobs. Job processing should also cease.

498 **5.4.2 ResumePrinter**

499 ([rfc2911] §3.2.8) Resume the processing and scheduling of Jobs in the Printer.

500 **5.4.3 PurgeJobs**

501 ([rfc2911] §3.2.9) Removes all jobs from the Printer, regardless of their state.

502 **5.4.4 DisablePrinter**

503 ([adm-ops] §3.1.1) Prevents the Printer from accepting any more Job Creation operations. The
504 Printer sets the PrinterIsAcceptingJobs Printer State attribute to 'false'.

505 **5.4.5 EnablePrinter**

506 ([adm-ops] §3.1.2) Allows the Printer to start accepting Job Creation operations. The Printer sets
507 the PrinterIsAcceptingJobs Printer State attribute to 'true'.

508 **5.4.6 SetPrinterAttributes**

509 ([set-ops] §4.1) Set the values of the supplied Printer Processing and Printer Description attributes.

510 **6 Globalization**

511 The two aspects of globalization being addressed are the character sets and natural language of the
512 human readable strings. Determining what character set is being used is left up to the protocol
513 mapping of this semantic model. The natural language being used is represented in the Printer and
514 the Job. The Printer declares the natural language it uses for all its semantic elements of type
515 string. Administrators are free to change the localization and the values in the string elements.
516 Each job creator declares the natural language for the Job and all its contained Documents. Not all
517 string elements are treated the same.

518 Any semantic element that is labeled type1, type2 or type3 keyword in the constraint column is the
519 following tables do not have any globalization issues from the Printer's point of view. They are
520 simply a sequence of octets that have a semantic meaning attached to them. The fact that the
521 sequence of octets can be interpreted as ASCII strings is unimportant. The keywords are intended
522 for consumption by automata. We leave it to Client implementations to determine how the
523 keywords will be presented to end-users.

524 There are also strings with specific formats. These formats are URI, URI Scheme, MIME,
525 IEEE1284 and DateTime. Any semantic element whose string value must adhere to one of the
526 previous formats is excluded from this discussion.

527 There are a few elements whose value is set by automata. Those values are "JobStateMessage",
528 "DocumentStateMessage" and "PrinterStateMessage". If the semantic model is mapped to a
529 protocol that allows the Client to request a language, the Printer will return these strings in the
530 requested language if possible.

531 All the remaining Printer element strings are assumed to be in the Printer's language. All the
532 remaining Job element strings are assumed to be in the language of the Job.

533 **7 Summary of attributes**

534 This section summarizes the attributes for the Document, Job and Printer objects. Included in the
535 definition are the processing attributes that can be applied at either the Job or Document level.

536 For each attribute, the tables contain the attribute name, whether the attribute is multi-valued, its
537 syntax, constraints, a short description and a reference to the Document where the semantics of the
538 attribute is completely specified. The basic syntax types are "Boolean", "String" and "Integer".
539 "Complex" types are a container for attributes of any type. Members are listed in the description
540 field. "RangeOfInteger" is a complex type that contains "Upperbound" and "Lowerbound"
541 integer value members. "Resolution" is a complex type that contains "CrossFeedDir" and
542 "FeedDir" integer value members and a "Units" string value member.

543 ## *7.1 Processing Attributes (Job and Document)*

544 * Group key: J=Job Processing Attributes, D=Document Processing Attributes

545 <div align="center">Table 3 - Processing Attributes (Job and Document)</div>

Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
	Description (values)				
AttributeFidelity		Boolean		J	[rfc2911] §15.1
Allows a user to control whether or not the Printer MUST honor *all* supplied attributes in the Job Creation operation. For a 'true' value the Printer rejects the job submission if any of the attribute values are unsupported. For a 'false' value the Printer accepts the job submission and does best effort. . Default = 'false' NOTE: Deprecated in favor of "JobMandatoryAttributes".					
Copies		Integer	1:MAX	D	[rfc2911] §4.2.5
The number of copies of the Output Document(s) to be printed. (See also JobCopies Job attribute)					
CoverBack		*complex*		D	[PWG5100.3] §3.1
The back cover to apply this Document. *(Includes Media/MediaCol, CoverType)*					
CoverFront		*complex*		D	[PWG5100.3] §3.1
The front cover to apply to this Document or job. *(Includes Media/MediaCol, CoverType)*					
CoverType		String	Type2 keyword	D	[PWG5100.3] §3.1.2
Indicates if covers are requested and which sides will contain print stream pages. (Keywords: no-cover, print-none, print-front, print-back, print-both) (See CoverBack & CoverFront for use)					
DocumentCopies	Yes	RangeOfInteger		J	[PWG5100.4] §5.1.3
Specifies the output document copies for override processing. (See DocumentOverrides for use)					
DocumentOverrides	Yes	complex		J	[PWG5100.4] §5.1
Provides for the overriding of processing instructions on a document basis. Applied to job, see PageOverride for overrides supplied at the document level. *(Includes InputDocuments/OutputDocuments, DocumentCopies, DocumentFormat, DocumentName, Compression, DocumentNaturalLanguage, PageRanges, and any other processing attribute that affects documents) NOTE: Deprecated in favor of supporting and using the Document Object*					

Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
FeedOrientation		String	Type3 keyword	D	[prod-print2] §5.1
Specifies the media edge which is fed into the print engine from the paper tray. *(Keywords: long-edge-first, short-edge-first).*					
Finishings	Yes	String	Type2 keyword	D	[rfc2911] §4.2.6 [PWG5100.1] §2
Identifies the finishings that the Printer uses for each copy of the Output Document. (See also JobFinishings Job attribute) *(Keywords: none, staple, punch, cover, bind, saddle-stitch, edge-stitch, staple-top-left, staple-bottom-left, staple-top-right, staple-bottom-right, edge-stitch-left, edge-stitch-top, edge-stitch-right, edge-stitch-bottom, staple-dual-left, staple-dual-top, staple-dual-right, staple-dual-bottom)*					
FinishingsCol		complex		D	[PWG5100.3] §3.2
Enables an end user to specify detailed finishing options not possible with the "Finishings" attribute for the Output Document. (See also JobFinishingsCol Job attribute) *(Includes FinishingTemplate, Stitching)*					
FinishingTemplate		String	Maxlength=1023	D	[PWG5100.3] §3.1
A string specifying some particular finishing operation. (See FinishingsCol/JobFinishingsCol for use)					
FontNameRequested		String	Maxlength=255	D	[prod-print2] §5.2
Specifies the font name if the document data is in a format that does not have inherent font information (e.g., 'text/plain'), otherwise, this attribute is ignored.					
FontSizeRequested		Integer	1:MAX	D	[prod-print2] §5.3
Specifies the font size in points (1/72 of an inch) if the document data is in a format that does not have inherent font information (e.g., 'text/plain'), otherwise, this attribute is ignored.					
ForceFrontSide	yes	Integer		D	[PWG5100.3] §3.3
Forces the specified pages to be printed on the front side of a sheet of media. The pages of the output document start at 1.					
ImpositionTemplate		String	Type2 keyword	D	[PWG5100.3] §3.4
Specifies imposition method for laying out finished page images onto the surface of output media. *(Keywords: none, signature)*					
InputDocuments	Yes	RangeOfInteger		D	[PWG5100.4] §5.1.1
Specifies the input documents for override processing. (See DocumentOverrides for use) NOTE: Deprecated since DocumentOverrides are deprecated					
InsertAfterPageNumber		Integer		D	[PWG5100.3] §3.5.1

Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
Specifies the input page after which the Insert Sheet will be placed. (See InsertSheet for use)					
InsertCount		Integer		D	[PWG5100.3] §3.5.2
Specifies the number of Insert Sheet to insert. (See InsertSheet for use)					
InsertSheet	Yes	complex		D	[PWG5100.3] §3.5
Specifies how Insert Sheets are to be inserted into the sequence of media sheets that are produced for each copy of the documents. *(Includes InsertAfterPageNumber, InsertCount, Media/MediaCol)*					
JobAccountingOutputBin		String	Type3 keyword	J	[PWG5100.3] §3.8.3
Specifies the output bin where the accounting sheet is to be placed. (See JobAccountingSheet for use) *(Keywords: top, middle, bottom, side, left, right, center, rear, face-up, face-down large-capacity, my-mailbox, stacker-N, mailbox-N, tray-N *Note:N is replaced by a cardinal number, *Note: See [PWG5100.2 §2.1 for description of keywords)*					
JobAccountingSheet		complex		J	[PWG5100.3] §3.8
Specifies the accounting sheet for a job. *(Includes JobAccountingSheetType, Media/ MediaCol, JobAccountingOutputBin).*					
JobAccountingSheetType		String	Type3 keyword	J	[PWG5100.3] §3.8.1
Specifies the accounting sheet format for a job. (See JobAccountingSheet for use) *(Keywords: none, standard)*					
JobCopies		Integer	1:MAX	J	[rfc2911] §4.2.5
The number of copies of the Job to be printed. (See also Copies Document Processing attribute) NOTE: New attribute to differentiate job and document level copies.					
JobErrorSheet		complex		J	[PWG5100.3] §3.9
Specifies the error sheet for a job. *(Includes JobErrorSheetType, JobErrorSheetWhen, Media/MediaCol).*					
JobErrorSheetType		String	Type3 keyword	J	[PWG5100.3] §3.9.1
Specifies the error sheet format for a job. (See JobErrorSheet for use) *(Keywords: none, standard)*					
JobErrorSheetWhen		String	Type2 keyword	J	[PWG5100.3] §3.9.2
Specifies the accounting sheet format for a job. (See JobErrorSheet for use) *(Keywords: on-error, always)*					
JobFinishings	Yes	String	Type2 keyword	J	[rfc2911] §4.2.6

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Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
Identifies the finishing that the Printer uses for each job copy of the Job. (See also Finishings Document attribute) *(Keywords: none, staple, punch, cover, bind, saddle-stitch, edge-stitch, staple-top-left, staple-bottom-left, staple-top-right, staple-bottom-right, edge-stitch-left, edge-stitch-top, edge-stitch-right, edge-stitch-bottom, staple-dual-left, staple-dual-top, staple-dual-right, staple-dual-bottom)* NOTE: New attribute to differentiate job and document level finishing.					
JobFinishingCol		complex		J	[PWG5100.3] §3.2
Enables an end user to specify detailed finishing options not possible with the "JobFinishings" attribute. . (See also FinishingsCol Document attribute) *(Includes FinishingTemplate, Stitching)*) NOTE: New attribute to differentiate job and document level finishing.					
JobHoldUntil		String	Type3 keyword	J	[rfc2911] §4.2.2
Specifies the named time period during which the Job must become a candidate for printing. (keywords: no-hold, indefinite, day-time, evening, night, weekend, second-shift, third-shift)					
JobHoldUntilTime		String	DateTime [rfc1123]	J	[prod-print2] §5.4
Specifies the date and time after which the Job must become a candidate for printing. (example: Fri, 03 May 2002 08:49:37 GMT)					
JobMandatoryAttributes	Yes	String	Type3 keyword	J	Need reference
Allows a user to list that attributes the Printer must honor. The Printer rejects the job submission if *any* of the listed attributes are unsupported or contain values that the Printer does not support. All of the remaining supplied attributes are best effort. (See [rfc2911] §15.1) *(Keywords: none and any Processing attribute names)* NOTE: New attribute to align fidelity with FSG work.					
JobPriority		Integer	1:100	J	[rfc2911] §4.2.1
Priority for scheduling the Job. A higher value specifies a higher priority.					
JobSaveDisposition		Complex		J	[prod-print2] §5.7
Specifies that the Printer is to save the job as a file that can be re-printed on demand anytime in the future using the Print-URI operation (see section 5.1.2).) *(Includes SaveDisposition, SaveInfo)*					
JobSheets		String	type3 keyword	J	[rfc2911] §4.2.3 [PWG5100.3] §6.2
Specifies which job start/end sheet(s), will be printed with a job. *(Keywords: none, standard, job-start-sheet, job-end-sheet, job-both-sheets, first-print-stream-page)*					
JobSheetsCol		complex		J	[PWG5100.3] §3.11
Allows the client to specify the media for the JobSheet. *(Includes JobSheets, Media/MediaCol)*					
JobSheetMessage		String	Maxlength=1023	J	[PWG5100.3] §3.12
Conveys a message that is delivered with the job.					

PWG Semantic Model

Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
Media		String	type3 keyword	D	[rfc2911] §4.2.11
The name of the medium that the Printer uses for all impressions of the Job. *(Keyword examples: na_letter_8.5x11in, iso_a4_210x297mm, na_monarch_3.875x7.5in. See [pwg5101.1])*					
MediaCol		complex		D	[PWG5100.3] §3.13
Enables a client end user to submit a list of media characteristics to the Printer as a way to more completely specify the media to be used than the Media attribute. *(Includes MediaBackCoating, MediaColor, MediaFrontCoating, MediaGrain , MediaHoleCount, MediaInfo, MediaKey, MediaMaterial, MediaOrderCount, MediaPrePrinted, MediaRecycled, MediaSize, MediaThickness, MediaTooth, MediaType, MediaWeightMetric)*					
MediaBackCoating		String	Type3 keyword	D	[PWG5100.3] §3.13.10
Indicates the pre-process coating applied to the back of the media. (See MediaCol for use) *(Keywords: none, glossy, high-gloss, semi-gloss, satin, matte)*					
MediaColor		String	Type3 keyword	D	[PWG5100.3] §3.13.4
Indicates the desired color of the media being specified. (See MediaCol for use) *(Keywords: no-color, white, pink, yellow, blue, green, buff, goldenrod, red, gray, ivory, orange)*					
MediaFrontCoating		String	Type3 keyword	D	[PWG5100.3] §3.13.10
Indicates the pre-process coating applied to the front of the media. (See MediaCol for use) *(Keywords: none, glossy, high-gloss, semi-gloss, satin, matte)*					
MediaGrain		String	Type3 keyword	D	[prod-print2] §8.4.2
Indicates the grain of the media. (See MediaCol for use) *(Keywords: x-direction, y-direction)*					
MediaHoleCount		Integer		D	[PWG5100.3] §3.13.6
Indicates the number of pre-drilled holes in the desired media. (See MediaCol for use)					
MediaInfo		String	Maxlength=255	D	[PWG5100.3] §3.13.3
Specifies information that helps describe the media instance. Intended for human consumption. (See MediaCol for use)					
MediaInputTrayCheck		String	Type3 keyword	D	[PWG5100.3] §3.13.14
Indicates that the characteristics of the media in the identified input tray must match the characteristics of the media identified by the "media" or "media-col" attribute. *(Keywords: top, middle, bottom, side, large-capacity, envelope, main, manual. See [RFC2911] Appendix C)*					
MediaKey		String	Type3 keyword	D	[PWG5100.3] §3.13.1
The name of the media represented as a keyword or name. Values are the same as the keyword and name values for the Media Document Processing attribute and represent the same media, except for media size and input tray keywords. (See MediaCol for use)					
MediaMaterial		String	Type3 keyword	D	[prod-print] §8.4.3
The material of the media. (See MediaCol for use) *(Keywords: aluminum, dry-film, paper, polyester, wet-film)*					

Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
MediaOrderCount		Integer	1:MAX	D	[PWG5100.3] §3.13.7
Indicates the number of sheets, within an ordered sequence of sheets; after which the sequence begins to repeat. (See MediaCol for use)					
MediaPrePrinted		String	Type3 keyword	D	[PWG5100.3] §3.13.11
Indicates the pre-printed characteristics of the desired media. (See MediaCol for use) *(Keywords: blank, pre-printed, letter-head)*					
MediaRecycled		String	Type3 keyword	D	[PWG5100.3] §3.13.10
Indicates the recycled characteristics of the media. (See MediaCol for use*) (Keywords: none, standard)*					
MediaSize		Complex		D	[PWG5100.3] §3.13.8
Explicitly specifies the numerical media width and height dimensions. (See MediaCol for use) *(Includes XDimension, YDimension)*					
MediaSizeName		String	Type3 keyword	D	Need UPnP ref
The medium size that the Printer uses for all impressions of the Job. *(Keywords: na_letter_8.5x11in. See [pwg5101.1] §5)*					
MediaThickness		Integer	1:MAX	D	[prod-print2] §8.4.4
The thickness of the media in units of one hundredth of a millimeter. This unit is equivalent to 1/2540 th of an inch. (See MediaCol for use)					
MediaTooth		String	Type3 keyword	D	[prod-print2] §8.4.1
The tooth (or roughness) of the media. (See MediaCol for use) *(Keywords: fine, medium, coarse)*					
MediaType		String	Type3 keyword	D	[PWG5100.3] §3.13.2
The medium type that the Printer uses for all impressions of the Job. (See MediaCol for use) *(Keywords: stationery, transparency envelope, envelope-plain, envelope-window, continuous, continuous-long, continuous-short, tab-stock, pre-cut-tabs, full-cut-tabs, multi-part-forms, labels, multi-layer, screen, screen-paged, photographic, cardstock, other See also [pwg5101.1] §3)*					
MediaWeightMetric		Integer		D	[PWG5100.3] §3.13.9
Indicates the weight of the desired media rounded to the nearest whole number of grams per square meter. (See MediaCol for use)					
MultipleDocumentHandling		String	type2 keyword	J	[rfc2911] §4.2.4
Controls whether Input Document in multi-Document jobs are combined into a single Output Document or are kept as separate Output Document Useful for application of Finishings and the placement of one or more print-stream pages into impressions and onto media sheets for multi-Document Jobs. *(Keywords: single-Document, separate-Document-uncollated-Copies, separate-Document-collated-Copies, single-Document-new-sheet)*					

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Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
NumberUp		Integer	1:MAX	D	[rfc2911] §4.2.9
Indicates the number of Input pages that the Printer is to image on one impression.					
OrientationRequested		String	type2 keyword	D	[rfc2911] §4.2.10
The desired orientation for printed pages for document formats that don't have a built-in orientation. *(Keywords: portrait, landscape, reverse-landscape, reverse-portrait)*					
OutputBin		String	Type2 keyword	J	[PWG5100.2] §2.1
Specifies the output bin where the job is to be delivered. *(Keywords: top, middle, bottom, side, left, right, center, rear, face-up, face-down large-capacity, my-mailbox, stacker-N*, mailbox-N*, tray-N*. *Note: N is replaced by a cardinal number)*					
OutputDocuments	Yes	RangeOfInteger		D	[PWG5100.4] §5.1.2
Specifies the output documents for override processing. (See DocumentOverrides for use) NOTE: Deprecated DocumentOverrides are deprecated.					
PageDelivery		String	Type2 keyword	D	[PWG5100.3] §3.15
Indicates whether the pages of the job are to be delivered to the output bin or finisher in the same page order as the original document and face up or face down. . See the PageOrderReceived Document Description attribute and the CurrentPageOrder Document State attribute. *(Keywords: same-order-face-up, same-order-face-down, reverse-order-face-up, reverse-order-face-down, system-specified)*					
PageOverrides	Yes	complex		D	[PWG5100.4] §5.2
Provides for the overriding of processing instructions on a page basis. *(Includes InputDocuments/OutputDocuments, DocumentCopies, Page, Sides, media and any other processing attribute that affects pages)*					
Pages	yes	RangeOfInteger		D	[PWG5100.4] §5.2.4
Specifies a range of pages in the document data. NOTE: Deprecated in favor of "PageRanges"					
PagesPerSubset	yes	RangeOfInteger		D	[PWG5100.4] §5.3
Partitions one or more Input-Documents into contiguous subsets of Input-Pages. Each subset is defined to be an Output-Document.					
PageRanges	yes	RangeOfInteger		D	[RFC2911] §4.2.7
Specifies a range of pages in the document data to be output.					
PdlInitFile	Yes	Complex		D	[prod-print2] §5.8
Controls initialization of the Printer's Page Description Language (PDL) interpreter. (Includes PdlInitFileEntry, PdlInitFileLocation. PdlInitFileName)					
PdlInitFileEntry		String	Maxlength=255	D	[prod-print2] §5.8.1.3

Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
Specifies an entry point within the init file at which the PDL interpreter starts. (See PdlInitFile for use)					
PdlInitFileLocation		String	Maxlength=1023	D	[prod-print2] §5.8.1.1
Contains a URL that specifies the path to the directory where the initialization file for the Printer's PDL interpreter will be found. (See PdlInitFile for use)					
PdlInitFileName		String	Maxlength=255	D	[prod-print2] §5.8.1.2
Specifies the name of the PDL interpreter's initialization file within the directory specified by the PdlInitFileLocation attribute. (See PdlInitFile for use)					
PresentationDirectionNumberUp		String	Type2 keyword	D	[PWG5100.3] §3.17
Specifies the placement order of the page images on a Finished-Page Image with the "number-up" attribute. *(Keywords: toright-tobottom, tobottom-toright, toleft-tobottom, tobottom-toleft, toright-totop, totop-toright, toleft-totop)*					
PrintQuality		String	type2 keyword	D	
The print quality that the Printer uses for the Job. *(Keyworsd: draft, normal, high)*					
PrinterResolution		resolution		D	RFC2911] §4.2.12
The resolution that Printer uses for the Job in cross-feed and feed direction in units of dpi or dpcm.					
ProofPrint		Complex		J	[prod-print2] §5.9
Specifies the attributes for zero or more proof prints of the job that are to be printed prior to the printing the full run of the job. (Includes ProofPrintCopies , Media/MediaCol and any other Processing attributes).					
ProofPrintCopies		Integer	0:MAX	J	[prod-print2] §5.9.1
Specifies the number of proof prints to be printed prior to the printing the full run of the job. (See ProofPrint for use)					
SaveDisposition		String	type3 keyword	J	[prod-print2] §5.7.1.1
Specifies whether the Printer must print and/or save the job. (See JobSaveDisposition for use) *(Keywords: none, save-only, print-save)*					
SaveDocumentFormat		String	MimeMediaType [rfc2046], [rfc2048]	J	[prod-print2] §5.7.1.2.3.3
Indicates the document format in which the Printer saves the Document Data. (See DocumentFormat Document Description attribute) (See SaveInfofor use)					
SaveInfo	Yes	complex		J	[prod-print2] §5.7.1.2

Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
Contains sets of attributes that each tell the Printer how to create each copy of the saved job. (See JobSaveDisposition for use) *(Includes SaveLocation, SaveName, SaveDocumentFormat)*					
SaveLocation		String	Maxlength=1023	J	[prod-print2] §5.7.1.2.3.1
Specifies the path to the directory as a URI where the Printer saves the Document Data and other Job information. (See SaveInfofor use)					
SaveName		String	Maxlength= 255	J	[prod-print2] §5.7.1.2.3.2
Specifies the name of the saved job in the directory specified by the "save-location" member attribute. The value may be a relative path. (See SaveInfofor use)					
SeparatorSheets		complex		D	[PWG5100.3] §3.18
Specifies the separator sheets to be printed with the Document. *(Includes SeparatorSheetType, Media/MediaCol)*					
SeparatorSheetsType		String	Type3 keyword	D	[PWG5100.3] §3.18.1
Specifies the separator sheets type. (See SeparatorSheets for use) *(Keywords: none, slip-sheets, start-sheet, end-sheet, both-sheets)*					
SheetCollate		String	Type2 keyword	D	[job-prog] §3.1
Specifies if the media sheets of each copy of each printed document in a job are to be in sequence. *(Keywords: uncollated, collated)*					
Sides		String	type2 keyword	D	[rfc2911] §4.2.8
Indicates how an impression is to be placed upon the side(s) of the media. *(Keywords: one-sided, two-sided-long-edge, two-sided-short-edge, two-sided-long-edge, tumble)*					
Stitching		complex		D	[PWG5100.3] §3.2.2
Provides detailed stitching parameters. (See FinishingsCol/JobFinishingsCol for use) *(Includes StitchingReferenceEdge, StitchingOffset, StitchingLocations)*					
StitchingLocations	yes	Integer		D	[PWG5100.3] §3.2.2.3
The distance along the stitching axis where a stitch will be placed in hundredths of a millimeter. (See Stitching for use)					
StitchingOffset		Integer		D	[PWG5100.3] §3.2.2.2
The perpendicular distance from the reference edge to the stitching axis in hundredths of a millimeter. (See Stitching for use)					
StitchingReferenceEdge		String	type2 keyword	D	[PWG5100.3] §3.2.2.1
Specifies the stitching reference edge of the output media. (See Stitching for use) *(Keyword: bottom, top, left, right)*					

Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
XDimension		Integer	0:MAX	D	[PWG5100.3] §3.13.8.1
Size of the media in hundredths of a millimeter along the bottom edge. (See MediaSize for use)					
XImagePosition		String	type2 keyword	D	[PWG5100.3] §3.19.2
Causes the specified point of the Finished-Page Image to be positioned at a specified location. *(Keywords: none, center, left, right)*					
XImageShift		Integer		D	[PWG5100.3] §3.19.3
Causes the Finished-Page Image to be shifted in position with respect to the x-axis of the media. The unit of measure for this attribute is hundredths of a millimeter. The sign of the value indicates the direction of the shift.					
Xside1ImageShift		Integer		D	[PWG5100.3] §3.19.4
Causes each Finished-Page Image that would be placed on the front side of a sheet to be shifted in position with respect to the x-axis of the media. The unit of measure for this attribute is hundredths of a millimeter. The sign of the value indicates the direction of the shift.					
Xside2ImageShift		Integer		D	[PWG5100.3] §3.19.5
Causes each Finished-Page Image that would be placed on the back side of a sheet to be shifted in position with respect to the x-axis of the media. The unit of measure for this attribute is hundredths of a millimeter. The sign of the value indicates the direction of the shift.					
YDimension		Integer	0:MAX	D	[PWG5100.3] §3.13.8.2
Size of the media in hundredths of a millimeter along the left edge. (See MediaSize for use)					
YImagePosition		String	type2 keyword	D	[PWG5100.3] §3.19.6
Causes the specified point of the Finished-Page Image to be positioned at a specified location. *(Keywords: none, center, top, bottom)*					
YImageShift		Integer		D	[PWG5100.3] §3.19.7
Causes the Finished-Page Image to be shifted in position with respect to the y-axis of the media. The unit of measure for this attribute is hundredths of a millimeter. The sign of the value indicates the direction of the shift.					
Yside1ImageShift		Integer		D	[PWG5100.3] §3.19.8
Causes each Finished-Page Image that would be placed on the front side of a sheet to be shifted in position with respect to the y-axis of the media. The unit of measure for this attribute is hundredths of a millimeter. The sign of the value indicates the direction of the shift.					
Yside2ImageShift		Integer		D	[PWG5100.3] §3.19.9

Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
	Description (values)				
	Causes each Finished-Page Image that would be placed on the back side of a sheet to be shifted in position with respect to the y-axis of the media. The unit of measure for this attribute is hundredths of a millimeter. The sign of the value indicates the direction of the shift.				

546

7.2 Job Attributes (State and Description)

548 * Group Key: S=State, D=Description

549 **Table 4- Job Attributes (State and Description)**

Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
	Description (values)				
DateTimeAtCreation		String	DateTime [rfc1123]	S	[rfc2911] §4.3.14.5
	Indicates the date and time at which the Job was created . (example: Fri, 03 May 2002 08:49:37 GMT)				
DateTimeAtProcessing		String	DateTime [rfc1123]	S	[rfc2911] §4.3.14.6
	Indicates the date and time at which the Job first began processing. (example: Fri, 03 May 2002 08:49:37 GMT)				
DateTimeAtCompleted		String	DateTime [rfc1123]	S	[rfc2911] §4.3.14.7
	Indicates the date and time at which the Job completed. (example: Fri, 03 May 2002 08:49:37 GMT)				
DetailedStatusMessage	Yes	String	Maxlength=1023	S	[rfc2911] §4.3.10
	Specifies additional detailed and technical information about the job. Intended for use by the system administrator or other experienced technical persons persons and so is not localized by the Printer. (example: "PostScript error: stack overflow") (Was JobDetailedStatusMessage)				
DocumentAccessErrors	Yes	String	Maxlength=1023	S	[rfc2911] §4.3.11
	Information about each Document access error for this job encountered by the Printer. (example: "(404) http://www.company.com/pub/fileToPrint.pdf ") (Was JobDocumentAccessErrors)				
Impressions		Integer	0:MAX	D	[rfc2911] §4.3.17.2
	The total size in number of impressions in all the Job's Document(s). (Was JobImpressions)				
ImpressionsCompleted		Integer	0:MAX	S	[rfc2911] §4.3.18.2
	The number of impressions completed for the Job so far. (Was JobImpressionsCompleted)				
ImpressionsCompletedCurrentCopy		Integer	0:MAX	S	[job-prog] §4.4

Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
The number of impressions completed for the current iteration of this Job so far.					
JobAccountId		String	Maxlength=255	D	[PWG5100.3] §3.6
Account associated with this Job.					
JobAccountingUserID		String	Maxlength=255	D	[PWG5100.3] §3.7
Specifies the User ID associated with the "JobAccountId".					
JobCollationType		String	Type2 keyword	S	[job-prog] §4.1
Identifies the collation type of the Job. *(Keywords: other, unknown, uncollated-sheets, uncollated-documents, collated-documents)*					
JobId		Integer	1:MAX	S	[rfc2911] §4.3.2
The Printer sets this to the ID of this Job , which is unique for the Printer.					
JobMessageFromOperator		String	Maxlength=127	D	[rfc2911] §4.3.16
Message to the end user indicating the reasons for any management action taken on this Job. (example: "Job canceled due to length", "Pick job up in mailbox")					
JobMessageToOperator		String	Maxlength=1023	D	[PWG5100.3] §3.10
Message from the end user to indicate something about the processing of this Job. (example: "Call 555-1234 before running this job")					
JobName		String	Maxlength=255	D	[rfc2911] §4.3.5
The Printer sets this to the client-supplied end-user friendly name for the Job, else the Printer must generate a name from other information. (example: "license agreement memo")					
JobOriginatingUserName		String	Maxlength=255	D	[rfc2911] §4.3.6
The Printer sets this attribute to the most authenticated printable name that it can obtain (example: "John Doe", \authDomain\John Doe")					
JobPassword		String	Maxlength=255	D	[prod-print2] §4.1
Contains a password supplied by the client encrypted according to method specified by the client in the JobPasswordEncryption attribute.					
JobPasswordEncryption		String	Type3 keyword	D	[prod-print2] §4.2
Specifies the type of encryption that the client is used for the supplied value of the JobPassword attribute. *(Keywords: none, md2, md4, md5, sha)*					
JobPhoneNumber		String	Maxlength=127	D	[prod-print2] §5.5
Contains the contact telephone number for this Job.					
JobPrinterMakeAndModel		String	Maxlength=127	S	[prod-print] §6.1

Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
Identifies the make and model of the output device which saved this Job according to the JobSaveDisposition Job Processing attribute.					
JobPrinterUri		String	uri	S	[rfc2911] §4.3.3
The Printer set this to the URI of Printer that created this Job. (example: ipp://www.company.com/printer)					
JobRecipientName		String	Maxlength=255	D	[prod-print2] §5.6
Contains the name of the person that is to receive the output of this Job and is commonly printed on the job sheet. It may also be used to reference a data base containing delivery instructions for the recipient.					
JobState		String	Type1 keyword	S	[rfc2911] §4.3.7
The current state of this Job (see section 4.2.1.1). See also JobStateReasons attribute below. *(Keywords: pending, pending-held, processing, processing-stopped, canceled, aborted, completed)*					
JobStateMessage		String	Maxlength=1023	S	[rfc2911] §4.3.6
Specifies information about the "JobState" and "JobStateReasons" attributes in human readable text localized by the Printer according to the natural language supplied in the client's query request. (example: "Job completed successfully with warnings" for an English request)					
JobStateReasons	Yes	String	type2 keyword	S	[rfc2911] §4.3.8
Provides additional information about this Job's current state. *(Keywords: none, aborted-by-system, canceled-at-device, canceled-by-operator, canceled-by-user, completed-successfully, completed-with-errors, completed-with-warnings, compression-error, document-access-error, document-format-error, incoming, interpreting, job-data-insufficient, job-hold-until-specified, job-password-wait, job-restartable, job-resuming, job-saved-successfully, job-save-error, job-saving, job-scheduling, job-suspended, job-suspended-by-operator, job-suspended-by-system, job-suspended-by-user, job-suspending, outgoing, printer-stopped, printer-stopped-partly, printing, processing-to-stop-point, proof-print-wait, queued, queued-for-marker, queued-in-device, resources-are-not-ready, resources-are-not-supported, service-off-line, spooling, streaming, submission-interrupted, transforming, unsupported-compression, unsupported-document-format, warnings-detected)*					
JobUri		String	uri	S	[rfc2911] §4.3.1
The Printer sets this to the URI for this Job. (example: ipp://www.company.com/printer/jobs/22) The URI is globally unique.					
KOctets		Integer	0:MAX	D	[rfc2911] §4.3.17.1
The total size of this Job's Document(s) in integral units of 1024 octets. (Was JobKOctets)					
KOctetsProcessed		Integer	0:MAX	S	[rfc2911] §4.3.18.1

Attribute Name		Multivalued	Syntax	Constraint	Group*	Reference
	Description (values)					
	the total number of octets processed in integral units of 1024 octets so far. (Was JobKOctetsProcessed)					
MediaSheets			Integer	0:MAX	D	[rfc2911] §4.3.17.3
	The total number of media sheets to be produced for this Job's Document(s). . (Was JobMediaSheets)					
MediaSheetsCompleted			Integer	0:MAX	S	[rfc2911] §4.3.18.3
	The media-sheets completed marking and stacking so far. (Was JobMediaSheetsCompleted)					
MoreInfo			String	uri	S	[rfc2911] §4.3.4
	URI used to obtain information intended for end user consumption about this specific Job/Document. (example: "http://www.company.com/printer/embededjobpage") . (Was JobMoreInfo)					
NumberOfDocuments			Integer	0:MAX	S	[rfc2911] §4.3.12
	The number of Documents in this Job.					
NumberOfInterveningJobs			Integer	0:MAX	S	[rfc2911] §4.3.15
	The number of jobs that are "ahead" of this Job assuming the current scheduled order.					
OutputDeviceAssigned			String	Maxlength=127	S	[rfc2911] §4.3.13
	Identifies the output device to which the Printer has assigned this Job (example: "Pete's Printer")					
PrinterUpTime			Integer	1:MAX	S	[rfc2911] §4.3.14.4
	The amount of time (in seconds) that the Printer has been up and running. See Printer attribute "PrinterUpTime" (Was JobPrinterUpTime)					
SheetsCompletedCopyNumber			Integer	0:MAX	S	[job-prog] §4.2
	Number of the copy being stacked for the current Document.					
SheetsCompletedDocumentNumber			Integer	0:MAX	S	[job-prog] §4.3
	Number of the document in this Job currently being stacked. . The Documents in a Job are numbered 1, 2, 3. A 0 value means no Document is currently being stacked.					
TimeAtCreation			Integer	MIN:MAX	S	[rfc2911] §4.3.14.1
	The time at which the Job was created in "PrinterUpTime" seconds.					
TimeAtProcessing			Integer	MIN:MAX	S	[rfc2911] §4.3.14.2
	The time at which the Job first began processing in "PrinterUpTime" seconds.					
TimeAtCompleted			Integer	MIN:MAX	S	[rfc2911] §4.3.14.3
	The time at which the Job completed in "PrinterUpTime" seconds.					

Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
WarningsCount		Integer	MIN:MAX	S	[PWG5100.4 §6.1]
The total number of warnings that a Printer has generated while processing and printing a Job's Document(s). (Was JobWarningsCount)					

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7.3 Document Attributes (State and Description)

552 * Group Key: S=State, D=Description

553 **Table 5 – Document Attributes (State and Description)**

Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
Compression		String	Type2 keyword	D	[rfc2911] §4.4.32
Compression algorithm used on the Document Data, if any. *(Keywords: none, deflate, gzip, compress)*					
CurrentPageOrder		String	Type2 keyword	S	[PWG5100.3] §4.1
Indicates the page order of the pages in the document data. Initially set to PageOrderReceived and updated if data is transformed. *(Keywords: 1-to-n-order, n-to-1-order)*					
DateTimeAtCompleted		String	DateTime [rfc1123]	S	[rfc2911] §4.3.14.7
Indicates the date and time at which this Document completed. (example: Fri, 03 May 2002 08:49:37 GMT)					
DateTimeAtCreation		String	DateTime [rfc1123]	S	[rfc2911] §4.3.14.5
Indicates the date and time at which this Document was created . (example: Fri, 03 May 2002 08:49:37 GMT)					
DateTimeAtProcessing		String	DateTime [rfc1123]	S	[rfc2911] §4.3.14.6
Indicates the date and time at which this Document first began processing. (example: Fri, 03 May 2002 08:49:37 GMT)					
DetailedStatusMessage	Yes	String	Maxlength=1023	S	[rfc2911] §4.3.10
Specifies additional detailed and technical information about this Document. Intended for use by the system administrator or other experienced technical persons. (example: "PostScript error: stack overflow") (Was JobDetailedStatusMessage)					
DocumentAccessErrors	Yes	String	Maxlength=1023	S	[rfc2911] §4.3.11
Information about each Document access error for this Document encountered by the Printer. (example: "(404) http://www.company.com/pub/fileToPrint.pdf ") (Was JobDocumentAccessErrors)					

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Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
DocumentFormat		String	MimeMediaType [rfc2046], [rfc2048]	D	[rfc2911] §3.2.1.1
The Document format (i.e., PDL) for this Document. The value "application/octet-stream" has a special meaning. This value is used to indicate that a Printer is capable of auto-sensing the format of the Document. *(Examples: application/octet-stream, application/postscript, application/vnd.hp-PCL, "text/plain; charset=utf-8")*					
DocumentName		String	Maxlength=127	D	[rfc2911] §3.2.1.1
Name for this Document to be used in an implementation specific manner.					
DocumentNaturalLanguage		String	Maxlength=127	D	[rfc2911] §3.2.1.1
Identifies the Natural Language of this Document					
DocumentNumber		integer		S	[PWG5100.4] §9.2, [doc-obj] §6.1
The order of this document within a job starting at a base of 1.					
DocumentState		String	Type1 keyword	S	[doc-obj] §6.3.2
The current state of this Document. See also DocumentStateReasons attribute below. *(Keywords: pending, processing, canceled, aborted, completed)*					
DocumentStateMessage		String	Maxlength=127	S	[doc-obj] §6.7
Specifies information about the "DocumentState" and "DocumentStateReasons" attributes of this Document in human readable text localized by the Printer according to the language supplied in the client's query request.. *(Example: "Documentcompleted successfully with warnings" for an English request)*					
DocumentStateReasons	Yes	String	type2 keyword	S	[doc-obj] §6.5
Provides additional information about this Document's current state. *(Keywords: none, aborted-by-system, canceled-at-device, canceled-by-operator, canceled-by-user, completed-successfully, completed-with-errors, completed-with-warnings, compression-error, document-access-error, document-format-error, incoming, interpreting, outgoing, printing, queued, queued-for-marker, queued-in-device, resources-are-not-ready, resources-are-not-supported, spooling, streaming, submission-interrupted, transforming, unsupported-compression, unsupported-document-format, warnings-detected)*					
DocumentUri		String	Maxlength=1023	D	[rfc2911] §3.2.2
Reference to the Document to be printed (Print by reference)					
Impressions		Integer	0:MAX	D	[rfc2911] §4.3.17.2
The total size in number of impressions in this Document. (Was JobImpressions)					
ImpressionsCompleted		Integer	0:MAX	S	[rfc2911] §4.3.18.2

PWG Semantic Model

Attribute Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
The number of impressions completed for this Document so far. (Was JobImpressionsCompleted)					
ImpressionsCompletedCurrentCopy		Integer	0:MAX	S	[job-prog] §4.4
The number of impressions completed for the current iteration of this Document so far.					
JobId		Integer	1:MAX	S	[rfc2911] §4.3.2
The Printer sets this to the ID of the job containing this Document. The ID is unique for the Printer.					
JobUri		String	uri	S	[rfc2911] §4.3.1
The Printer sets this to the URI for the job. (example: ipp://www.company.com/printer/jobs/22) The URI is globally unique.					
KOctets		Integer	0:MAX	D	[rfc2911] §4.3.17.1
The total size of this Document in integral units of 1024 octets. (Was JobKOctets)					
KOctetsProcessed		Integer	0:MAX	S	[rfc2911] §4.3.18.1
the total number of octets processed in integral units of 1024 octets so far. (Was JobKOctetsProcessed)					
LastDocument		Boolean		D	[rfc2911] §3.3.1
Has a 'true' value if this Document is the last Input Document for the Job. Default = 'false'.					
MediaSheets		Integer	0:MAX	D	[rfc2911] §4.3.17.3
The total number of media sheets to be produced for this Document. (ISSUE3q: was JobMediaSheets)					
MediaSheetsCompleted		Integer	0:MAX	S	[rfc2911] §4.3.18.3
The media-sheets completed marking and stacking for this Document so far. (Was JobMediaSheetsCompleted)					
MoreInfo		String	uri	S	[rfc2911] §4.3.4
URI used to obtain information intended for end user consumption about this specific Document. (example: "http://www.company.com/printer/embededjobpage") . (Was JobMoreInfo)					
PageOrderReceived		String	Type2 keyword	D	[PWG5100.3] §3.16
Indicates the order of pages in this Document data as supplied with the job. *(Keywords: 1-to-n-order, n-to-1-order)*					
PrinterUpTime		Integer	1:MAX	S	[rfc2911] §4.3.14.4
The amount of time (in seconds) that the Printer has been up and running. (See Printer attribute "PrinterUpTime") (Was JobPrinterUpTime)					
SheetsCompletedCopyNumber		Integer	0:MAX	S	[job-prog] §4.2

Attribute Name		Multivalued	Syntax	Constraint	Group*	Reference
	Description (values)					
	Number of the copy being stacked for this Document.					
TimeAtCreation			Integer	MIN:MAX	S	[rfc2911] §4.3.14.1
	The time at which this Document was created in "PrinterUpTime" seconds.					
TimeAtProcessing			Integer	MIN:MAX	S	[rfc2911] §4.3.14.2
	The time at which this Document first began processing.					
TimeAtCompleted			Integer	MIN:MAX	S	[rfc2911] §4.3.14.3
	The time at which this Document completed.					
WarningCount			Integer	MIN:MAX	S	[PWG5100.4 §6.1
	The total number of warnings that a Printer has generated while processing and printing the Document. (Was Job WarningCount)					

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555 *7.4 Printer Attributes (State and Description)*

556 **Table 6 - Printer Attributes (State and Description)**

Attribute Name		Multivalued	Syntax	Constraint	Group*	reference
	Description (values)					
ColorSupported			boolean		D	[rfc2911] §4.4.26
	Indicates if this Printer is capable of any type of color printing at all, including highlight color.					
CompressionSupported		Yes	String	Type3 keyword	D	[rfc2911] §4.4.32
	Identifies the set of Compression algorithms for Document content that this Printer supports. *(Keywords: none, deflate, gzip, compress)*					
DeviceId			String	IEEE1284	D	See Appendix 11.1
	An identifier based on IEEE1284 to identify the device that the Printer represents. Often used to load an appropriate driver on the client device. (example: "MANUFACTURER:ACME;COMMAND SET:PCL,PJL,PS,XHTML-Print+xml;MODEL:LaserBeam 9;COMMENT:example;ACTIVE COMMAND SET:PCL")					
DocumentFormatDefault			String	MimeMediaType [rfc2046], [rfc2048]	D	[rfc2911] §4.4.21

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Attribute Name	Multivalued	Syntax	Constraint	Group*	reference
Description (values)					
The document format (i.e. PDL) that this Printer has been configured to assume if the client does not specify a document format in any of the actions that supply document content for a Job. The value "application/octet-stream" has a special meaning. This value is used to indicate that a Printer is capable of auto-sensing the format of the document. (examples: application/octet-stream, application/postscript, application/vnd.hp-PCL, "text/plain; charset=utf-8")					
DocumentFormatSupported	YES	String	MimeMediaType	D	
Identifies both the Document and Image formats supported by this Printer. Specifies the set of Document formats that the Printer supports. (examples: application/octet-stream, application/postscript, application/vnd.hp-PCL, "text/plain; charset=utf-8"). Also specifies the set of Image formats that the Printer supports. (examples: 'image/jpeg' which is a registered MIME Media Type with IANA.					
ImpressionsSupported		RangOfInteger	0:MAX	D	[rfc2911] §4.4.34
Specifies the upper and lower bounds for the number of impressions allowed per job. (Was JobImpressionsSupported)					
JobCreationAttributesSupported	YES	String	Type2 keyword	D	[prod-print1] §7.1
Identifies the set of Job Processing and Job Description attributes (but not member attributes) that this Printer will accept in a JobCreation action					
JobPasswordEncryptionSupported	Yes	String	type3 keyword	D	[prod-print1] §7.3
Identifies which encryption methods this Printer supports as values of the JobPasswordEncryption Job Description attribute for Secure Print. *(Keywords: none, md2, md4, md5, sha)*					
JobPasswordSupported		Integer	0:MAX	D	[prod-print1] §7.2
Indicates the maximum length that this Printer will accept for the unencrypted password which the client will encrypt as the value of the JobPassword Description Attribute.					
JobSpoolingSupported		String	type2 keyword	D	[prod-print1] §7.4
Indicates whether or not the Printer spools Jobs before interpreting the document data (RIPing). *(Keywords: spool, stream, automatic)*					
KOctetsSupported		RangOfInteger	0:MAX	D	[rfc2911] §4.4.33
Specifies the allowable upper and lower bounds of the total size per Job in integral units of 1024 octets that this Printerob will accept. (Was JobKOctetsSupported)					
MaxSaveInfoSupported		Integer	1:MAX	D	[prod-print1] §7.5
Identifies the maximum number of SaveInfo member attribute collections that this Printer can accept in a job request.					
MediaColDatabase	Yes	Complex		D	[prod-print1] §7.6

PWG Semantic Model

Attribute Name	Multivalued	Syntax	Constraint	Group*	reference
Description (values)					
Identifies all of the Media supported by this Printer using a collection value for each which identifies the media characteristics. This attribute is not returned when 'all' is requested. *(Includes any of the MediaCol member attributes)*					
MediaSheetsSupported		RangOfInteger	0:MAX	D	[rfc2911] §4.4.35
Specifies the upper and lower bounds for the number of media sheets allowed per job by this Printer. (Was JobMediaSheetsSupported)					
MultipleDocumentJobsSupported		boolean		D	[rfc2911] §4.4.16
Indicates whether this Printer supports more than one Document per job, i.e., more than one SendDocument and/or SendUri request per job. A multi-Document per job Printer must implement this attribute and have a value of 'true'. A single Document per job Printer may either not support this attribute or support it with a value of 'false'.					
MultipleOperationTimeOut		Integer	1:MAX	D	[rfc2911] §4.4.31
Identifies the minimum time (in seconds) that this multi-Document per job Printer will wait between actions on an open job before timing out. The actions can add Document to the open Job or close the Job. Timeouts are handled in an implementation specific manner. Multi-Document per job Printers must implement this attribute. The recommended value is greater than 60 and less than 240.					
OperationsSupported	Yes	String	type2 keyword	D	[rfc2911] §4.4.15
The set of supported actions for the Printer and Job. (Keywords: PrintJob, PrintUri, CreateJob, SendDocument, SendURI, ValidateJob, ValidateDocument, CancelJob, HoldJob, ReleaseJob, RestartJob, SetJobAttributes, SetDocumentAttributes, CancelDocument, DeleteDocument, GetJobs, GetPrinterAttributes, GetJobAttributes, GetDocuments, GetDocumentAttributes, GetPrinterSupportedValues, PausePrinter, ResumePrinter, PurgeJobs, DisablePrinter, EnablePrinter, SetPrinterAttributes).					
PagesPerMinute		Integer	0:MAX	D	[rfc2911] §4.4.36
Specifies the nominal number of pages per minute which may be generated by this Printer.					
PagesPerMinuteColor		Integer	0:MAX	D	[rfc2911] §4.4.37
Specifies the nominal number of pages per minute which may be generated by this Printer when printing color.					
PdlOverrideSupported		String	type2 keyword	D	[rfc2911] §4.4.28
Expresses the ability of this Printer to (1) guaranteed, (2) attempt to, or (3) not attempt to override a Document's processing instructions with Job Processing Attributes. *(Keywords: attempted, not-attempted)*					
PrinterCurrentTime		String	DateTime [rfc1123]	S	[rfc2911] §4.4.30
Indicates the current date and time. (example: Fri, 03 May 2002 08:49:37 GMT)					

PWG Semantic Model

Attribute Name	Multivalued	Syntax	Constraint	Group*	reference
Description (values)					
PrinterDetailedStatusMessages	Yes	String	Maxlength=1023	S	[prod-print2] §7.7
Specifies additional detailed and technical information about this Printer for the technical staff.					
PrinterDriverInstaller		String	Uri	D	[rfc2911] §4.4.8
Intended for consumption by automata to locate the driver installer for this Printer object. (example: "http://www.company.com/printer/installerProgram") Note: This attribute has not been used by any known implementation and is therefore deprecated.					
PrinterInfo		String	Maxlength=127	D	[rfc2911] §4.4.6
Descriptive information about this Printer object.(example: "Out of courtesy for others, please print only small (1-5 page) jobs at this printer")					
PrinterIsAcceptingJobs		Boolean		S	[rfc2911] §4.4.23
Indicates whether this Printer is currently able to accept jobs.					
PrinterLocation		String	Maxlength=127	D	[rfc2911] §4.4.5
Identifies the location of the device that this Printer represents. *(Example: Pete's Office)*					
PrinterMakeAndModel		String	Maxlength=127	D	[rfc2911] §4.4.9
Identifies the make and model of the device that this Printer object represents. *(Example: "Xerox Phaser 7700", "HP LaserJet 1000", "Lexmark Optra Color 45")*					
PrinterMessageFromOperator		String	Maxlength=127	D	[rfc2911] §4.4.25
End user information for this Printer. *(Example: "printer unavailable until 1pm due to preventive mainanance")*					
PrinterMoreInfo		String	uri	D	[rfc2911] §4.4.7
URI used to obtain information intended for end user consumption about this specific Printer. *(Example: "http://www.company.com/printer/embeddedwebpage")*					
PrinterMoreInfoManufacturer		String	uri	D	[rfc2911] §4.4.10
URI used to obtain more information for end user consumption about this type of device that this Printer represents. *(Example: "http://www.xerox.com/go/xrx/template/012.jsp?Xcntry=USA&Xlang=en_US&prodID=7700", "http://www.lexmark.com/US/products/overview/0,1224,MjQ5fDE=,00.html")*					
PrinterName		String	Maxlength=127	D	[rfc2911] §4.4.4
The end-user friendly name of this Printer object. (example: "Pete's Printer")					
PrinterState		String	type1 keyword	S	[rfc2911] §4.4.11
Identifies the current state of the device(s) that this Printer represents (see section0). (See "PrinterStateReasons" below) *(Keywords: idle, processing, stopped)*					

Attribute Name		Multivalued	Syntax	Constraint	Group*	reference
	Description (values)					
PrinterStateMessage			String	Maxlength=1023	S	[rfc2911] §4.4.13
	Information about the "printer- state" and "printer-state-reasons" attributes in human readable text localized by the Printer according to the natural language supplied in the client's query request. *(Example: "Printer stopped due to paper jam" for an English request)*					
PrinterStateReasons		Yes	String	type2 keyword	S	[rfc2911] §4.4.12
	Augments the "printer-state" attribute to give more detailed information about this Printer's state. Each keyword value may have a suffix to indicate its level of severity. The three suffixes (levels) are: "Report" (least severe), "Warning", and "Error" (most severe). Keywords without suffixes are assumed to be "Error" (most severe). See reference sor semantics of defined keywords. *(Keywords: other, none, connecting-to-device, cover-open, deactivated, developer-empty, developer-low, door-open, fuser-over-temp, fuser-under-temp, hold-new-jobs, input-tray-missing, interlock-open, interpreter-resource-unavailable, marker-supply-empty, marker-supply-low, marker-waste-almost-full, marker-waste-full, media-empty, media-jam, media-low, media-needed, moving-to-paused, opc-life-over, opc-near-eol, output-area-almost-full, output-area-full, output-tray-missing, paused, shutdown, spool-area-full, stopped-partly, stopping, timed-out, toner-empty, toner-low)*					
PrinterUpTime			integer	1:MAX	S	[rfc2911] §4.4.29
	The amount of time (in seconds) that this Printer has been up and running					
PrinterUriSupported		Yes	String	uri	D	[rfc2911] §4.4.1
	Contains at least one URI for this Printer object. The PrinterUriSupported, UriAuthenticationSupported and the UriSecuritySupported are parallel attributes. Each of these attributes must have the same cardinality. The "i"th value of each of these attributes describes the URI for the printer, the authentication mechanism used and the security method used. *(Example: ipp://www.company.com/printer)*					
QueuedJobCount			integer	0:MAX	S	[rfc2911] §4.4.24
	The number of jobs that this Printer has accepted but has not yet completed.					
ReferenceUriSchemesSupported		Yes	String	UriScheme	D	[rfc2911] §4.4.27
	Which URI schemes are supported by this Printer to retrieve Document This attribute must be supported if the Printer is capable of print by reference. *(Example: ftp, http)*					
UriAuthenticationSupported		Yes	String	type2 keyword	D	[rfc2911] §4.4.2
	The Client authentication mechanism that this Printer object uses to identify the user. (See PrinterUriSupported for additional information) *(Keywords: none, requesting-user-name, basic, digest and certificate)*					
UriSecuritySupported		Yes	String	type2 keyword	D	[rfc2911] §4.4.3

Attribute Name		Multivalued	Syntax	Constraint	Group*	reference
	Description (values)					
	Identifies the security mechanisms used for accessing this Printer object. (See PrinterUriSupported for additiona information) *(Keywords: none, ssl3, tls)*					
VersionsSupported		Yes	String	type2 keyword	D	[rfc2911] §4.4.14
	The versions of the semantics that this Printer supports. *(Keywords: 1.0, 1.1, etc.).*					
WhichJobsSupported		Yes	String	type2 keyword	D	[prod-print2] §7.8
	Contains the set of values that this Printer supports for the WhichJobs operation attribute that the client may supply in the Get-Jobs operation as a job filter. *(Keywords: completed, not-completed, pending, pending-held, processing, processing-stopped, canceled, aborted, all)*					

557

558 **8 Status Strings**

559 This Appendix lists the status strings that the Printer returns in each action response.

560   **Table 7 Status strings indicating some degree of success**

Status String	Actions where status may occur
	Description of status
successful-ok	Any
	Action succeeded and no requested attribute were substituted or ignored.
successful-ok-conflicting-attributes	PrintJob, PrintUri, JobCreate, SendDocument, SendUri
	Action succeeded but some attributes were conflicting and have been substituted or ignored.
successful-ok-ignored-or-substituted-attributes	PrintJob, PrintUri, JobCreate, SendDocument, SendUri
	Action succeeded but some unsupported attributes were ignored or substituted.

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Status String	Actions where status may occur
	Description of status
The following status strings are returned when the Printer rejects the action indicating some error on the part of the Client:	
client-error-bad-request	Any
	malformed syntax or constraint exceeded.
client-error-forbidden	Any
	The Printer understood the request, but is refusing to fulfill it for authentication and/or authorization reasons. The client should not try again even with credentials.
client-error-not-authenticated	Any
	The request requires user authentication. The client may try again with suitable authentication.

Status String	Actions where status may occur
	Description of status
client-error-not-authorized	Any
The requester is not authorized to perform the request. The Client should not try again.	
client-error-not-possible	
The action cannot be performed, because of the state of the target object.	
client-error-timeout	
The client did not produce a subsequent request within the time that the Printer was prepared to wait.	
client-error-not-found	
The target object was not found.	
client-error-gone	
The target object is no longer available.	
client-error-request-entity-too-large	
The request and/or the Document Content is too large.	
client-error-request-value-too-long	
A attribute value in the request is longer than the Printer supports.	
client-error-document-format-not-supported	
The document format is not supported.	
client-error-attributes-or-values-not-supported	
An attribute and/or value is not supported and must be in order to carry out the request. The Printer must return the unsupported attributes or values in the Unsupported Attributes group.	
client-error-uri-scheme-not-supported	
The URI scheme is not supported.	
client-error-charset-not-supported	
The charset is not supported.	
client-error-conflicting-attributes	
Some supplied attributes are conflicting. The Printer must return them in the Unsupported Attributes group.	
client-error-compression-not-supported	
The compression of the Document Content is not supported.	
client-error-compression-error	
An error occurred when uncompressing the Document Content.	
client-error-document-format-error	
An error occurred when interpreting the Document Content.	

Status String	Actions where status may occur
	Description of status
client-error-document-access-error	
	An error occurred when the Printer attempted to access the Document Content through the URI supplied.
client-error-attributes-not-settable	
	The supplied attribute(s) are not settable

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Status String	Actions where status may occur
	Description of status
The following status strings are returned when the Printer rejects the action indicating some error on the part of the Printer:	
server-error-internal-error	
	An unexpected internal error occurred.
server-error-operation-not-supported	
	The Printer does not support the requested action.
server-error-service-unavailable	
	The Printer is unable to service the request at this time due to overloading or maintenance. The client should try again later as per the "message" Operation attribute.
server-error-version-not-supported	
	The Printer doesn't support the requested major version of the protocol and returns the closest version that it does support.
server-error-device-error	
	The Printer encountered a device error that causes it to be unable to accept a new request. For example, a paper jam for a Printer that doesn't spool and so cannot accept a new job submission until the jam is fixed.
server-error-temporary-error	
	A temporary error such as a buffer full write error, a memory overflow, or a disk full condition.
server-error-not-accepting-jobs	
	The Printer is not currently accepting jobs. Its "PrinterIsAcceptingJobs" Printer Description attribute is 'false'.
server-error-busy	
	A temporary error indicating that the Printer is too busy processing jobs and/or other requests. A Client should try again later.

Status String	Actions where status may occur
Description of status	
server-error-job-canceled	
The job has been canceled by an operator or aborted by the system. For example, while the Client is transmitting the Document Content to the Printer.	
server-error-multiple-document-jobs-not-supported	
The Printer doesn't support multiple document jobs and the client attempted to supply a second SendDocument or SendUri request. The Printer's "MultipleDocumentJobsSupported" Printer Description attribute is 'false'.	
server-error-printer-is-deactivated	
The Printer has been deactivated using the Deactivate-Printer operation and is only accepting the Activate-Printer	

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9 Change Log

570	5/16/02	PJZ	original draft

570   5/16/02   PJZ   original draft

571   5/23/02   TH   re-organize draft with comments from Melinda Grant

572   5/26/02   TH   detailed review of the draft

573   5/29/02   PJZ   Incorporated comments prior to initial release

574   6/4/02   SAA   Modified to split the Job Attributes into 3 categories:

575   1) Processing Attributes

576   2) Content Attributes

577   3) Job Attributes

578

579   The Processing Attributes were further split into 3 subcategories:

580   1) Rendering attributes

581   2) Imposition Attributes

582   3) Finishing Attributes

583   Added attributes from UPnP Print Basic service template: MediaSize, MediaType,
584   DeviceId attributes.

585   Removed references to Mandatory vs. Optional since a semantic model should not
586   dictate what is used or not used by the future solutions targeted at specific markets.
587   For example, UPnP picked specific attributes for the SOHO market and did not need
588   all of the Mandatory IPP attributes.

589   Modified Printer Description Attributes with the following:

590   1) Added in DeviceId.

591   2) Changed Document* to Content*.

592   3) Removed VersionsSupported and OperationsSupported since these are
593   dependent on the interface used in specific solutions.

594 6/17/02   PJZ   Added high level description of PWG Action semantics and Printer state
595 transitions. Returned VersionsSupported and OperationsSupported.

596 8/16/02   PJZ   Changed Content back to document, Added PWG5100.1, PWG5100.2,
597 PWG5100.3, PWG5100.4, job-progress to model. Filled out document object, added "Job Level"
598 subcategory to Processing attributes

599 9/1/02   PJZ   Changes from email input and PWG meeting. Printer/Job/Document
600 Attribute groups broken out into State and Description groups

601 9/9/02   PJZ   Final edits to ready document for review. Updated all figures and added
602 highlighting of sections to review.

603 9/16/02   PJZ   Added more definitions and document actions. Incorporated the comments
604 from teleconference and TH mail note. Updated references.

605 9/27/02   TNH   Version 0.11: Spell checked, corrected some misspelled attribute names,.
606 Finished moving Compression and DocumentFormat from the Processing to the Document
607 Description tables. Improved the attributes descriptions, especially those that are related to other
608 attributes. Added the attributes and values from [prod-print2]. Added several attributes from IPP
609 documents that were missing for some reason. Corrected a number of Maxlength values. Sorted
610 the values of JobStateReasons, DocumentStateReasons, and PrinterStateReasons, so easier to keep
611 track of. Add References: [adm-ops], [prod-print2].

612 9/30/02   PJZ   Began conversion of status string section to table. Corrected and updated
613 figures. Removed detailed IPP encoding section. Added globalization section

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Author's Addresses

657

658
659   Peter Zehler
660   Xerox Corporation
661   800 Phillips Road
662   Webster, NY 14580
663
664   Phone: 585 265-8755
665   Fax: 585-265-8871
666   e-mail: pzehler@crt.xerox.com
667
668   PWG Semantic Model Web Page: http://www.pwg.org/sm/
669   PWG Semantic Model Mailing List: sm@pwg.org
670
671   To subscribe to the sm mailing list, send the following email:
672   1) send it to majordomo@pwg.org
673   2) leave the subject line blank
674   3) put the following two lines in the message body:
675   subscribe sm
676   end
677

678   Implementers of this specification document are encouraged to join IPP Mailing List in order to
679   participate in any discussions of clarification issues and review of registration proposals for
680   additional attributes and values.

681

682   Other Participants:

Alan Berkema – HP   Lee Farrell - Canon Information Systems
–Don Fullman - Xerox   Melinda Grant - HP
 David Hall - HP   Tom Hastings - Xerox
 Harry Lewis - IBM   –Ira Mcdonald – High North
Gail Songer - Netreon   Bob Taylor - HP
William Wagner - NetSilicon/DPI

683

11 Appendix A – UPnP Definitions

684

11.1 DeviceID

685
686   The value of this variable MUST exactly match the IEEE 1284-2000 Device ID string, except the
687   length field MUST not be specified.. The value is assigned by the Printer vendor and MUST NOT
688   be localized by the Print Service.

689   The IEEE 1284-2000 Device ID is a length field followed by a case-sensitive string of ASCII
690   characters defining peripheral characteristics and/or capabilities. For the purposes of this

691 specification, the length bytes MUST NOT be included. The Device ID sequence is composed of a
692 series of keys and values of the form:

693 `key: value {,value} repeated for each key`

694 As indicated, each key will have one value, and MAY have more than one value. The minimum
695 necessary keys (case-sensitive) are MANUFACTURER, COMMAND SET, and MODEL. (These
696 keys MAY be abbreviated as MFG, CMD, and MDL respectively.) Each implementation MUST
697 supply these three keys and possibly additional ones as well. Each key (and each value) is a string
698 of characters. Any characters except colon (:), comma (,), and semi-colon (;) MAY be included as
699 part of the key (or value) string. Any leading or trailing white space (SPACE[x'20'], TAB[x'09'],
700 VTAB[x'0B'], CR[x'0D'], NL[x'0A'], or FF[x'0C']) in the string is ignored by the parsing program
701 (but is still counted as part of the overall length of the sequence).

702 An example ID String, showing optional comment and active command set keys and their
703 associated values (the text is actually all on one line):

704

705 `MANUFACTURER:ACME Manufacturing;`

706 `COMMAND SET:PCL,PJL,PS,XHTML-Print+xml;`

707 MODEL:LaserBeam 9;

708 `COMMENT:Anything you like;`

709 `ACTIVE COMMAND SET:PCL;`

710

711 (See IEEE 1284-2000 clause 7.6)

712 Note: One of the purposes of the DeviceId variable is to select a printer driver for those clients that
713 need a printer driver. The values of the COMMAND SET key are interpreted by the printer driver
714 provided by the vendor and so are vendor-defined, rather than being standardized.

715 **12 Appendix B – IPP Mapping**

716 *12.1 Changes to remove some IPP specific aspects*

717 This section lists some changes to remove some IPP specific aspects from the PWG Semantic
718 Model. Any attribute name containing "ipp" has had the "ipp" removed. The IPP operation names
719 have the hyphens removed to be the PWG action names and the operations supported are mixed
720 keywords, not integer enum values. All attributes names have had the first letter capitalized and
721 the '-' character removed and the character following the '-' has been capitalized. The keyword
722 attribute values defined remain unchanged and are all lower case, except for the ones that specify
723 other attributes names (which are changed to be the mixed case without hyphensThe term "object"
724 is sometimes changed to "data class". The term "operation" has been changed to "action" to use
725 the term more frequently used with XML.

726 The types of the attributes have been simplified. All keyword, text, name, DateTime, uri,
727 UriScheme, enum and mimeMediaType are represented by the simple string type. The term
728 "keyword" continues to be used for string values enumerated as part of the PWG Model. The

729 integer enums values are replaced by their associated keyword. The "1setOf X" types are
730 represented as the base type and the "Multivalued" field in the tables below set to "Yes". Integers
731 and Boolean types remain the same. Any applicable constraints placed on the attribute values has
732 been noted in the tables below.

733 The following IPP attributes are not included: operation-id, attributes-charset, attributes-natural-
734 language, page-overrides, request-id, version-number

735 *12.2 Attribute Group Mapping*

736 IPP Actions may contain a number of parameters. The first parameter is always the Operation
737 Attributes for the Action. The IPP Operation Attributes have been mapped to the Printer and Job
738 Description Attribute Groups.

739 The IPP Printer Description Attributes map to the PWG Printer State and Printer Description
740 Attributes. The IPP Job Description Attributes map to the PWG Job State and Job Description
741 Attributes.

742 The IPP Job Template Attributes map to the PWG Job Processing and Document Processing
743 Attributes. IPP does not differentiate between the PWG Processing Attribute subgroups of
744 Rendering, Imposition and Finishing Attributes.

745