



A Project of the PWG-IPP Working Group

# 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.

## PWG Semantic Model

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24

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157

158 **1 Introduction**

159

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

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

168 **ISSUE 01: Need a real Terminology section badly, right here. Explain Processing Attributes**  
 169 **(supplied only in a request), Production Instructions (represented by Processing Attributes and PDL**  
 170 **content), Data Classes, Job Ticket, operation (or action?), object, etc. Is must, should, and may to**  
 171 **be used?**

172 **2 Terminology**

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.
End User	A print client that has no special rights on the printer. The End User typically submit jobs. The End User is allowed to query the printer, jobs and documents and control jobs based on policy.
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
Impression	Everything printed on a single side of a media
Page	A logical entity that represents the information contained on a single

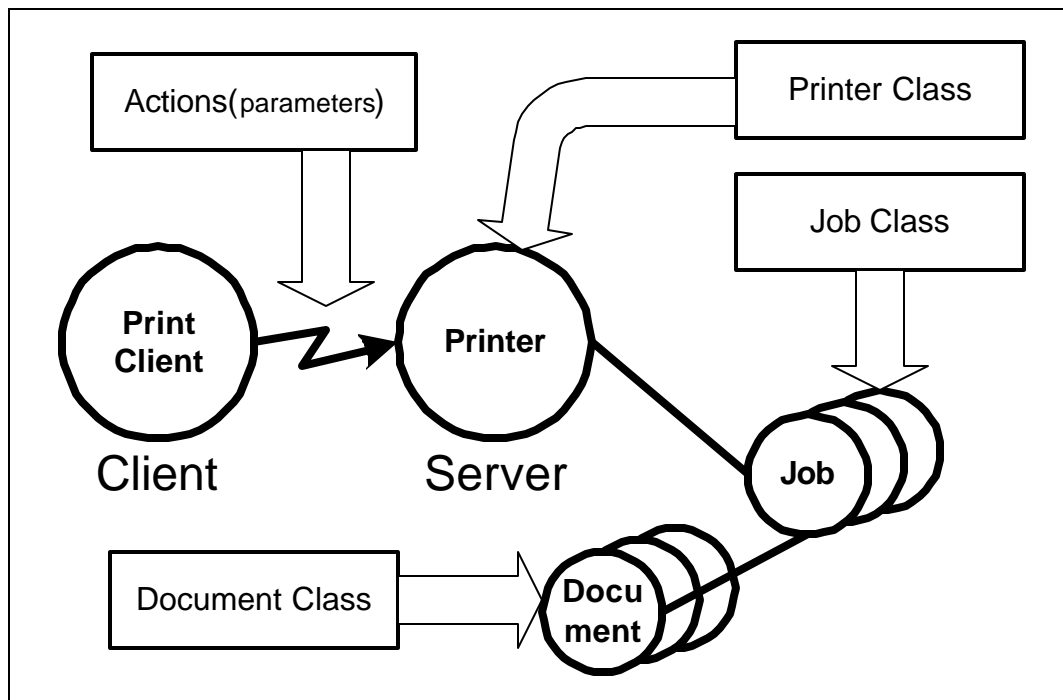
## PWG Semantic Model

	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
--	--

173

### 174 3 Model Overview

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



182

183 **Figure 1 Model Overview**

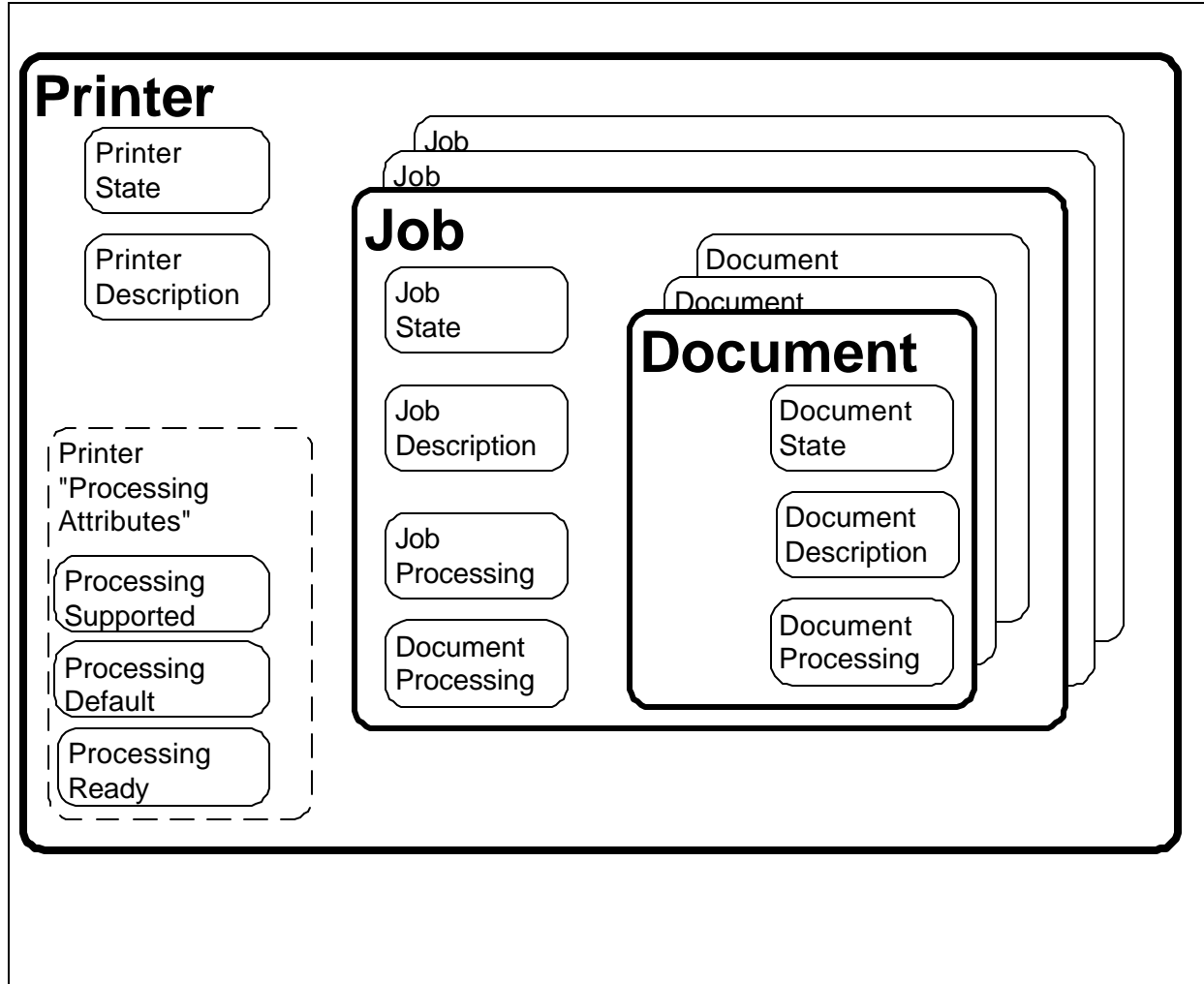
184 The objects are represented in the semantic model as data classes. The methods are represented as a  
185 set of actions that act upon those data classes. The actions permit the creation and control of Jobs  
186 and documents as well as the submission of Document data. The content of a Document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

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



190 **4 Data Classes**

191 This section describes the data classes in the PWG semantic model. Some of the classes are taken  
 192 from the model and semantics of IPP [rfc2911]. Figure 2 Shows the data classes, their attribute  
 193 groups and the containment relationship between the classes



194  
 195 Figure 2 Data Classes

196 **4.1 Printer Object Class**

197 The Printer class is represented by a collection of attributes as shown in Figure 2. The Printer  
 198 Attributes are presented in detail in Table 6. The printer object also contains attributes that  
 199 describe the valid processing attribute values. (See section 4.3.2 for processing attributes) The  
 200 Printer class is the container for Jobs.

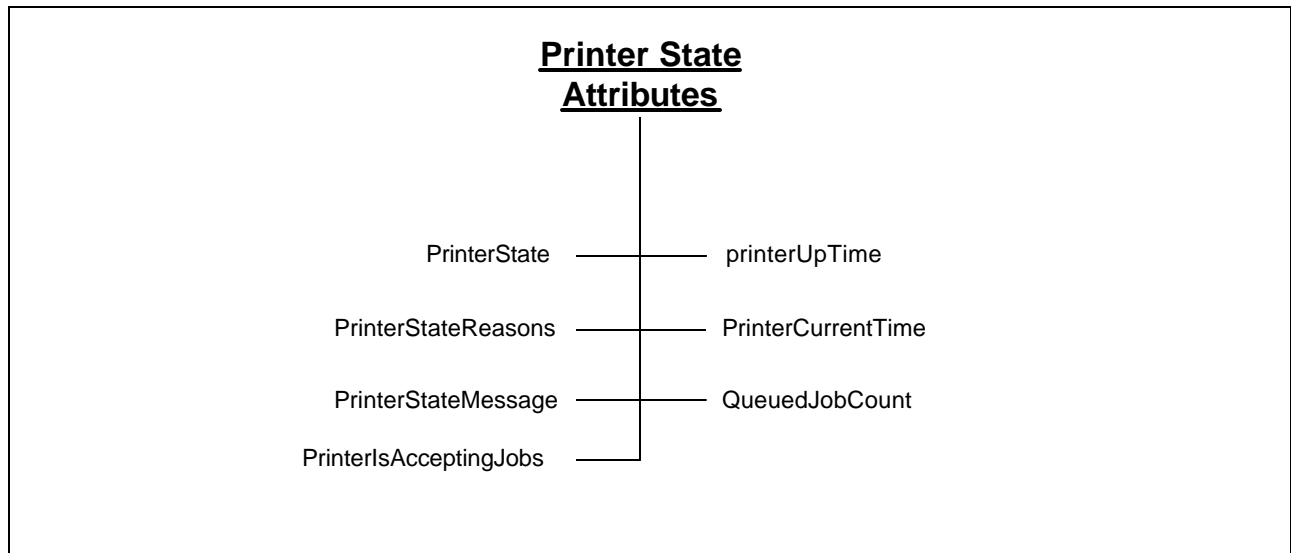
201 **4.1.1 Printer State Attributes**

202 Figure 3 below shows the Printer State Attributes. These attributes represent the state of the printer  
 203 such as the number of jobs or existing error conditions. Automata primarily control the attributes  
 204 in this group. End Users cannot directly modify their values. The End User can affect the values

## PWG Semantic Model

205 of these attributes through actions (e.g. PausePrinter can change the value of  
206 PrinterIsAcceptingJobs”). The semantics of the attributes are summarized in Table 6.

207



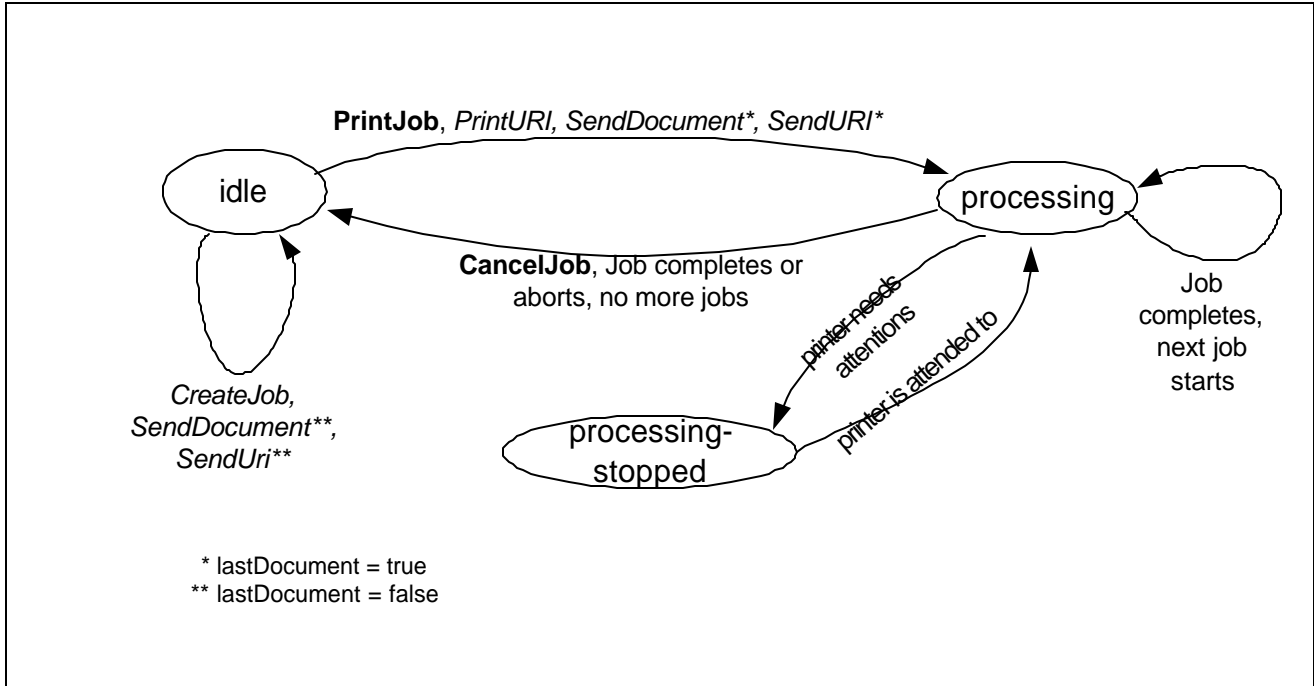
208  
209

210

**Figure 3 Printer State Attributes**

### 211 4.1.1.1 The Printer Life Cycle

212 The “PrinterState” attribute is one of the most important Printer Description attributes. **Error!**  
213 **Reference source not found.** shows the values of the “PrinterState” attribute and the Printer life  
214 cycle as affected by actions on the Printer and job processing.



215  
216

217

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

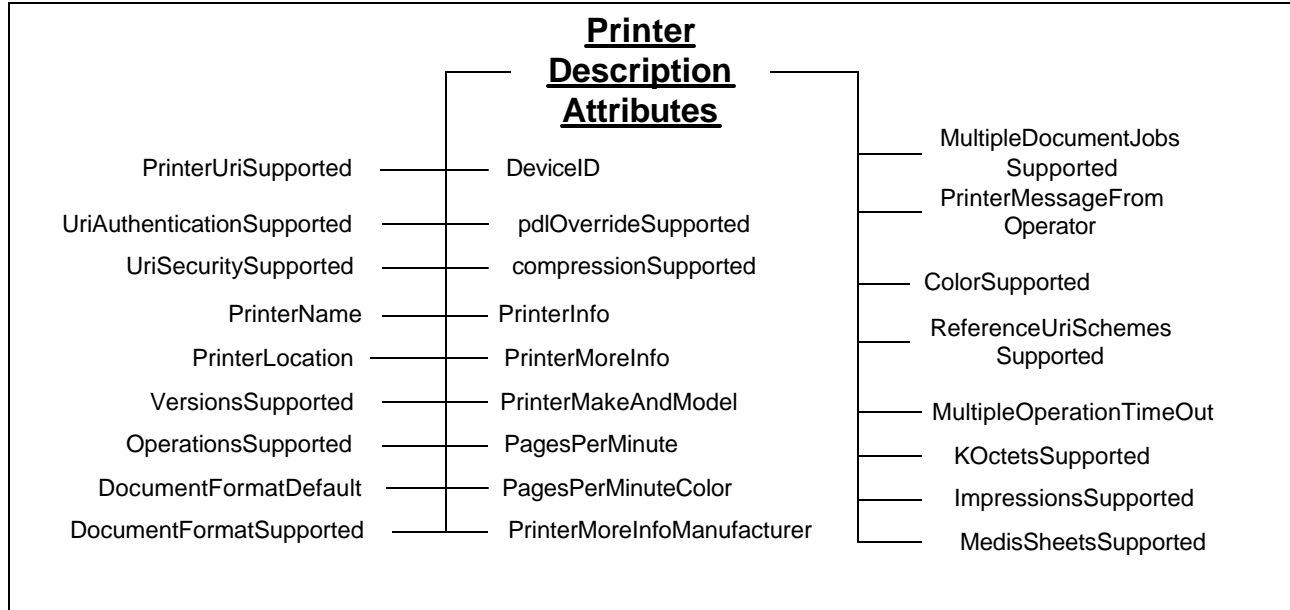
218

**4.1.2 Printer Description Attributes**

219  
220  
221  
222  
223  
224

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

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225  
226

227

**Figure 5 Printer Description Attributes**

### 228 4.1.3 Printer Defaults, Supported and Ready Processing Attributes

229 See section 4.3.2 below for the attributes that may comprise these groups. Processing Attributes  
 230 are the union of Job Processing Attributes and Document Processing Attributes. If a Processing  
 231 attribute (e.g. Media) is supported, the Printer must have an associated Processing Supported  
 232 Attribute (e.g. MediaSupported) and Processing Default Attribute (e.g. MediaDefault) Printer  
 233 attribute. There may be an associated Processing Ready Attribute (e.g. MediaReady) Printer  
 234 attribute. By retrieving the Printer Processing attributes, a Client can determine all the Job and  
 235 Document Processing attributes and values that may be used in creating Jobs and Documents.

#### 236 4.1.3.1 Processing Supported Attributes

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

245 **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)

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PageRanges	RangeOfInteger (multivalued)	Boolean (are PageRanges supported)
------------	------------------------------	------------------------------------

246

### 247 **4.1.3.2 Processing Default Attributes**

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

### 253 **4.1.3.3 Processing Ready Attributes**

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

## 256 **4.2 Job Object Class**

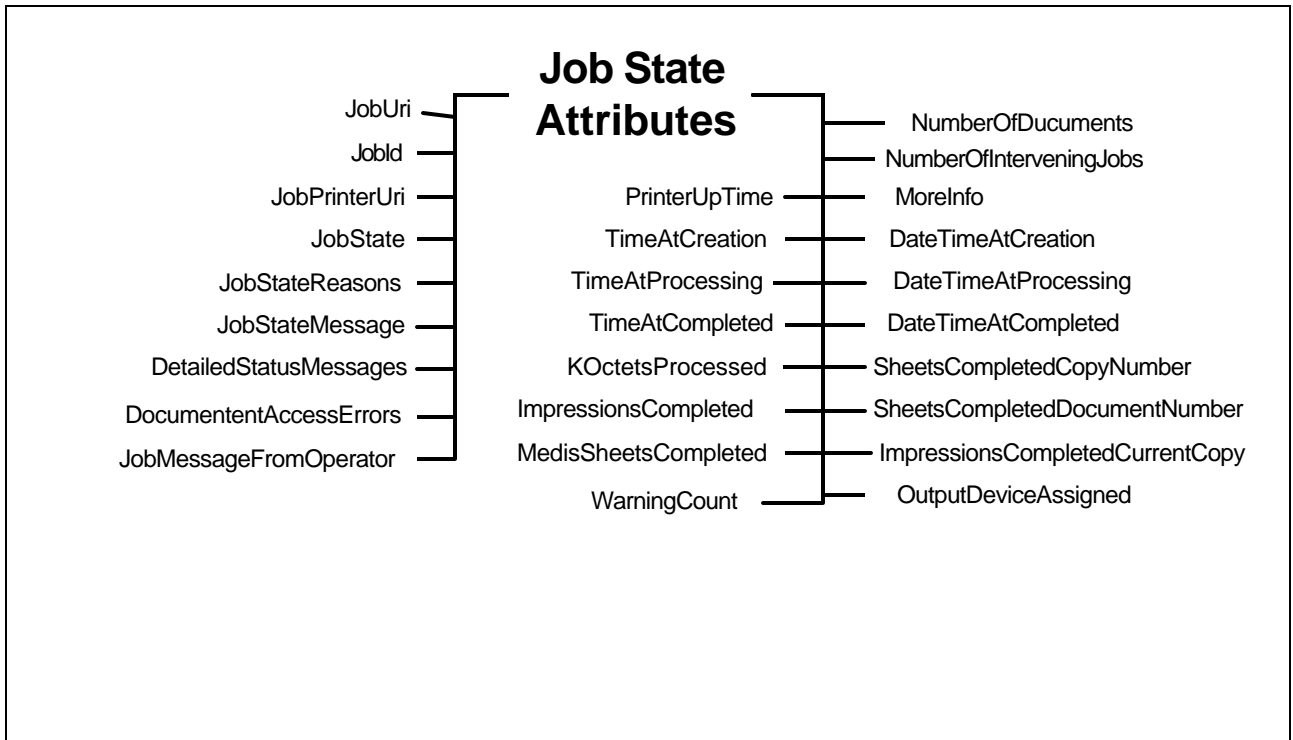
257 The Job object class is represented by a collection of attributes divided into four groups as shown  
258 in Figure 2. The Job class also contains the document class

- 259 Job State Attributes – See Section 4.2.1
- 260 Job Description Attributes – See section 4.2.2.
- 261 Job Processing Attributes – See section 4.4.1
- 262 Document Processing Attributes – See section 4.4.2

### 263 **4.2.1 Job State Attributes**

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

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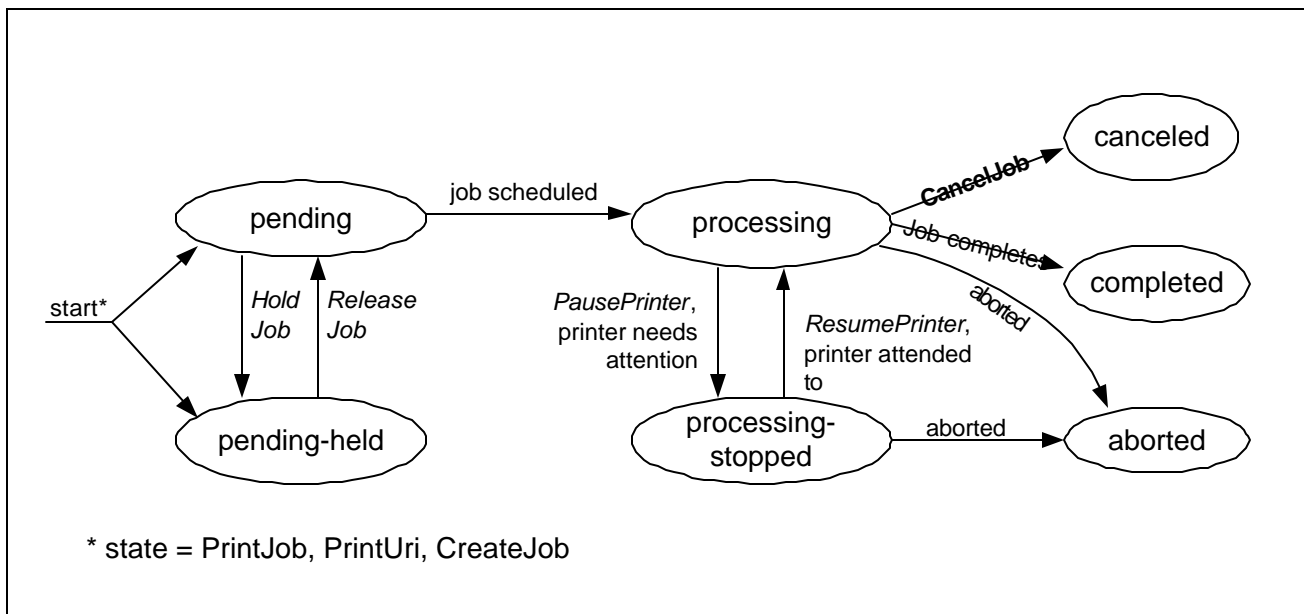
268  
269

270

**Figure 6 Job State Attributes**

## 271 4.2.1.1 The Job Life Cycle

272 The "JobState" attribute is one of the most important Job State attributes. Figure 7 shows the  
273 values of the "JobState" attribute and the Job life cycle as affected by actions on the Job, Printer,  
274 and job processing.



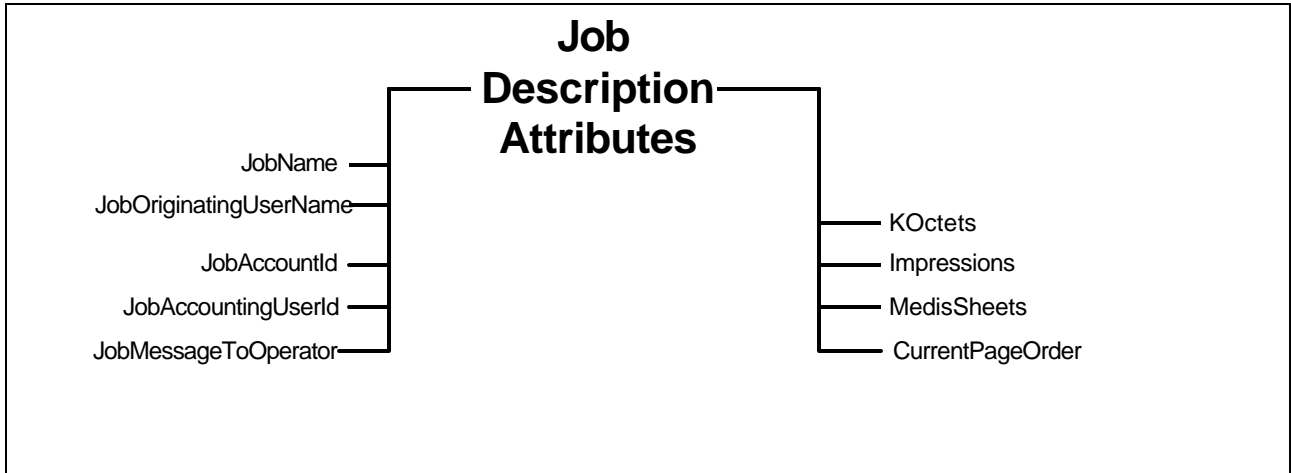
275

276

**Figure 7 The "JobState" Job Attribute and the Job object life Cycle**

277 **4.2.2 Job Description Attributes**

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



282  
283

284 **Figure 8 Job Description Attributes**

285 **4.3 Document Object Class**

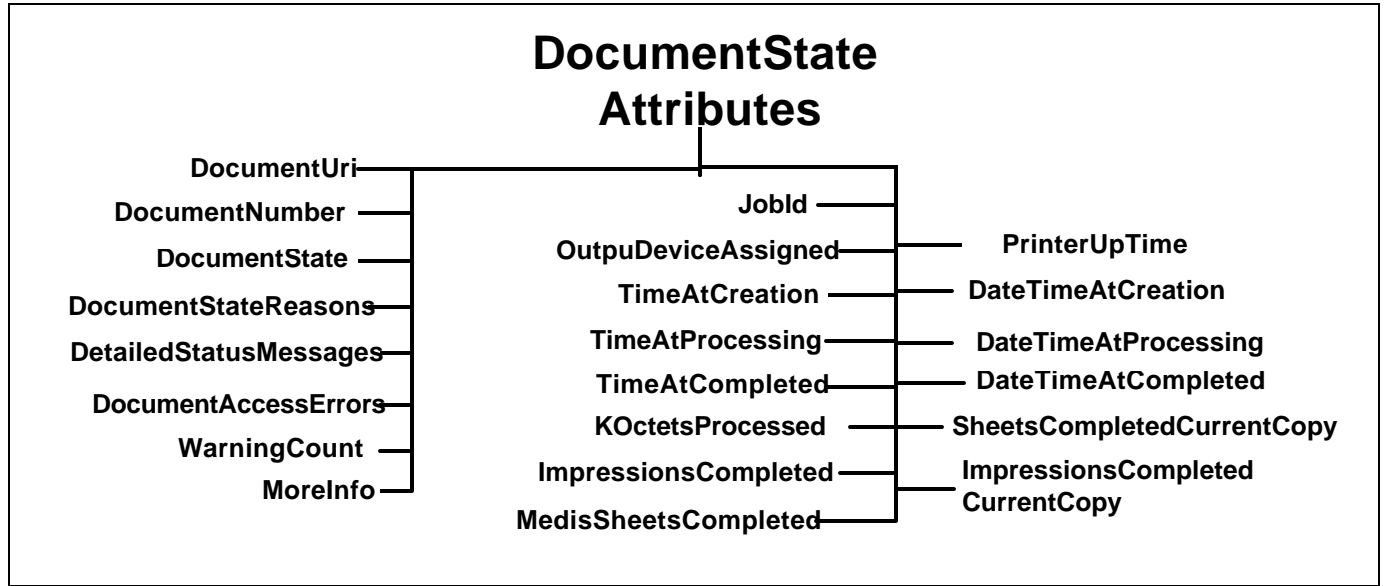
286 The Document object class is represented by a collection of attributes divided into Three groups as  
 287 shown in Figure 2. The Document class contains the document class

- 288 Document State Attributes – See Section 4.3.1.
- 289 Document Description Attributes – See section .
- 290 Document Processing Attributes – See section 4.4.2

291 **4.3.1 Document State Attributes**

292 Figure 9 shows the Document State Attributes. Automata primarily control the attributes in this  
 293 group. End Users cannot directly modify their values. The End User can affect the values of these  
 294 attributes through actions (e.g. CancelDocument can change the value of DocumentsState”). The  
 295 semantics of the attributes are summarized Table 5

296



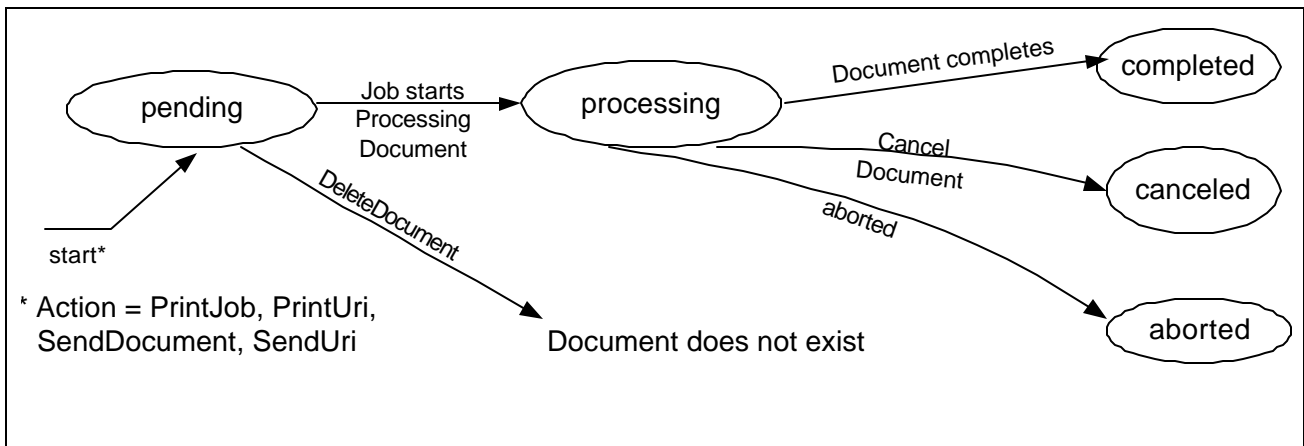
297  
298

299

**Figure 9 Document State Attributes**

300 **4.3.1.1 The Document Life Cycle**

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



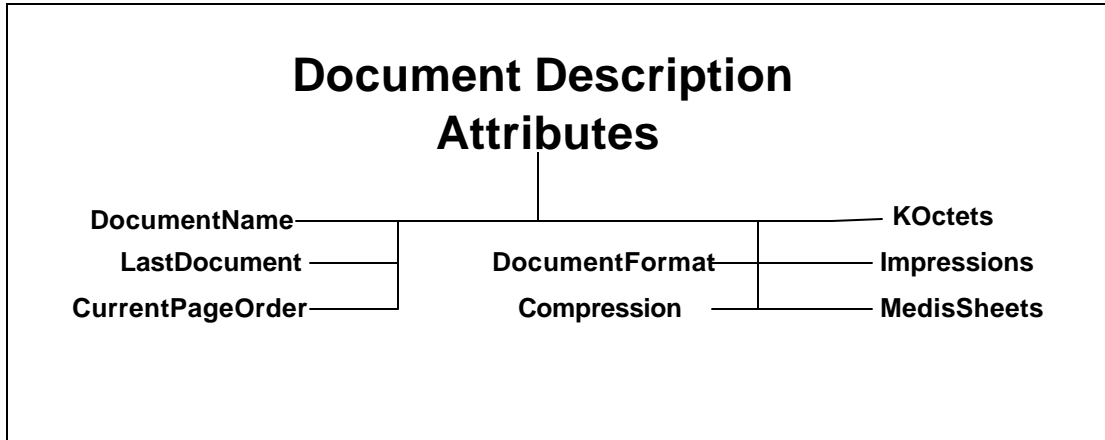
308  
309

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



311 **4.3.2 Document Description Attributes**

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



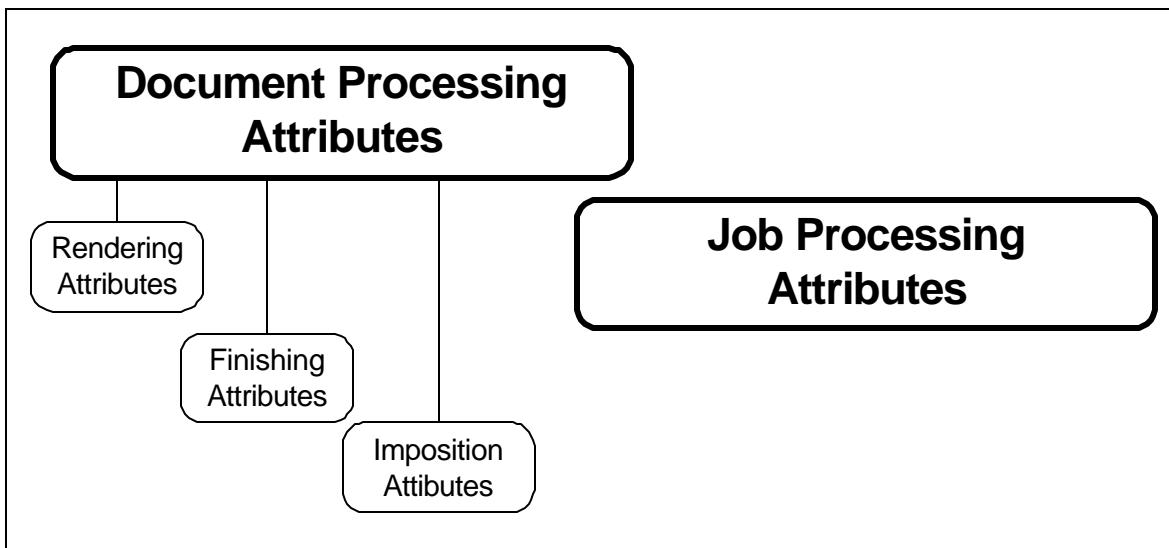
316

317 **Figure 11 Document DescriptionAttributes**

318 **4.4 Processing Attributes**

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

- 324 1) Job Processing Attributes are processing instructions applied the Job level. See section  
 325 4.4.1.  
 326 2) Document Processing Attributes are specific to documents. See section 4.4.2.



327

328

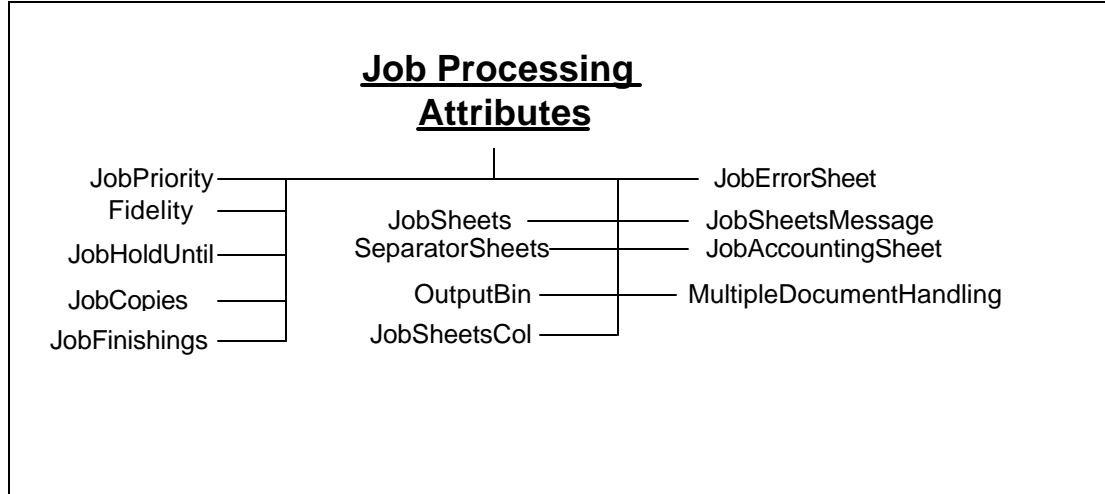
**Figure 12 - Processing Attribute Groups**

329 **4.4.1 Job Processing Attributes**

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

333

334



335

**Figure 13 Job Processing Attributes**

336

337 **4.4.2 Document Processing Attributes**

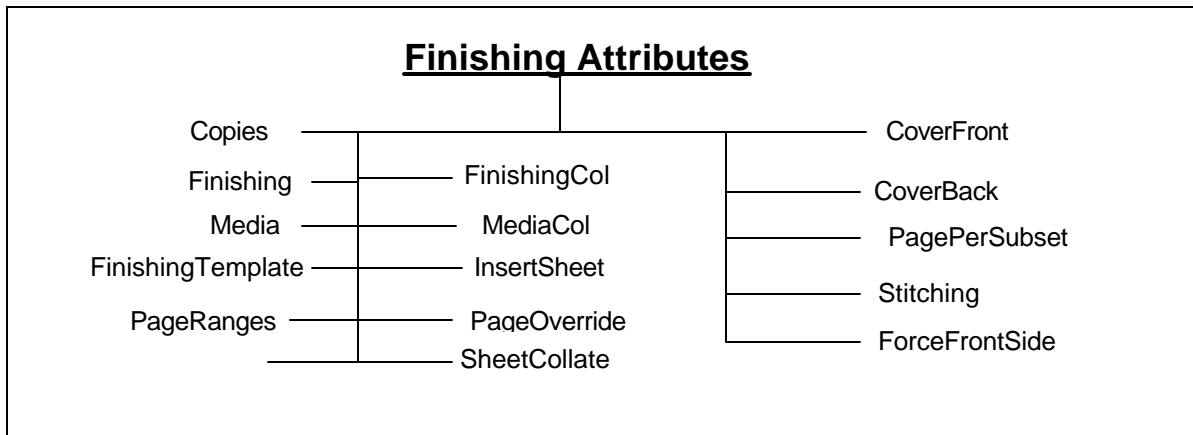
338 Document Processing Attributes are attributes that are applied to documents (e.g. “copies”). The  
 339 Document Processing Attributes can be applied at the Job or Document level. If the attributes are  
 340 applied at the Job level they are the default values for all the Documents in the Job. If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

- 344 1) Finishing Attributes define how multiple physical sheets are manipulated to create final  
 345 output products. See section 4.4.2.1.
- 346 2) Imposition Attributes identify how the logical pages look on the output media. See section  
 347 4.4.2.2.
- 348 3) Rendering Attributes determine the quality and resolution of how marks are made on the  
 349 page. See section 4.4.2.3.

350 **4.4.2.1 Finishing Attributes**

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

353



354

355

356

**Figure 14 Finishing Attributes**

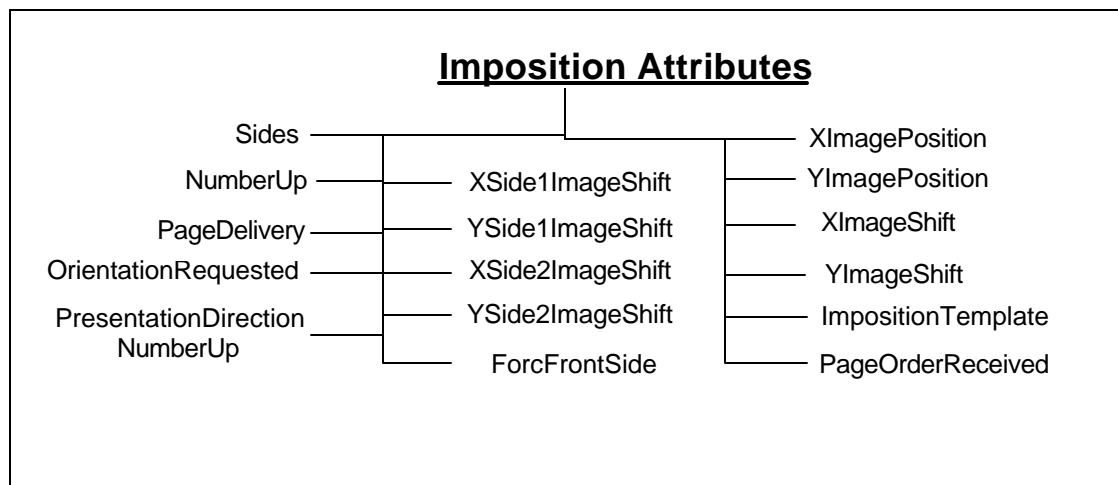
357

**4.4.2.2 Imposition Attributes**

358

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

360



361

362

363

**Figure 15 Imposition Attributes**

364

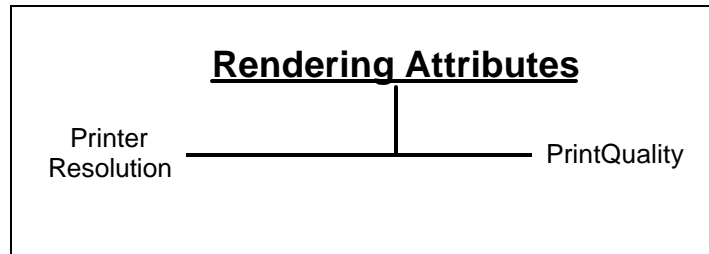
**4.4.2.3 Rendering Attributes**

365

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

366

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367

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**Figure 16 Rendering Attributes**

## 370 5 Actions

371 The PWG has defined a number of operations that affect Printers, Jobs and their document. Below  
 372 is a description of the semantics of these Actions. Naturally different protocol bindings will use  
 373 differing subsets of the Actions or define new ones. Another difference will be the precise  
 374 parameters to the Actions. Below is an abstract definition of the Actions. **ISSUE 2: Need to add**  
 375 **Document actions(GetDocumentAttribute, CancelDocument, CancelCurrentDocument,**  
 376 **DeleteDocument, GetDocuments, SetDocumentAttribute, ValidateDocument from PSI and PWG**  
 377 **Document object work in progress.**

### 378 5.1 Action Summary

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

Job Creation and Document submission	Job Control	Status and Information access	Printer Control
PrintJob	CancelJob	GetJobs	PausePrinter
PrintUri	HoldJob	GetPrinterAttributes	ResumePrinter
CreateJob	ReleaseJob	GetJobAttributes	PurgeJobs
SendDocument	RestartJob		
SendURI			
ValidateJob			

381

**Table 2 - Summary of Actions**

### 382 5.2 Job Creation and document submission Actions

383 This section describes the Job Creation actions that create a Job and the ones that create add  
 384 Document to a Job. The Job Creation actions are: PrintJob, PrintUri, and CreateJob. The PrintJob  
 385 action also submits the Document. The PrintUri action submits a URI reference to the Document  
 386 which the Printer then retrieves when needed at a later time. The CreateJob action only creates the

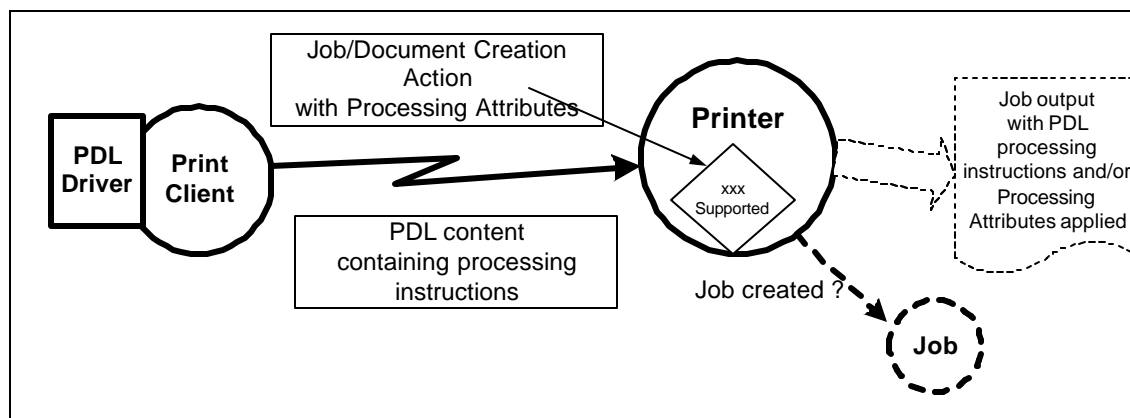
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387 job and the Client must issue subsequent SendDocument and SendUri actions in order to submit  
388 document content or a URI reference, respectively, for a job.

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

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

396 A concept that is important in the PWG model is a set of instructions that can be applied to a print  
397 job. Examples of these instructions include the number of copies and the media to use. These  
398 instructions are referred to as Processing Attributes. The Processing Attributes are made up of the  
399 Job Processing Attributes (see section 4.4.1) and the Document Processing Attributes (see section  
400 4.4.2) sent in a Job or Document Creation Action.



401

402 **Figure 17 Processing Instruction Processing**

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

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

417 The PWG model allows a client to control the Printer's acceptance of a job submission based on  
418 the job request and the Printer's current configured capabilities as follows. When the client

## PWG Semantic Model

419 supplies a ‘true’ value for the “AttributeFidelity” Job Processing attribute, the Printer must reject  
420 the job unless the Printer supports *all* of the supplied Job Processing attributes and values. When  
421 the client supplies a ‘false’ value or omits the attribute, the Printer must accept the job submission  
422 and ignore or substitute attributes and values, respectively, that it does not support. Note that the  
423 “AttributeFidelity” Job Processing attribute covers only the creation of the Job. It is  
424 implementation specific how a Printer handles processing a job when the Printer encounters  
425 unsupported processing instructions in the document content.

### 426 **5.2.1 PrintJob**

427 ([rfc2911] §3.2.1) Submit a print job with only one document and supply the document content  
428 data. If the Printer accepts the job, it creates the Job object and returns a unique “JobId” attribute  
429 for the Printer and a globally unique “JobUri” attribute. The Printer also sets the corresponding Job  
430 attributes with these values.

### 431 **5.2.2 PrintUri**

432 ([rfc2911] §3.2.2) Identical to the PrintJob operation (see section 5.2.1) except that a client  
433 supplies a URI reference to the document data.

### 434 **5.2.3 CreateJob**

435 ([rfc2911] §3.2.4) Similar to the PrintJob operation (see section 5.2.1), except that in the CreateJob  
436 request the Client does not supply Document Data. The client supplies a single set of Job  
437 Processing attributes that the Printer applies to the Output Document(s) of the job. The  
438 “MultipleDocumentHandling” Job Processing attribute controls whether the Printer produces  
439 separate Output Documents or combines the Input Documents into a single Output Document (see  
440 section 22).

#### 441 **5.2.3.1 The “MultipleDocumentHandling” Job Processing attribute**

442 When a client submits a job with more than one Input Document, the  
443 “MultipleDocumentHandling” Job attribute allows the client to specify whether the Printer is to (1)  
444 produce corresponding separate Output Documents or (2) combine the Input Documents into a  
445 single Output Document. For example, the ‘single-document’ and ‘single-document-new-sheet’  
446 values allow the client to staple all of the Input Documents into a single Output Document, with the  
447 latter value forcing each Input Document to start on a new sheet (useful when doing two-sided  
448 printing). When requesting multiple Copies, the ‘separate-document-uncollated-Copies’ value  
449 results in the Copies of each Input Document being together in an Output set, while the ‘separate-  
450 document-collated-Copies’ value keeps a copy of each Input Document together in an Output set.  
451 For example, a job with Input Documents A, B, C and “Copies” = 2 will result in A, A, B, B, C, C  
452 or A, B, C, A, B, C, respectively. If the Printer supports multiple documents per job, the Printer  
453 must support this Job Processing attribute with at least one value.

### 454 **5.2.4 SendDocument**

455 ([rfc2911] §3.3.1) Submits the entire Document Content for the next Input Document of a job  
456 created by a previous CreateJob action (see section 5.2.3).

457 **5.2.5 SendUri**

458 ([rfc2911] §3.3.2) Identical to the SendDocument operation (see section 5.2.4) except that a client  
459 supplies a URI reference to the Document Content data, instead of supplying the document content.

460 **5.2.6 ValidateJob**

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

464 **5.3 Job Control Actions**

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

467 **5.3.1 CancelJob**

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

470 **5.3.2 HoldJob**

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

473 **5.3.3 ReleaseJob**

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

475 **5.3.4 RestartJob**

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

477 **5.4 Status and information Actions**

478 This section describes the actions that allow a client to obtain status and attributes of Jobs and  
479 PrinterS: GetJobs, GetPrinterAttributes, and GetJobAttributes.

480 **5.4.1 GetJobs**

481 ([rfc2911] §3.3.4) Retrieve the list of Jobs belonging to the Printer. The Client may supply some  
482 simple filters (e.g. "MyJobs, "Limit) to control which jobs will be returned. The Client may supply  
483 a list of Job attribute and/or attribute group names to be returned in the response (See 5.4.3). A  
484 group of Job attributes will be returned for each returned Job.

485 **5.4.2 GetPrinterAttributes**

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

489 **5.4.3 GetJobAttributes**

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

492 **5.5 Printer Control Actions**

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

495 **5.5.1 PausePrinter**

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

497 **5.5.2 ResumePrinter**

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

499 **5.5.3 PurgeJobs**

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

502 **6 Summary of attributes**

503 This section summarizes the attributes for the Document, Job and Printer objects. Included in the  
 504 definition are the processing attributes that can be applied at either the Job or Document level.  
 505 For each attribute, the tables contain the attribute name, whether the attribute is multi-valued, its  
 506 syntax, constraints, a short description and a reference to the Document where the semantics of the  
 507 attribute is completely specified:

508 **6.1 Processing Attributes (Job and Document)**

509 Table 3 - Processing Attributes (Job and Document)

Attribute Name	Multivalued	Syntax	Constraint	Group	Reference
<b>Description (values)</b>					
Copies		Integer	1:MAX		[rfc2911] §4.2.5
	The number of copies of the Output Document(s) to be printed.				
CoverBack		<i>complex</i>			[PWG5100.3] §3.1
	The back cover to apply to document or job. ( <i>Includes Media/MediaCol, CoverType</i> )				
CoverFront		<i>complex</i>			[PWG5100.3] §3.1
	The front cover to apply to document or job. ( <i>Includes Media/MediaCol, CoverType</i> )				
CoverType		String	Type2 keyword		[PWG5100.3] §3.1.2



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Attribute Name	Multivalued	Syntax	Constraint	Group	Reference
<b>Description (values)</b>					
Indicates if covers are requested and which sides will contain print stream pages. (Keywords: no-cover, print-none, print-front, print-back, print-both)					
DocumentCopies	Yes	RangeOfInteger			[PWG5100.4] §5.1.3
Specifies the output document copies for override processing.					
DocumentOverride		complex			[PWG5100.4] §5.1
Provides for the overriding of processing instructions on a document basis. <may also be applied only to a portion of a document. Applied to job, see PageOverride for overrides at the document level. (Includes InputDocuments/OutputDocuments, DocumentCopies, DocumentFormat, DocumentName, Compression, DocumentNaturalLanguage, PageRanges, and any other processing attribute that affects documents) <b>NOTE: Deprecated in favor of Document Object</b>					
Finishing	Yes	String	Type2 keyword		[rfc2911] §4.2.6
Identifies the finishing that the Printer uses for each copy of each printed Output Document in the Job (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)					
FinishingCol		complex			[PWG5100.3] §3.2
Enables an end user to specify detailed finishing options not possible with the “Finishing” attribute (Includes FinishingTemplate, Stitching)					
FinishingTemplate		String	Maxlength=1023		[PWG5100.3] §3.1
A string specifying some particular finishing operation.					
ForceFrontSide	yes	Integer			[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		[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			[PWG5100.4] §5.1.1
Specifies the input documents for override processing.					
InsertAfterPageNumber		Integer			[PWG5100.3] §3.5.1
Specifies the input page after which the Insert Sheet will be placed.					
InsertAfterPageNumber		Integer			[PWG5100.3] §3.5.2
Specifies the number of Insert Sheet to insert.					

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Attribute Name	Multivalued	Syntax	Constraint	Group	Reference
<b>Description (values)</b>					
InsertSheet	Yes	complex			[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 in a job. ( <i>Includes InsertAfterPageNumber, InsertCount, Media/MediaCol</i> )				
JobAccountingOutputBin		String	Type3 keyword		[PWG5100.3] §3.8.3
	Specifies the output bin where the accounting sheet is to be placed. (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			[PWG5100.3] §3.8
	Specifies the accounting sheet for a job. ( <i>Includes JobAccountingSheetType, Media/ MediaCol, JobAccountingOutputBin</i> ).				
JobAccountingSheetType		String	Type3 keyword		[PWG5100.3] §3.8.1
	Specifies the accounting sheet format for a job. (keywords: none, standard)				
JobCopies		Integer	1:MAX		[rfc2911] §4.2.5
	The number of copies of the Job to be printed. <b>NOTE: New attribute to differentiate job and document level copies.</b>				
JobErrorSheet		complex			[PWG5100.3] §3.9
	Specifies the error sheet for a job. ( <i>Includes JobErrorSheetType, JobErrorSheetWhen, Media/MediaCo</i> ).				
JobErrorSheetType		String	Type3 keyword		[PWG5100.3] §3.9.1
	Specifies the error sheet format for a job. (keywords: none, standard)				
JobErrorSheetWhen		String	Type2 keyword		[PWG5100.3] §3.9.2
	Specifies the accounting sheet format for a job. (keywords: on-error, always)				
JobFinishing	Yes	String	Type2 keyword		[rfc2911] §4.2.6
	Identifies the finishing that the Printer uses for each job copy of the Job (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) <b>NOTE: New attribute to differentiate job and document level finishing.</b>				
JobHoldUntil		String	Type3 keyword		[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)				

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Attribute Name	Multivalued	Syntax	Constraint	Group	Reference
<b>Description (values)</b>					
JobPriority		Integer	1:100		[rfc2911] §4.2.1
Priority for scheduling the Job. A higher value specifies a higher priority.					
JobSheets		String	type3 keyword		[rfc2911] §4.2.3
Specifies which job start/end sheet(s), will be printed with a job.. (Keywords: none, standard)					
JobSheetsCol		complex			[PWG5100.3] §3.11
Augments the “JobSheets” attribute. ( <i>Includes JobSheets, Media/MediaCol</i> )					
JobSheetMessage		String	Maxlength=102 3		[PWG5100.3] §3.12
Conveys a message that is delivered with the job.					
Media		String	type3 keyword		[rfc2911] §4.2.11
The medium that the Printer uses for all impressions of the Job. (Keywords: na_letter_8.5x11in. See [pwg5101.1])					
MediaCol		complex			[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.. ( <i>Includes MediaKey, MediaType, MediaInfo, MediaColor, MediaPreprinted, MediaHoleCount, MediaOrderCount, MediaSize, MediaWeightMetric, MediaBackCoating, MediaFrontCoating, MediaRecycled</i> ).					
MediaBackCoating		String	Type3 keyword		[PWG5100.3] §3.13.10
Indicates the pre-process coating applied to the back of the media. (Keywords: none, glossy, high-gloss, semi-gloss, satin, matte)					
MediaColor		String	Type3 keyword		[PWG5100.3] §3.13.4
Indicates the desired color of the media being specified. . (Keywords: no-color, white, pink, yellow, blue, green, buff, goldenrod, red, gray, ivory, orange)					
MediaFrontCoating		String	Type3 keyword		[PWG5100.3] §3.13.10
Indicates the pre-process coating applied to the front of the media. (Keywords: none, glossy, high-gloss, semi-gloss, satin, matte)					
MediaHoleCount		Integer			[PWG5100.3] §3.13.6
Indicates the number of pre-drilled holes in the desired media.					
MediaInfo		String	Maxlength=255		[PWG5100.3] §3.13.3
Specifies information that helps describe the media instance. Intended for human consumption.					
MediaInputTrayCheck		String	Type3 keyword		[PWG5100.3] §3.13.14

## PWG Semantic Model

Attribute Name	Multivalued	Syntax	Constraint	Group	Reference
<b>Description (values)</b>					
	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		[PWG5100.3] §3.13.1
	The name of the media represented as a keyword.				
MediaOrderCount		Integer			[PWG5100.3] §3.13.7
	Indicates the number of sheets, within an ordered sequence of sheets; after which the sequence begins to repeat..				
MediaPrePrinted		String	Type3 keyword		[PWG5100.3] §3.13.11
	Indicates the pre-printed characteristics of the desired media. (Keywords: blank, pre-printed, letter-head)				
MediaRecycled		String	Type3 keyword		[PWG5100.3] §3.13.10
	Indicates the recycled characteristics of the media. (Keywords: none, standard)				
MediaSize		Complex			[PWG5100.3] §3.13.8
	Explicitly specifies the numerical media width and height dimensions. ( <i>Includes XDimension, YDimension</i> )				
<i>XDimension</i>		Integer			[PWG5100.3] §3.13.8.1
	Size of the media in hundredths of a millimeter along the bottom edge.				
<i>YDimension</i>		Integer			[PWG5100.3] §3.13.8.2
	Size of the media in hundredths of a millimeter along the left edge.				
MediaSize		String	Type3 keyword		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) <b>ISSUE3: Resolve definition of media size (string(UpnP) vs. xy(PWG) vs. xy&amp;unit(?))</b>				
MediaType		String	Type3 keyword		[PWG5100.3] §3.13.2
	The medium type that the Printer uses for all impressions of the Job. (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			[PWG5100.3] §3.13.9
	Indicates the weight of the desired media rounded to the nearest whole number of grams per square meter.				
MultipleDocumentHandling		String	type2 keyword		[rfc2911] §4.2.4

## PWG Semantic Model

Attribute Name	Multivalued	Syntax	Constraint	Group	Reference
<b>Description (values)</b>					
	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)				
NumberUp		Integer	1:MAX		[rfc2911] §4.2.9
	Indicates the number of pages in an impression.				
OrientationRequested		String	type2 keyword		[rfc2911] §4.2.10
	The desired orientation for printed pages. (keywords: portrait, landscape, reverse-landscape, reverse-portrait)				
OutputBin		String	Type2 keyword		[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			[PWG5100.4] §5.1.2
	Specifies the output documents for override processing.				
PageDelivery		String	Type2 keyword		[PWG5100.3] §3.15
	Indicates if 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, if the pages are delivered face up or face down. (keywords: same-order-face-up, same-order-face-down, reverse-order-face-up, reverse-order-face-down, system-specified)				
PageOrderReceived		String	Type2 keyword		[PWG5100.3] §3.16
	Specifies the page order of the pages in the document data. (keywords: 1-to-n-order, n-to-1-order)				
PageOverride	Yes	complex			[PWG5100.4] §5.2
	Provides for the overriding of processing instructions on a page basis. ( <i>Includes InputDocuments/OutputDocuments, DocumentCopies, Page, Sides, media and any other processing attribute that affects pages</i> ) <b>ISSUE4: Check FSG definition of PageOverride</b>				
Pages	yes	RangeOfInteger			[PWG5100.4] §5.2.4
	Specifies a range of pages in the document data.				
PagesPerSubset	yes	RangeOfInteger			[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			[RFC2911] §4.2.7

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Attribute Name	Multivalued	Syntax	Constraint	Group	Reference
<b>Description (values)</b>					
Specifies a range of pages in the document data.					
PresentationDirectionNumberUp		String	Type2 keyword		[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		
The print quality that the Printer uses for the Job. (keyword: draft, normal, high)					
PrinterResolution		resolution			RFC2911] §4.2.12
The resolution that Printer uses for the Job in cross-feed and feed direction in units of dpi or dpc.					
Sides		String	type2 keyword		[rfc2911] §4.2.8
Indicates how an impression is to be placed upon the side(s) of the media (keyword: one-sided, two-sided-long-edge, two-sided-short-edge, two-sided-long-edge, tumble)					
SeparatorSheets		complex			[PWG5100.3] §3.18
Specifies the separator sheets to be printed with the job. ( <i>Includes SeparatorSheetType, Media/MediaCol</i> )					
SeparatorSheetsType		String	Type3 keyword		[PWG5100.3] §3.18.1
Specifies the separator sheets type. (keywords: none, slip-sheets, start-sheet, end-sheet, both-sheets)					
SheetCollate		String	Type2 keyword		[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)					
Stitching		complex			[PWG5100.3] §3.2.2
Provides detailed stitching parameters. ( <i>Includes StitchingReferenceEdge, StitchingOffset, StitchingLocations</i> )					
StitchingLocations	yes	Integer			[PWG5100.3] §3.2.2.3
The distance along the stitching axis where a stitch will be placed in hundredths of a millimeter.					
StitchingOffset		Integer			[PWG5100.3] §3.2.2.2
The perpendicular distance from the reference edge to the stitching axis in hundredths of a millimeter.					
StitchingReferenceEdge		String	type2 keyword		[PWG5100.3] §3.2.2.1
Specifies the stitching reference edge of the output media. (keyword: bottom, top, left, right)					

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Attribute Name	Multivalued	Syntax	Constraint	Group	Reference
<b>Description (values)</b>					
XImagePosition		String	type2 keyword		[PWG5100.3] §3.19.2
	Causes the specified point of the Finished-Page Image to be positioned at a specified location. (keyword: none, center, left, right)				
XImageShift		Integer			[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			[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			[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.				
YImagePosition		String	type2 keyword		[PWG5100.3] §3.19.6
	Causes the specified point of the Finished-Page Image to be positioned at a specified location. (keyword: none, center, top, bottom)				
YImageShift		Integer			[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			[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			[PWG5100.3] §3.19.9
	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.				

510

### 511 **6.2 Job Attributes (State and Description)**

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

## PWG Semantic Model

Attribute Name	Multivalued	Syntax	Constraint	Group	Reference
<b>Description (values)</b>					
AttributeFidelity		Boolean			[rfc2911] §15.1
	Allows a user to control the Printer's acceptance of the job submission based on whether or not the Printer supports all the supplied job Processing attributes and values. Default = 'false'				
Compression		String	Type2 keyword		[rfc2911] §4.4.32
	Compression algorithm used on the Document Data, if any. (keywords: none, deflate, gzip, compress)				
CurrentPageOrder		String	Type2 keyword		[PWG5100.3] §4.1
	Represents the current page order of the document data supplied with the job. (keywords: 1-to-n-order, n-to-1-order)				
DateTimeAtCreation		String	DateTime [rfc1123]		[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]		[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]		[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		[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. (example: "PostScript error: stack overflow") (Was JobDetailedStatusMessage)				
DocumentAccessErrors	Yes	String	Maxlength=1023		[rfc2911] §4.3.11
	Information about each Document access error for this job encountered by the Printer. (example: "(404) <a href="http://www.company.com/pub/fileToPrint.pdf">http://www.company.com/pub/fileToPrint.pdf</a> ") (Was JobDocumentAccessErrors)				
DocumentState		String	Type1 keyword		TBD
	The current state of the job (see section 4.2.1.1). See also DocumentStateReasons attribute below. (keywords: pending, processing, canceled, aborted, completed)				
DocumentStateMessage		String	Maxlength=127		TBD
	Specifies information about the "DocumentState" and "DocumentStateReasons" attributes in human readable text. (example: "Document completed successfully with warnings")				
DocumentStateReasons	Yes	String	type2 keyword		TBD



## PWG Semantic Model

Attribute Name	Multivalued	Syntax	Constraint	Group	Reference
<b>Description (values)</b>					
					Provides additional information about the Document's current state. (keywords: none, incoming, data-insufficient, document-access-error, submission-interrupted, outgoing, resources-are-not-ready, interpreting, queued, transforming, queued-for-marker, printing, canceled-by-user, canceled-by-operator, canceled-at-device, aborted-by-system, unsupported-compression, compression-error, unsupported-Document-format, Document-format-error, completed-successfully, completed-with-warnings, completed-with-errors, restartable, queued-in-device))
Impressions		Integer	0:MAX		[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		[rfc2911] §4.3.18.2
					The number of impressions completed for the job so far. (Was JobImpressionsCompleted)
ImpressionsCompletedCurrentCopy		Integer	0:MAX		[job-prog] §4.4
					The number of impressions completed for the current iteration of the job so far.
JobAccountId		String	Maxlength=1023		[PWG5100.3] §3.6
					Account associated with the job.
JobAccountingUserID		String	Maxlength=1023		[PWG5100.3] §3.7
					Specifies the User ID associated with the "JobAccountId".
JobId		Integer	1:MAX		[rfc2911] §4.3.2
					The Printer sets this to the ID of the job that is unique for the Printer.
JobMessageFromOperator		String	Maxlength=127		[rfc2911] §4.3.16
					Message to the end user indicating the reasons for any management action taken on a job. (example: "Job canceled due to length", "Pick job up in mailbox")
JobMessageToOperator		String	Maxlength=127		[PWG5100.3] §3.10
					Message from the end user to indicate something about the processing of the job. (example: "Call 555-1234 before running this job")
JobName		String	Maxlength=127		[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=1023		[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")
JobPrinterUri		String	uri		[rfc2911] §4.3.3

## PWG Semantic Model

Attribute Name	Multivalued	Syntax	Constraint	Group	Reference
<b>Description (values)</b>					
	The Printer set this to the URI of Printer that created this Job. (example: ipp://www.company.com/printer)				
JobState		String	Type1 keyword		[rfc2911] §4.3.7
	The current state of the 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=127		[rfc2911] §4.3.6
	Specifies information about the "JobState" and "jobStateReasons" attributes in human readable text. (example: "Job completed successfully with warnings")				
JobStateReasons	Yes	String	type2 keyword		[rfc2911] §4.3.8
	Provides additional information about the job's current state. (keywords: none, incoming, data-insufficient, Document-access-error, submission-interrupted, outgoing, job-hold-until-specified, resources-are-not-ready, printer-stopped-partly, printer-stopped, interpreting, queued, transforming, queued-for-marker, printing, canceled-by-user, canceled-by-operator, canceled-at-device, aborted-by-system, unsupported-compression, compression-error, unsupported-Document-format, Document-format-error, processing-to-stop-point, service-off-line, completed-successfully, completed-with-warnings, completed-with-errors, restartable, queued-in-device))				
JobUri		String	uri		[rfc2911] §4.3.1
	The Printer sets this to the URI for the job. (example: ipp://www.company.com/printer/jobs/22)				
KOctets		Integer	0:MAX		[rfc2911] §4.3.17.1
	The total size of the Job's Document(s) in integral units of 1024 octets. (Was JobKOctets)				
KOctetsProcessed		Integer	0:MAX		[rfc2911] §4.3.18.1
	the total number of octets processed in integral units of 1024 octets so far. (Was JobKOctetsProcessed)				
MediaSheets		Integer	0:MAX		[rfc2911] §4.3.17.3
	The total number of media sheets to be produced for this job. . (Was JobMediaSheets)				
MediaSheetsCompleted		Integer	0:MAX		[rfc2911] §4.3.18.3
	The media-sheets completed marking and stacking for the entire job so far. (Was JobMediaSheetsCompleted)				
MoreInfo		String	uri		[rfc2911] §4.3.4
	URI used to obtain information intended for end user consumption about this specific Job. (example: " <a href="http://www.company.com/printer/embeddedjobpage">http://www.company.com/printer/embeddedjobpage</a> "). (Was JobMoreInfo)				
NumberOfDocuments		Integer	0:MAX		[rfc2911] §4.3.12
	The number of Documents in the job.				

## PWG Semantic Model

Attribute Name	Multivalued	Syntax	Constraint	Group	Reference
<b>Description (values)</b>					
NumberOfInterveningJobs		Integer	0:MAX		[rfc2911] §4.3.15
The number of jobs that are "ahead" of this job assuming the current scheduled order.					
OutputDeviceAssigned		String	Maxlength=127		[rfc2911] §4.3.13
Identifies the output device to which the Printer has assigned this job (example: "Pete's Printer")					
PrinterUpTime		Integer	1:MAX		[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		[job-prog] §4.2
Number of the copy being stacked for the current document.					
SheetsCompletedDocumentNumber		Integer	0:MAX		[job-prog] §4.3
Number of the document in the job currently being stacked.					
TimeAtCreation		Integer	MIN:MAX		[rfc2911] §4.3.14.1
The time at which the Job was created in "PrinterUpTime" seconds.					
TimeAtProcessing		Integer	MIN:MAX		[rfc2911] §4.3.14.2
The time at which the Job first began processing.					
TimeAtCompleted		Integer	MIN:MAX		[rfc2911] §4.3.14.3
The time at which the Job completed.					
WarningCount		Integer	MIN:MAX		[PWG5100.4] §6.1
total number of warnings that a Printer has generated while processing and printing the Job.. (Was JobWarningCount)					

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### 514 **6.3 Document Attributes (State and Description)**

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

Attribute Name	Multivalued	Syntax	Constraint	Group	Reference
<b>Description (values)</b>					
AttributeFidelity		Boolean			[rfc2911] §15.1
Allows a user to control the Printer's acceptance of the document submission based on whether or not the Printer supports all the supplied document Processing attributes and values. Default = 'false'					
Compression		String	Type2 keyword		[rfc2911] §4.4.32

## PWG Semantic Model

Attribute Name	Multivalued	Syntax	Constraint	Group	Reference
<b>Description (values)</b>					
	Compression algorithm used on the Document Data, if any. (keywords: none, deflate, gzip, compress)				
CurrentPageOrder		String	Type2 keyword		[PWG5100.3] §4.1
	Represents the current page order of the document data. (keywords: 1-to-n-order, n-to-1-order)				
DateTimeAtCreation		String	DateTime [rfc1123]		[rfc2911] §4.3.14.5
	Indicates the date and time at which the Document was created . (example: Fri, 03 May 2002 08:49:37 GMT)				
DateTimeAtProcessing		String	DateTime [rfc1123]		[rfc2911] §4.3.14.6
	Indicates the date and time at which the Document first began processing. (example: Fri, 03 May 2002 08:49:37 GMT)				
DateTimeAtCompleted		String	DateTime [rfc1123]		[rfc2911] §4.3.14.7
	Indicates the date and time at which the Document completed. (example: Fri, 03 May 2002 08:49:37 GMT)				
DetailedStatusMessage	Yes	String	Maxlength=1023		[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. (example: "PostScript error: stack overflow") (Was JobDetailedStatusMessage)				
DocumentAccessErrors	Yes	String	Maxlength=1023		[rfc2911] §4.3.11
	Information about each Document access error for this job encountered by the Printer. (example: "(404) <a href="http://www.company.com/pub/fileToPrint.pdf">http://www.company.com/pub/fileToPrint.pdf</a> ") (Was JobDocumentAccessErrors)				
DocumentFormat		String	MimeMediaType [rfc2046], [rfc2048]		[rfc2911] §3.2.1.1
	The Document format (i.e. PDL) for the 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		[rfc2911] §3.2.1.1
	Name for the Document to be used in an implementation specific manner.				
DocumentNaturalLanguage		String	Maxlength=127		[rfc2911] §3.2.1.1
	Identifies the Natural Language of the Document				
DocumentState		String	Type1 keyword		<b>ISSUE5: New</b>
	The current state of the document. See also DocumentStateReasons attribute below. (keywords: pending, processing, canceled, aborted, completed)				

## PWG Semantic Model

Attribute Name	Multivalued	Syntax	Constraint	Group	Reference
<b>Description (values)</b>					
DocumentStateMessage		String	Maxlength=127		ISSUE6: New
	Specifies information about the "DocumentState" and "DocumentStateReasons" attributes in human readable text. (example: "Documentcompleted successfully with warnings")				
DocumentStateReasons	Yes	String	type2 keyword		ISSUE7: New
	Provides additional information about the document state. (keywords: none, incoming, document-access-error, submission-interrupted, outgoing, resources-are-not-ready, interpreting, transforming, warnings-detected, queued-for-marker, printing, canceled-by-user, canceled-by-operator, canceled-at-device, aborted-by-system, unsupported-compression, compression-error, unsupported-Document-format, Document-format-error, completed-successfully, completed-with-warnings, completed-with-errors, queued-in-device)				
DocumentUri		String	Maxlength=1023		[rfc2911] §3.2.2
	Reference to document to be printed (Print by reference)				
Impressions		Integer	0:MAX		[rfc2911] §4.3.17.2
	The total size in number of impressions in the Document. (Was JobImpressions)				
ImpressionsCompleted		Integer	0:MAX		[rfc2911] §4.3.18.2
	The number of impressions completed for the document so far. (Was JobImpressionsCompleted)				
ImpressionsCompletedCurrentCopy		Integer	0:MAX		[job-prog] §4.4
	The number of impressions completed for the current iteration of the document so far.				
InputDocumentNumber		integer			[PWG5100.4] §9.2
	The order of the document within a job starting at a base of 1.				
KOctets		Integer	0:MAX		[rfc2911] §4.3.17.1
	The total size of the Document in integral units of 1024 octets. (Was JobKOctets)				
KOctetsProcessed		Integer	0:MAX		[rfc2911] §4.3.18.1
	the total number of octets processed in integral units of 1024 octets so far. (Was JobKOctetsProcessed)				
LastDocument		Boolean			[rfc2911] §4.??
	'true' if this is the last Input Document for the job. Default = 'false'.				
PrinterUpTime		Integer	1:MAX		[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)				
MediaSheets		Integer	0:MAX		[rfc2911] §4.3.17.3

## PWG Semantic Model

Attribute Name	Multivalued	Syntax	Constraint	Group	Reference
<b>Description (values)</b>					
	The total number of media sheets to be produced for this document. (ISSUE3q: was JobMediaSheets)				
MediaSheetsCompleted		Integer	0:MAX		[rfc2911] §4.3.18.3
	The media-sheets completed marking and stacking for the document so far. (Was JobMediaSheetsCompleted)				
MoreInfo		String	uri		[rfc2911] §4.3.4
	URI used to obtain information intended for end user consumption about this specific Job. (example: " <a href="http://www.company.com/printer/embeddedjobpage">http://www.company.com/printer/embeddedjobpage</a> ") . (Was JobMoreInfo)				
PageRanges	Yes	RangeOfInteger			
	Identifies the range(s) of pages that are to be printed by the Printer for each copy of each Output Document.				
SheetsCompletedCopyNumber		Integer	0:MAX		[job-prog] §4.2
	Number of the copy being stacked for the current document.				
TimeAtCreation		Integer	MIN:MAX		[rfc2911] §4.3.14.1
	The time at which the Document was created in "PrinterUpTime" seconds.				
TimeAtProcessing		Integer	MIN:MAX		[rfc2911] §4.3.14.2
	The time at which the Document first began processing.				
TimeAtCompleted		Integer	MIN:MAX		[rfc2911] §4.3.14.3
	The time at which the Document completed.				
WarningCount		Integer	MIN:MAX		[PWG5100.4] §6.1
	total number of warnings that a Printer has generated while processing and printing the Document. (Was Job WarningCount)				

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### 517 **6.4 Printer Attributes (State and Description)**

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

Attribute Name	Multivalued	Syntax	Constraint	reference
<b>Description (values)</b>				
ColorSupported		boolean		[rfc2911] §4.4.26
	Indicates if the device is capable of any type of color printing at all, including highlight color.			
CompressionSupported	Yes	String	Type3 keyword	[rfc2911] §4.4.32

## PWG Semantic Model

Attribute Name	Multivalued	Syntax	Constraint	reference
<b>Description (values)</b>				
	Identifies the set of supported Compression algorithms for Document content. (keywords: none, deflate, gzip, compress)			
DeviceId		String		See Appendix 10.1
	An identifier based on IEEE1284 to identify the device. 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]	[rfc2911] §4.4.21
	The document format (i.e. PDL) that the 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	
	Identifies both the Document and Image formats supported by the 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.			
JobImpressionsSupported		RangOfInteger	0:MAX	[rfc2911] §4.4.34
	Specifies the upper and lower bounds for the number of impressions allowed per job.			
JobKOctetsSupported		RangOfInteger	0:MAX	[rfc2911] §4.4.33
	Specifies the allowable upper and lower bounds of the total size per job in integral units of 1024 octets.			
JobMediaSheetsSupported		RangOfInteger	0:MAX	[rfc2911] §4.4.35
	Specifies the upper and lower bounds for the number of media sheets allowed per job.			
MultipleDocumentJobsSupported		boolean		[rfc2911] §4.4.16
	Indicates whether the Printer supports more than one Document per job, i.e., more than one SendDocument and/or SendUri request per job. A multi-Documents 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	[rfc2911] §4.4.31

## PWG Semantic Model

Attribute Name	Multivalued	Syntax	Constraint	reference
	<b>Description (values)</b>			
	Identifies the minimum time (in seconds) that a multi-Document per job Printer must wait between actions on an open job. 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	[rfc2911] §4.4.15
	The set of supported actions for the Printer and Job. (keywords: PrintJob, PrintUri, ValidateJob, CreateJob, SendDocument, SendUri, CancelJob, GetJobAttributes, GetJobs, GetPrinterAttributes, HoldJob, ReleaseJob, RestartJob, PausePrinter, ResumePrinter, PurgeJobs).			
PagesPerMinute		Integer	0:MAX	[rfc2911] §4.4.36
	Specifies the nominal number of pages per minute which may be generated by this printer.			
PagesPerMinuteColor		Integer	0:MAX	[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	[rfc2911] §4.4.28
	Expresses the ability of a Printer to either attempt to override a Document's processing instructions with Job Processing Attributes or not. (keywords: attempted, not-attempted)			
PrinterCurrentTime		String	DateTime [rfc1123]	[rfc2911] §4.4.30
	Indicates the current date and time. (example: Fri, 03 May 2002 08:49:37 GMT)			
PrinterDriverInstaller		String	Uri	[rfc2911] §4.4.8
	Intended for consumption by automata to locate the driver installer for this Printer object. Note: This attribute has not been used by any known implementation. (example: " <a href="http://www.company.com/printer/installerProgram">http://www.company.com/printer/installerProgram</a> ")			
PrinterInfo		String	Maxlength=127	[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		[rfc2911] §4.4.23
	Indicates whether the printer is currently able to accept jobs.			
PrinterLocation		String	Maxlength=127	[rfc2911] §4.4.5
	Identifies the location of the device. (example: Pete's Office)			
PrinterMakeAndModel		String	Maxlength=127	[rfc2911] §4.4.9
	Identifies the make and model of the device. (example: "Xerox Phaser 7700", "HP LaserJet 1000", "Lexmark Optra Color 45")			
PrinterMessageFromOperator		String	Maxlength=127	[rfc2911] §4.4.25



## PWG Semantic Model

Attribute Name	Multivalued	Syntax	Constraint	reference
	<b>Description (values)</b>			
	End user information for the printer. (example: “printer unavailable until 1pm due to preventive mainanance”)			
PrinterMoreInfo		String	uri	[rfc2911] §4.4.7
	URI used to obtain information intended for end user consumption about this specific Printer. (example: “ <a href="http://www.company.com/printer/embeddedwebpage">http://www.company.com/printer/embeddedwebpage</a> ”)			
PrinterMoreInfoManufacturer		String	uri	[rfc2911] §4.4.10
	URI used to obtain more information for end user consumption about this type of device. (example: “ <a href="http://www.xerox.com/go/xrx/template/012.jsp?Xcntry=USA&amp;Xlang=en_US&amp;prodID=7700">http://www.xerox.com/go/xrx/template/012.jsp?Xcntry=USA&amp;Xlang=en_US&amp;prodID=7700</a> ”, “ <a href="http://www.lexmark.com/US/products/overview/0,1224,MjQ5fDE=,00.html">http://www.lexmark.com/US/products/overview/0,1224,MjQ5fDE=,00.html</a> ”)			
PrinterName		String	Maxlength=127	[rfc2911] §4.4.4
	The end-user friendly name of the Printer object. (example: “Pete’s Printer”)			
PrinterState		String	type1 keyword	[rfc2911] §4.4.11
	Identifies the current state of the device (see section4.1.1.1). See “PrinterStateReasons” below. (keywords: idle, processing, stopped)			
PrinterStateMessage		String	Maxlength=1023	[rfc2911] §4.4.13
	Information about the "printer- state" and "printer-state-reasons" attributes in human readable text. (example: “Printer stopped due to paper jam”)			
PrinterStateReasons	Yes	String	type2 keyword	[rfc2911] §4.4.12
	Augments the "printer-state" attribute to give more detailed information about the Printer 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, media-needed, media-jam, moving-to-paused, paused, shutdown, connecting-to-device, timed-out, stopping, stopped-partly, toner-low, toner-empty, spool-area-full, cover-open, interlock-open, door-open, input-tray-missing, media-low, media-empty, output-tray-missing, output-area-almost- full, output-area- full, marker-supply- low, marker-supply-empty, marker-waste-almost- full, marker-waste- full, fuser-over-temp, fuser- under-temp, opc- near-eol, opc- life-over, developer-low, developer-empty, interpreter-resource-unavailabl)			
PrinterUpTime		integer	1:MAX	[rfc2911] §4.4.29
	The amount of time (in seconds) that a Printer has been up and running			
PrinterUriSupported	Yes	String	uri	[rfc2911] §4.4.1

## PWG Semantic Model

Attribute Name	Multivalued	Syntax	Constraint	reference
<b>Description (values)</b>				
Contains at least one URI for the 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	[rfc2911] §4.4.24
The number of jobs that the Printer has accepted but has not yet completed.				
ReferenceUriSchemesSupported	Yes	String	UriScheme	[rfc2911] §4.4.27
Which URI schemes are supported by the 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	[rfc2911] §4.4.2
The Client authentication mechanism that the 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	[rfc2911] §4.4.3
Identifies the security mechanisms used for accessing the Printer object. See PrinterUriSupported for additional information. (keywords: none, ssl3, tls)				

519

## 520 **7 Status Strings**

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

522 The following status strings are returned when the Printer accepts the action request and indicates  
523 some degree of success:

524 successful-ok - Action succeeded and no requested attribute were substituted or ignored.

525 successful-ok-ignored-or-substituted-attributes - Action succeeded but some unsupported attributes  
526 were ignored or substituted.

527 successful-ok-conflicting-attributes - Action succeeded but some attributes were conflicting and  
528 have been substituted or ignored.

529

530 The following status strings are returned when the Printer rejects the action indicating some error  
531 on the part of the Client:

532 client-error-bad-request - malformed syntax or constraint exceeded.

533 client-error-forbidden - The Printer understood the request, but is refusing to fulfill it for  
534 authentication and/or authorization reasons. The client should not try again even with  
535 credentials.

## PWG Semantic Model

- 536 client-error-not-authenticated - The request requires user authentication. The client may try again  
537 with suitable authentication.
- 538 client-error-not-authorized - The requester is not authorized to perform the request. The Client  
539 should not try again.
- 540 client-error-not-possible - The action cannot be performed, because of the state of the target object.
- 541 client-error-timeout - The client did not produce a subsequent request within the time that the  
542 Printer was prepared to wait.
- 543 client-error-not-found - The target object was not found.
- 544 client-error-gone - The target object is no longer available.
- 545 client-error-request-entity-too-large - The request and/or the Document Content is too large.
- 546 client-error-request-value-too-long - A attribute value in the request is longer than the Printer  
547 supports.
- 548 client-error-document-format-not-supported - The document format is not supported.
- 549 client-error-attributes-or-values-not-supported - An attribute and/or value is not supported and must  
550 be in order to carry out the request. The Printer must return the unsupported attributes or  
551 values in the Unsupported Attributes group.
- 552 client-error-uri-scheme-not-supported - The URI scheme is not supported.
- 553 client-error-charset-not-supported - The charset is not supported.
- 554 client-error-conflicting-attributes - Some supplied attributes are conflicting. The Printer must  
555 return them in the Unsupported Attributes group.
- 556 client-error-compression-not-supported - The compression of the Document Content is not  
557 supported.
- 558 client-error-compression-error - An error occurred when uncompressing the Document Content.
- 559 client-error-document-format-error - An error occurred when interpreting the Document Content.
- 560 client-error-document-access-error - An error occurred when the Printer attempted to access the  
561 Document Content through the URI supplied.  
562
- 563 The following status strings are returned when the Printer rejects the action indicating some error  
564 on the part of the Printer:
- 565 server-error-internal-error - An unexpected internal error occurred.
- 566 server-error-operation-not-supported - The Printer does not support the requested action.
- 567 server-error-service-unavailable - The Printer is unable to service the request at this time due to  
568 overloading or maintenance. The client should try again later as per the “message”  
569 Operation attribute.
- 570 server-error-version-not-supported - The Printer doesn’t support the requested major version of the  
571 protocol and returns the closest version that it does support.
- 572 server-error-device-error - The Printer encountered a device error that causes it to be unable to  
573 accept a new request. For example, a paper jam for a Printer that doesn’t spool and so  
574 cannot accept a new job submission until the jam is fixed.
- 575 server-error-temporary-error - A temporary error such as a buffer full write error, a memory  
576 overflow, or a disk full condition.
- 577 server-error-not-accepting-jobs - The Printer is not currently accepting jobs. Its  
578 “PrinterIsAcceptingJobs” Printer Description attribute is ‘false’.
- 579 server-error-busy - A temporary error indicating that the Printer is too busy processing jobs and/or  
580 other requests. A Client should try again later.

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581 server-error-job-canceled - The job has been canceled by an operator or aborted by the system. For  
582 example, while the Client is transmitting the Document Content to the Printer.  
583 server-error-multiple-document-jobs-not-supported - The Printer doesn't support multiple  
584 document jobs and the client attempted to supply a second SendDocument or SendUri  
585 request. The Printer's "MultipleDocumentJobsSupported" Printer Description attribute is  
586 'false'.  
587

## 588 **8 Change Log**

589 5/16/02 PJZ original draft  
590 5/23/02 TH re-organize draft with comments from Melinda Grant  
591 5/26/02 TH detailed review of the draft  
592 5/29/02 PJZ Incorporated comments prior to initial release  
593 6/4/02 SAA Modified to split the Job Attributes into 3 categories:  
594 1) Processing Attributes  
595 2) Content Attributes  
596 3) Job Attributes

597

598 The Processing Attributes were further split into 3 subcategories:

599 1) Rendering attributes  
600 2) Imposition Attributes  
601 3) Finishing Attributes

602 Added attributes from UPnP Print Basic service template: MediaSize, MediaType,  
603 DeviceId attributes.

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

608 Modified Printer Description Attributes with the following:

609 1) Added in DeviceId.  
610 2) Changed Document\* to Content\*.  
611 3) Removed VersionsSupported and OperationsSupported since these are  
612 dependent on the interface used in specific solutions.

613 6/17/02 PJZ Added high level description of PWG Action semantics and Printer state  
614 transitions. Returned VersionsSupported and OperationsSupported.

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615 8/16/02 PJZ Changed Content back to document, Added PWG5100.1, PWG5100.2,  
616 PWG5100.3, PWG5100.4, job-progress to model. Filled out document object, added "Job Level"  
617 subcategory to Processing attributes

618 9/1/02 PJZ Changes from email input and PWG meeting. Printer/Job/Document  
619 Attribute groups broken out into State and Description groups

620 9/9/02 PJZ Final edits to ready document for review. Updated all figures and added  
621 highlighting of sections to review.

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661 IPP Web Page: <http://www.pwg.org/sm/>  
662 IPP Mailing List: [sm@pwg.org](mailto:sm@pwg.org)  
663

664 To subscribe to the sm mailing list, send the following email:  
665 1) send it to [majordomo@pwg.org](mailto:majordomo@pwg.org)  
666 2) leave the subject line blank  
667 3) put the following two lines in the message body:  
668 subscribe sm  
669 end  
670

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

674

675 Other Participants:

Harry Lewis - IBM  
William Wagner - NetSilicon/DPI

Tom Hastings - Xerox  
Lee Farrell - Canon Information Systems  
Gail Songer - Netreon

676 *ZZZ add other names ZZZ*

677 **10 Appendix A – UPnP Definitions**

678 **10.1 DeviceID**

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

682 The IEEE 1284-2000 Device ID is a length field followed by a case-sensitive string of ASCII  
683 characters defining peripheral characteristics and/or capabilities. For the purposes of this  
684 specification, the length bytes MUST NOT be included. The Device ID sequence is composed of a  
685 series of keys and values of the form:

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686 key: value {,value} repeated for each key

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

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

697

698 MANUFACTURER:ACME Manufacturing;

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

700 MODEL:LaserBeam 9;

701 COMMENT:Anything you like;

702 ACTIVE COMMAND SET:PCL;

703

704 (See IEEE 1284-2000 clause 7.6)

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

## 708 **11 Appendix B – IPP Mapping**

### 709 **11.1 Action Parameter Overview**

710 IPP Actions may contain a number of parameters. The first parameter is always the Operation  
711 Attributes for the Action. The Operation Attributes contains common information such as the  
712 target of the action (Job or Printer), a version number, or a sequence id to tie the request and  
713 response together. Other information is Action-specific such as the name of the Job to be created  
714 or a filter that controls the information to be returned in a query. The sections below describe the  
715 Operation Attributes and any other Action specific parameters.

### 716 **11.2 Job Creation Actions**

717

#### 718 **11.2.1 PrintJob**

719 ([rfc2911] §3.2.1)

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720 **PrintJobRequest(Operation Attributes, [Job Processing Attributes], [Job Finishing**  
721 **Attributes], [Document Attributes], Document Data)**

722 **Operation Attributes:**

723 **PrinterUri(uri):** The target printer for the job

724 **[Document Attributes]:** [**requestingUserName**], [**JobName**],

725 [**DocumentFormat**], [**JobKOctets**], [**jobImpressions**], [**JobMediaSheets**]:

726 see section 4.2.1.

727 **[Job Processing Attributes]:**

728 Any Job Processing Attribute (see section 4.3.2) or vendor/site specific extension.

729 **[Job Description Attributes]:**

730 Any Job Description Attribute (see section 3.2.2) or vendor/site specific extension.

731

732 **[Job Finishing Attributes]:**

733 Any Job Finishing Attribute (see section 4.3.2) or vendor/site specific extension.

734 **[Document Attributes]:**

735 Any Document Attributes for the single document sent (see section 4.3.2) or  
736 vendor/site specific extension.

737

738 **Document data:** The document to print.

739

740 **PrintJobResponse(Operation Attributes, [Unsupported Attributes], Job Attributes)**

741 **Operation Attributes :**

742 **statusCode:** Results of the action (see Appendix section 11.6).

743 [*statusMessage*]: Localized text description of the status code.

744 [*detailedStatusMessage*]: Text for detailed and technical information about the job.

745 **[Unsupported Attributes]:** any unsupported or conflicting attributes and or attribute  
746 values. May be returned on success or failure.

747 **Job Attributes:**

748 **JobUri, JobId, JobState, JobStateReasons ,** [*JobStateMessage*],

749 [*NumberOfInterveningJobs*] See section 4.2.1.

### 750 **11.2.2 PrintUri**

751 ([rfc2911] §3.2.2) The calling sequence is the same as PrintJob () except that the Operation  
752 Attributes in the request contains the “documentUri” attribute and the Document Data is omitted.

### 753 **11.2.3 CreateJob**

754 ([rfc2911] §3.2.4) Similar to the PrintJob operation (see section 1.2), except that in the CreateJob  
755 request the Client does not supply Document Data. The client supplies a single set of Job  
756 Processing attributes that the Printer applies to the Output Document(s) of the job.



757 **11.2.4 SendDocument**

758 ([rfc2911] §3.3.1) Submits the entire Document Content for the next Input Document of a job  
759 created by a previous CreateJob action (see section 11.2.3).

760 **SendDocumentRequest(Operation Attributes, Document Data)**

761 **Operation Attributes:**

762 **JobUri(uri)** or (**PrinterUri(uri)** and **jobId(integer)**): The target job.

763 **[requestingUserName]**: see section 4.2.1.

764 **[Document Attributes]:**

765 **Document data:** The document to print.

766

767 **SendDocumentResponse(Operation Attributes, [Unsupported Attributes], Job Attributes)**

768 **Operation Attributes :**

769 **statusCode:** Results of the action (see Appendix section 11.6).

770 *[statusMessage]*: Localized text description of the status code

771 *[detailedStatusMessage]*: Text for detailed and technical information.

772 **[Unsupported Attributes]**: any unsupported or conflicting attributes and or attribute  
773 values. May be returned on success or failure.

774 **Job Attributes:**

775 **JobUri, JobId, JobState, JobStateReasons , [JobStateMessage],**

776 *[NumberOfInterveningJobs]* See section .

777 **11.2.5 SendUri**

778 ([rfc2911] §3.3.2) The calling sequence is the same as SendDocument () except that the Operation  
779 Attributes in the request contains the “documentUri” attribute and the Document Data is omitted.

780 **11.2.6 ValidateJob**

781 ([rfc2911] §3.2.3) The calling sequence is similar to PrintJob (see section 11.2) except the request  
782 does not contain the Document Data and the response does not contain the Job Attributes.

783 **11.3 Job Control Actions**

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

786 **11.3.1 CancelJob**

787 ([rfc2911] §3.3.3)

788 **CancelJobRequest(Operation Attributes)**

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789       **Operation Attributes:**  
790           **JobUri(uri)** or (**PrinterUri(uri)** and **JobId(integer)**): The target job.  
791           **[requestingUserName]**: see section 4.2.1.  
792           *[message(string)]*: Message from the Client to the Printer Operator. Utilized in an  
793           implementation specific manner.  
794

795 **CancelJobResponse(Operation Attributes, [Unsupported Attributes])**

796       **Operation Attributes :**  
797           **statusCode**: Results of the action (see Appendix section 11.6).  
798           *[statusMessage]*: Localized text description of the status code.  
799           *[detailedstatusMessage]*: Text for detailed and technical information about the job  
800       **[Unsupported Attributes]**: any unsupported or conflicting attributes and or attribute  
801       values. May be returned on success or failure.

### 802 **11.3.2       HoldJob**

803 ([rfc2911] §3.3.5) The request calling sequence is similar to CancelJob (see section 11.3.1) except  
804 that the “jobHoldUntil” attribute may be in the “Operation Attributes”. The response sequence is  
805 the same as CancelJob.

### 806 **11.3.3       ReleaseJob**

807 ([rfc2911] §3.3.6) The calling sequence is the same as CancelJob (see section 11.3.1).

### 808 **11.3.4       RestartJob**

809 ([rfc2911] §3.3.7) The request calling sequence is similar to CancelJob except that the  
810 “jobHoldUntil” attribute may be in the “Operation Attributes”. The response sequence is the same  
811 as CancelJob (see section 11.3.1).

## 812 **11.4 Status and information Actions**

813 This section describes the actions that allow a client to obtain status and attributes of Jobs and  
814 PrinterS: GetJobs, GetPrinterAttributes, and GetJobAttributes.

### 815 **11.4.1       GetJobs**

816 ([rfc2911] §3.3.4)

817 **GetJobsRequest(Operation Attributes)**

818       **Operation Attributes:**  
819           **PrinterUri(uri)**: The target printer containing the jobs  
820           **[requestingUserName]**: see section 4.2.1.  
821           **[requestedAttributes (string(multivalued))]**: set of Job Attribute and/or Attribute  
822           Group names to be returned for each Job. Default = ‘JobUri’ and ‘JobId’.  
823           **[whichJobs(string)]**: Allows user to restrict jobs returned to completed or  
824           active/queued states. (keywords: completed, not-completed (Default)).

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825 [myJobs(boolean)]: Allows user to restrict jobs returned to just the user's jobs or  
826 all jobs. Default = 'false'.

827 [limit(integer)]: Sets maximum number of jobs to return. Default = no limit.

828 **GetJobsResponse(Operation Attributes, [Unsupported Attributes], Job Attributes)**

829 **Operation Attributes :**

830 **statusCode:** Results of the action (see Appendix section 11.6).

831 [*statusMessage*]: Localized text description of the status code.

832 [*detailedstatusMessage*]: Text for detailed and technical information about the job.

833 **Unsupported Attributes:** any unsupported or conflicting attributes and or attribute values.  
834 May be returned on success or failure.

835 **Job Attributes(sequence of requested attributes/values (multivalued)):** A list of jobs each  
836 containing the requested attributes

### 837 11.4.2 GetPrinterAttributes

838 ([rfc2911] §3.2.5)

839 **GetPrinterAttributesRequest(Operation Attributes)**

840 **Operation Attributes:**

841 **PrinterUri(uri):** The target printer

842 [**requestingUserName**]: see section 4.2.1.

843 [**requestedAttributes (string(multivalued))**]: set of Printer Attribute and/or  
844 Attribute Group names to be returned. Default = 'all'.

845 [**DocumentFormat(string)**]: Since some capabilities can be PDL specific, this  
846 optional attributes allows the Printer to return capabilities based on PDL if  
847 known to the Printer.

848 **GetPrinterAttributesResponse(Operation Attributes, [Unsupported Attributes], Printer  
849 Attributes)**

850 **Operation Attributes :**

851 **statusCode:** Results of the action (see Appendix section 11.6).

852 [*statusMessage*]: Localized text description of the status code.

853 [*detailedstatusMessage*]: Text for detailed and technical information about the  
854 Printer.

855 [**Unsupported Attributes**]: any unsupported or conflicting attributes and or attribute  
856 values. May be returned on success or failure.

857 **Printer Attributes(requested attributes/values (multivalued)):** The requested attributes

### 858 11.4.3 GetJobAttributes

859 ([rfc2911] §3.3.4) .

860 **GetJobAttributesRequest(Operation Attributes)**

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861       **Operation Attributes:**  
862           **JobUri(uri)** or (**PrinterUri(uri)** and **JobId(integer)**): The target job  
863           **[requestingUserName]**: see section 4.2.1.  
864           **[requested-attributes (string(multivalued))]**: set of Job Attribute and/or Attribute  
865           Group names to be returned for each Job. Default = 'all'.  
866 **GetJobAttributesResponse(Operation Attributes, [Unsupported Attributes], Job Attributes)**  
867       **Operation Attributes :**  
868           **statusCode:** Results of the action (see Appendix section 11.6).  
869           *[statusMessage]: Localized text description of the status code.*  
870           *[detailedstatusMessage]: Text for detailed and technical information about the job.*  
871       **[Unsupported Attributes]:** any unsupported or conflicting attributes and or attribute  
872       values. May be returned on success or failure.  
873       **Job Attributes(requested attribute/values(multivalued)):** The requested attributes and  
874       their values)

### 875   **11.5 Printer Control Actions**

876   This section describes actions which allow a client to control a Printer and may require operator  
877   credentials: PausePrinter, ResumePrinter, and PurgeJobs.

#### 878   **11.5.1       PausePrinter**

879   ([rfc2911] §3.2.7)

880   **PausePrinterRequest(Operation Attributes)**

881       **Operation Attributes:**

882           **PrinterUri(uri):** The target printer for the job

883           **[requestingUserName]**: see section 4.2.1.

884   **PausePrinterResponse(Operation Attributes, [Unsupported Attributes])**

885       **Operational Attributes :**

886           **statusCode:** Results of the action (see Appendix section 11.6).

887           *[statusMessage]: Localized text description of the status code.*

888           *[detailedStatusMessage]: Text for detailed and technical information.*

889       **[Unsupported Attributes]:** any unsupported or conflicting attributes and or attribute

890       values. May be returned on success or failure.

#### 891   **11.5.2       ResumePrinter**

892   ([rfc2911] §3.2.8) The calling sequence is the same as PausePrinter (see section 11.5.1).

#### 893   **11.5.3       PurgeJobs**

894   ([rfc2911] §3.2.9) The calling sequence is the same as PausePrinter (see section 11.5.1).

895 **11.6 Changes to remove some IPP specific aspects**

896 This section lists some changes to remove some IPP specific aspects from the PWG Semantic  
897 Model. Any attribute name containing “ipp” has had the “ipp” removed. The IPP operation names  
898 have the hyphens removed to be the PWG action names and the operations supported are mixed  
899 keywords, not integer enum values. All attributes names have had the first letter capitalized and  
900 the ‘-‘ character removed and the character following the ‘-‘ has been capitalized. The keyword  
901 attribute values defined remain unchanged and are all lower case, except for the ones that specify  
902 other attributes names (which are changed to be the mixed case without hyphens). **ISSUE8: What**  
903 **about the case and hyphens in status code names (and removing the integer values)?** The term  
904 “object” is sometimes changed to “data class”. **ISSUE8: Why? and Why not done consistently?**  
905 The term “operation” has been changed to “action” to use the term more frequently used with  
906 XML.

907 The aspects of the model that deal with globalization (i.e. character set & language) have been  
908 removed. **ISSUE9: Should this be described generically in this document** Globalization will be  
909 addressed in a protocol specific binding of this semantic model. The Printer globalization attributes  
910 are charsetConfigured, charsetSupported, naturalLanguageConfigured, naturalLanguageSupported  
911 and generatedNaturalLanguageSupported.

912 The types of the attributes have been simplified. All keyword, text, name, DateTime, uri,  
913 UriScheme, enum and mimeType are represented by the simple string type. The term  
914 “keyword” continues to be used for string values enumerated as part of the PWG Model. The  
915 integer enums values are replaced by the ir associated keyword. The “1setOf X” types are  
916 represented as the base type and the “Multivalued” field in the tables below set to “Yes”. Integers  
917 and Boolean types remain the same. Any applicable constraints placed on the attribute values has  
918 been noted in the tables below.

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