

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

Printer Working Group (PWG)

**Overview of the
PWG Semantic Model**

August 16, 2002

Version 0.07

Table of Contents

16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47

- 1 Model Overview5
- 2 Data Classes6
 - 2.1 Printer Object Class6
 - 2.1.1 Printer Attributes6
 - 2.1.2 The “PrinterState” attribute and the Printer Life Cycle7
 - 2.1.3 Printer " Processing" Attributes8
 - 2.2 Job Object Class9
 - 2.2.1 Job Attributes9
 - 2.2.2 The “JobState” attribute and the Job Life Cycle11
 - 2.3 Document Object Class11
 - 2.3.1 Document Attributes.....12
 - 2.3.2 The “DocumentState” attribute and the Document Life Cycle13
 - 2.4 Processing Attributes13
- 3 Actions15
 - 3.1 Action Summary.....15
 - 3.2 Job Creation and document submission Actions16
 - 3.2.1 PrintJob17
 - 3.2.2 PrintUri18
 - 3.2.3 CreateJob18
 - 3.2.4 SendDocument.....18
 - 3.2.5 SendUri.....18
 - 3.2.6 ValidateJob18
 - 3.3 Job Control Actions18
 - 3.3.1 CancelJob.....19
 - 3.3.2 HoldJob19
 - 3.3.3 ReleaseJob19
 - 3.3.4 RestartJob19
 - 3.4 Status and information Actions19
 - 3.4.1 GetJobs19
 - 3.4.2 GetPrinterAttributes.....19
 - 3.4.3 GetJobAttributes19

PWG Semantic Model

48	3.5	Printer Control Actions	19
49	3.5.1	PausePrinter	19
50	3.5.2	ResumePrinter.....	19
51	3.5.3	PurgeJobs	20
52	4	Summary of attributes.....	20
53	4.1	Processing Attributes	20
54	4.2	Job Attributes	27
55	4.3	Document Attributes.....	30
56	4.4	Printer Attributes	33
57	5	Status Codes.....	37
58	6	Change Log.....	39
59	7	References.....	40
60	8	Appendix A – UPnP Definitions	41
61	8.1	DeviceID.....	41
62	9	Appendix B – IPP Mapping.....	41
63	9.1	Action Parameter Overview	41
64	9.2	Job Creation Actions.....	42
65	9.2.1	PrintJob	42
66	9.2.2	PrintUri	43
67	9.2.3	CreateJob	43
68	9.2.4	SendDocument.....	43
69	9.2.5	SendUri.....	44
70	9.2.6	ValidateJob	44
71	9.3	Job Control Actions	44
72	9.3.1	CancelJob.....	44
73	9.3.2	HoldJob	45
74	9.3.3	ReleaseJob	45
75	9.3.4	RestartJob	45
76	9.4	Status and information Actions	45
77	9.4.1	GetJobs	45
78	9.4.2	GetPrinterAttributes.....	46
79	9.4.3	GetJobAttributes	46
80	9.5	Printer Control Actions	47

PWG Semantic Model

81 9.5.1 PausePrinter47
82 9.5.2 ResumePrinter.....47
83 9.5.3 PurgeJobs47
84 9.6 Changes to remove some IPP specific aspects47
85

Table of Figures

87 Figure 1 Model Overview.....5
88 Figure 2 Data Classes6
89 Figure 3 Printer Description Attributes7
90 Figure 4 - The "PrinterState" attribute and the Printer Life Cycle8
91 Figure 5 Job Attributes10
92 Figure 6 The "JobState" Job Attribute and the Job object life Cycle11
93 Figure 7 Document Attributes12
94 Figure 8 "DocumentState" Attribute and Document object life Cycle.....13
95 Figure 9 - Processing Categories14
96 Figure 10 Processing Attributes.....15
97 Figure 11 Production Instruction Processing.....17

Table of Tables

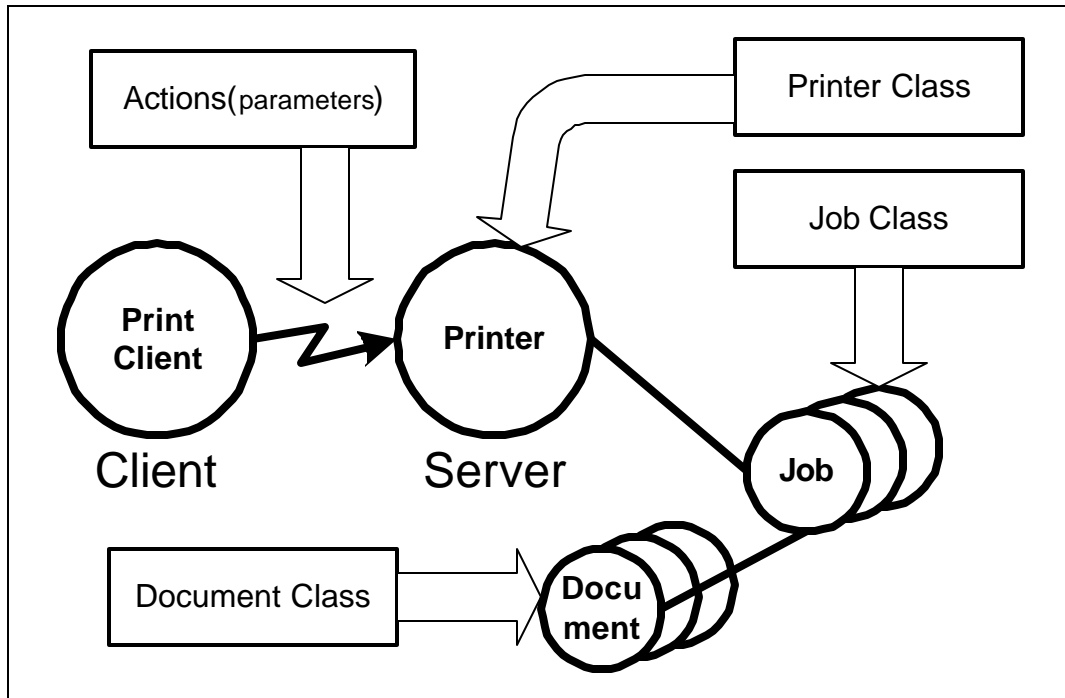
100 Table 1-Integer syntaxes whose “xxxSupported” syntax isn’t RangeOfInteger8
101 Table 2 - Summary of Actions16
102 **Table 3 - Processing Attributes**20
103 Table 4- Job Attributes27
104 Table 5 – Document Attributes.....30
105 Table 6 - Printer Attributes33

106

106

107 **1 Model Overview**

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



115

116 **Figure 1 Model Overview**

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

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

123 MediaSheet: A sheet of paper, or other material, used for printing.

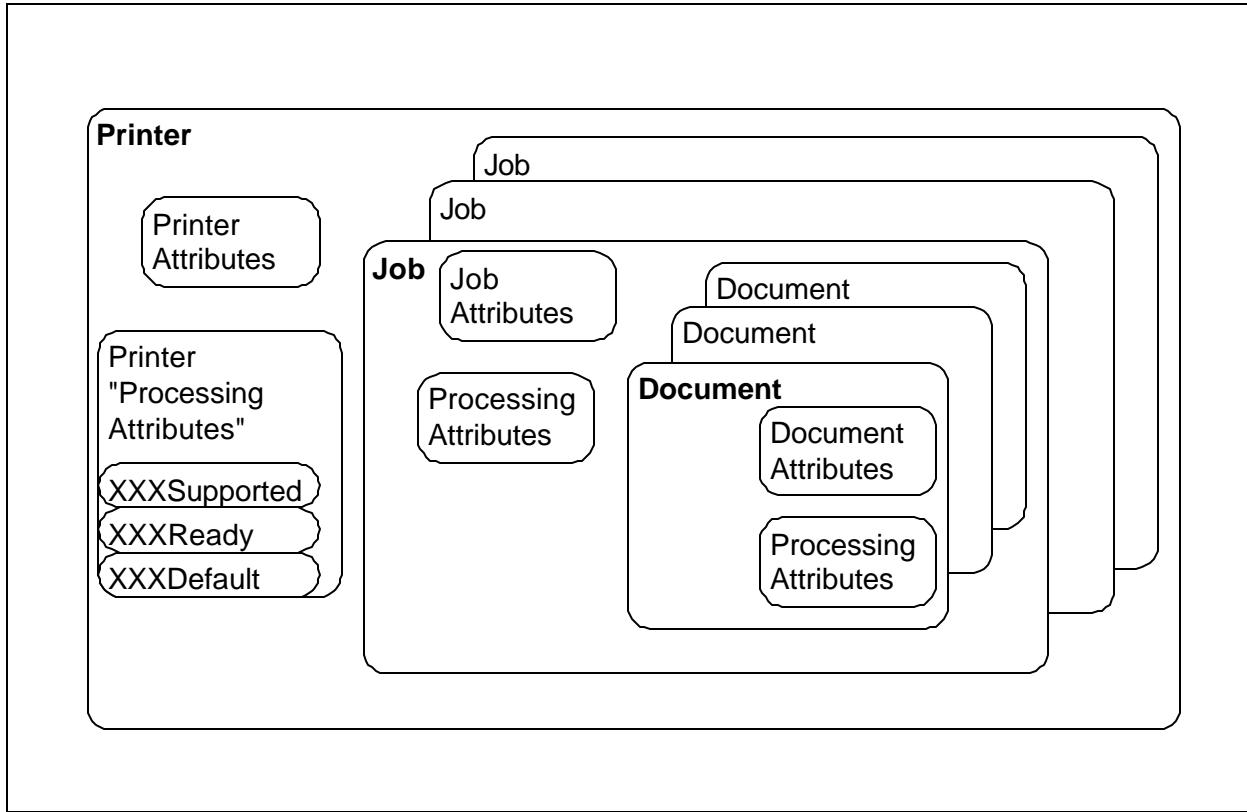
124 Impression: Everything printed on a single side of a media.

125 Page: A logical entity that represents the information contained on a single side of a sheet of
 126 media. Note that this is the electronic form and that multiple pages can be rendered
 127 into a single impression through N-Up printing.

128

129 **2 Data Classes**

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



133

134

135

136

Figure 2 Data Classes

137 **2.1 Printer Object Class**

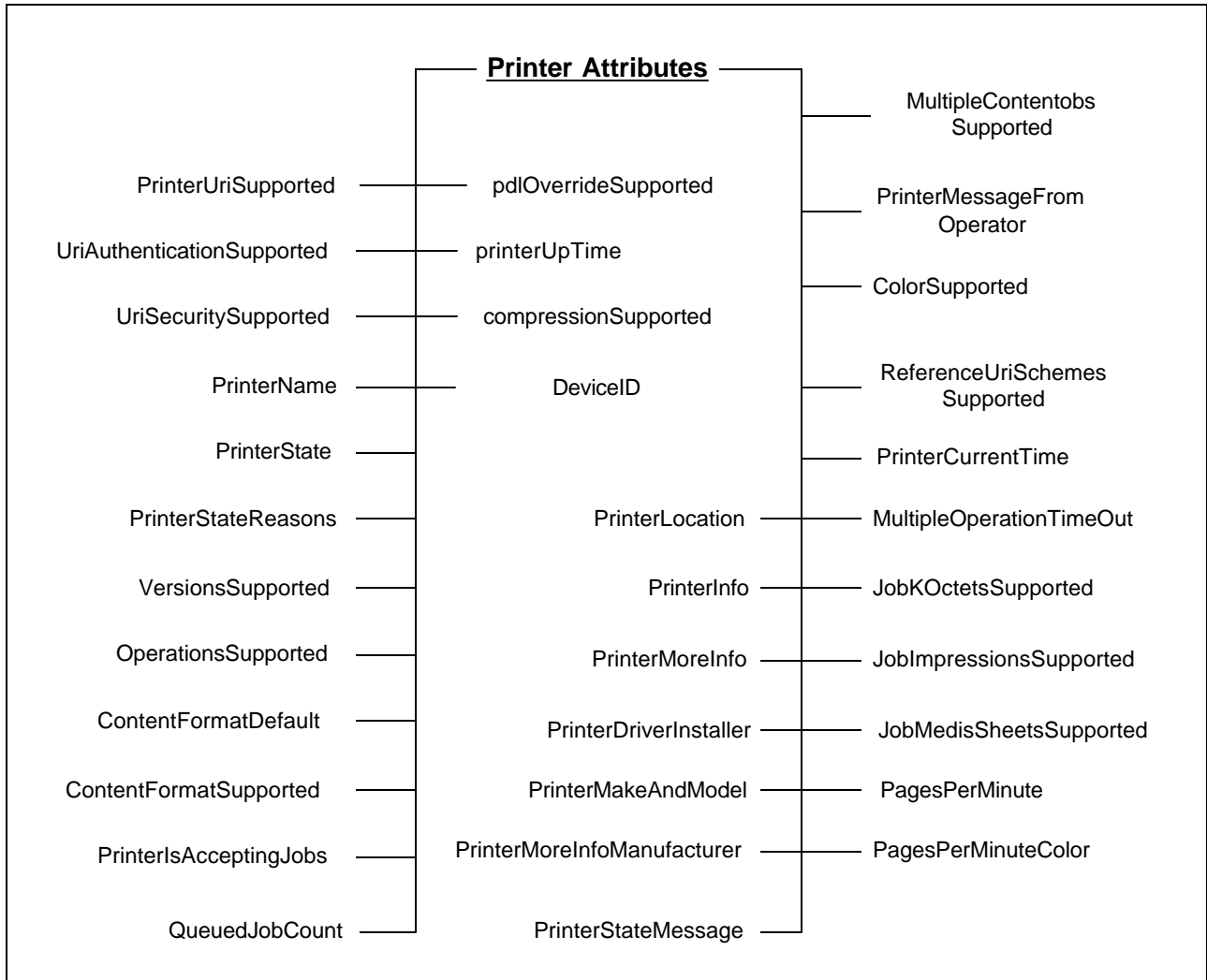
138 The Printer class is represented by a collection of attributes as shown in Figure 2. The Printer
 139 Attributes are presented in detail in Table 6. The printer object also contains attributes that
 140 describe the valid processing attribute values. (See section 2.4 for processing attributes) The Printer
 141 class is the container for Jobs.

142

143

144 **2.1.1 Printer Attributes**

145 Figure 3 below shows the Printer Attributes. These attributes represent the state of the printer and
 146 information that describes the printer such as its make, where it's located and its speed. The
 147 semantics of the attributes are summarized in Table 6.



149
150

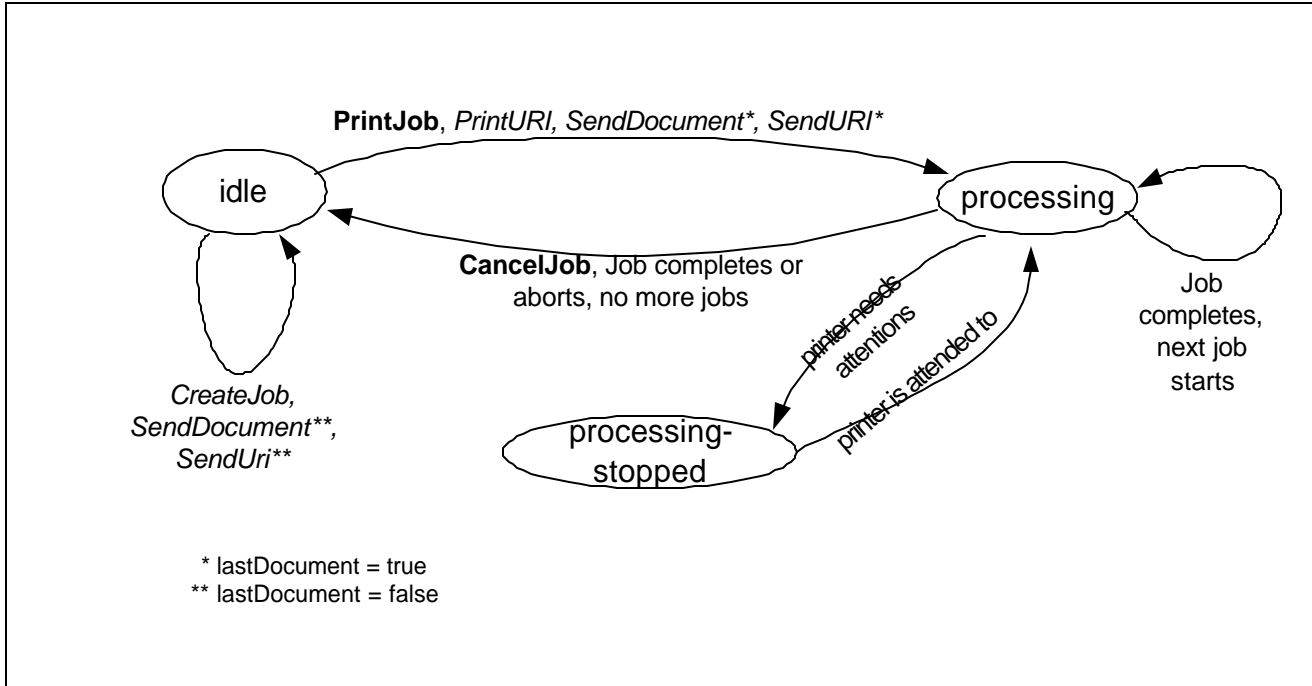
151

Figure 3 Printer Description Attributes

152 **2.1.2 The “PrinterState” attribute and the Printer Life Cycle**

153 The “PrinterState” attribute is one of the most important Printer Description attributes. Figure 4
154 shows the values of the “PrinterState” attribute and the Printer life cycle as affected by actions on
155 the Printer and job processing.

PWG Semantic Model



156
157

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

159 2.1.3 Printer "Processing" Attributes

160 See section 2.4 below for the attributes that may comprise this group. If a Processing attribute (e.g.
161 Media) is supported, the Printer must have an associated xxxSupported (e.g. MediaSupported) and
162 xxxDefault (e.g. MediaDefault) Printer "Processing" attribute. There may be an associated
163 xxxReady (e.g. MediaReady) Printer "Processing" attribute. By retrieving the Printer "Processing"
164 attributes, a Client can determine all the Processing attributes and their values that may be used in
165 creating Jobs and Documents.

166 2.1.3.1 xxxSupported Attributes

167 These attributes list all the currently configured valid values for the "xxx" Processing Attributes.
168 Though the Printer is configured to support the feature, human intervention may be required to
169 process the job (e.g. selected paper may have to be loaded into a tray). The syntax for
170 xxxSupported is multi-valued when an "xxx" attribute is a string. When "xxx" is an integer, the
171 syntax of the corresponding "xxxSupported" attribute is usually RangeOfInteger which indicates
172 the minimum and maximum values supported by the Printer. However, there are some exceptions
173 as indicated in Table 1.

174 **Table 1-Integer syntaxes whose "xxxSupported" syntax isn't RangeOfInteger**

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

175

176 **2.1.3.2 xxxDefault Attributes**

177 These attributes give the default value for the associated production instruction if the Processing
178 Attribute of the job and the instructions embedded in the PDL are not supplied. The syntax for the
179 “xxxDefault” attribute is the same as the corresponding “xxx” Processing Attribute. The only
180 exception is that the PageRanges attribute does not have a PageRangesDefault attribute.

181 **2.1.3.3 xxxReady Attributes**

182 These attributes give the features available without human intervention. The syntax for a
183 “xxxReady” attribute is the same as the corresponding “xxx” Processing Attribute.

184 **2.2 Job Object Class**

185 The Job object class is represented by a collection of attributes divided into two groups as shown in
186 Figure 2. The Job class contains the document class

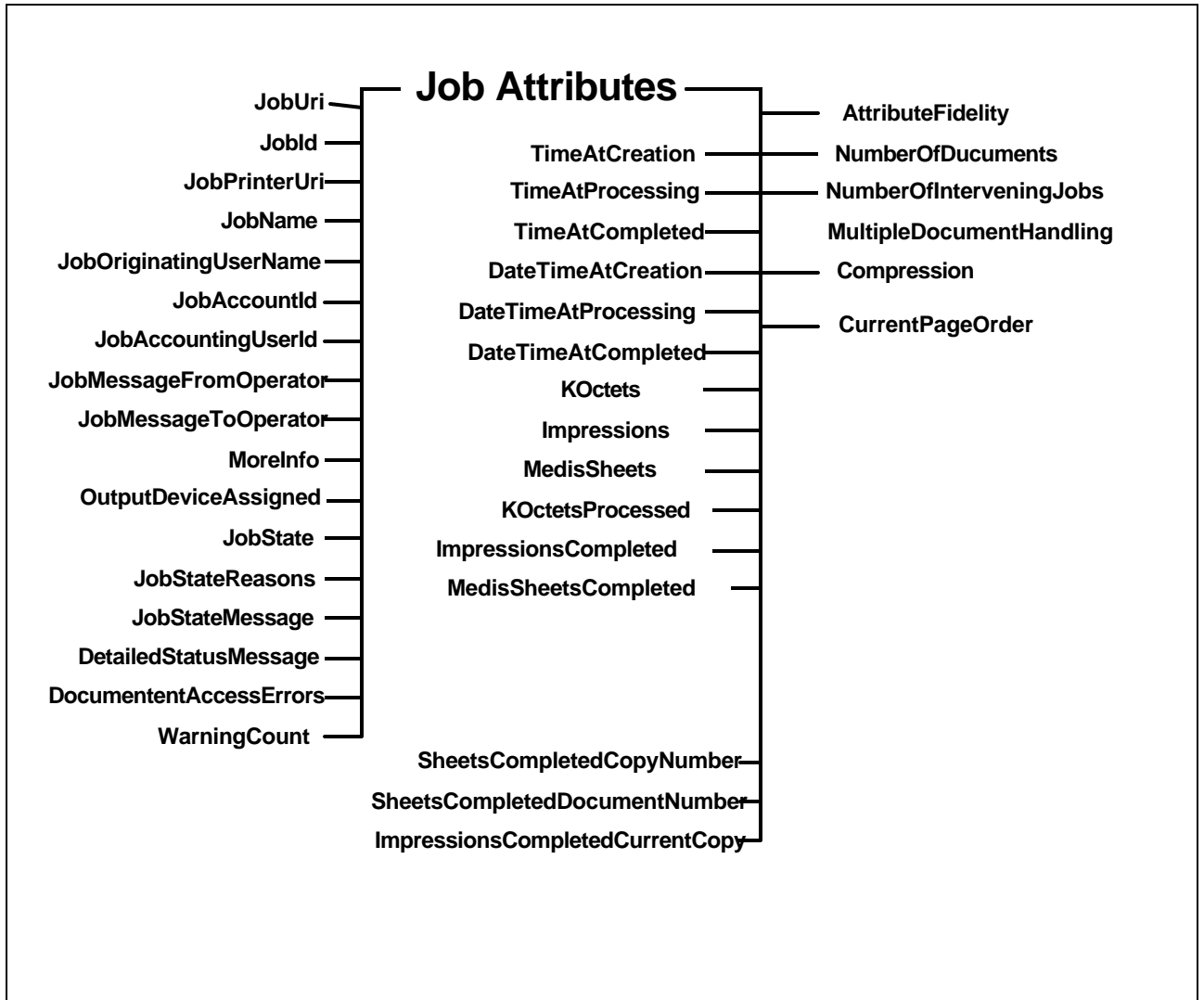
187 Processing Attributes - described in **Table 3 - Processing Attributes**

188 Job Attributes - described in Table 4- Job Attributes.

189 **2.2.1 Job Attributes**

190 Figure 5 below shows the Job Attributes. The semantics of the attributes are summarized in Table
191 4.

PWG Semantic Model



192
193

194

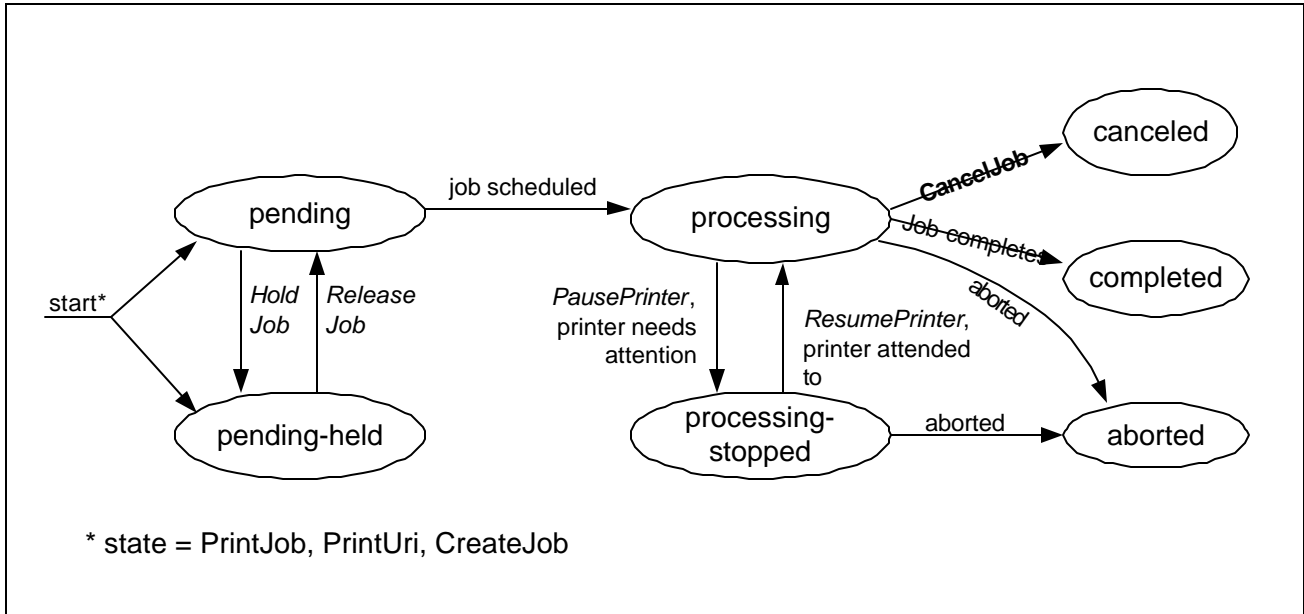
195

Figure 5 Job Attributes

196

197 **2.2.2 The “JobState” attribute and the Job Life Cycle**

198 The “JobState” attribute is one of the most important Job attributes. Figure 6 shows the values of
 199 the “JobState” attribute and the Job life cycle as affected by actions on the Job, Printer, and job
 200 processing.



201

202 **Figure 6 The "JobState" Job Attribute and the Job object life Cycle**

203 **2.3 Document Object Class**

204 The Document object class is represented by a collection of attributes divided into two groups as
 205 shown in Figure 2. The Document class contains the document class

206 Processing Attributes - described in **Table 3 - Processing Attributes**

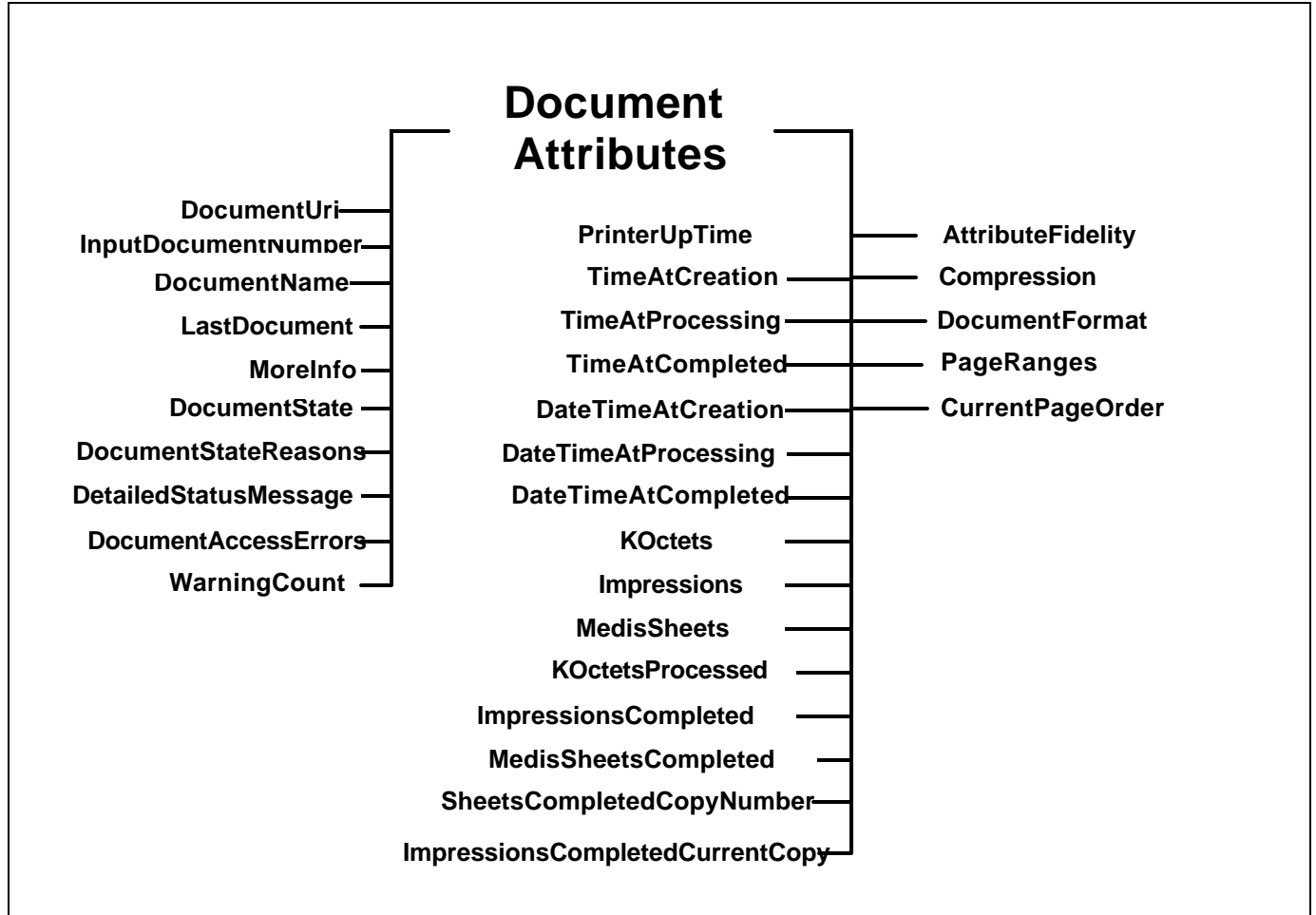
207 Document Attributes - described in Table 5 – Document Attributes.

208

209

210 **2.3.1 Document Attributes**

211 Figure 7 shows the Document Attributes. A Printer should support each Document Attribute that
 212 represents a feature of the Printer. The semantics of the attributes are summarized in Table 5 –
 213 Document Attributes

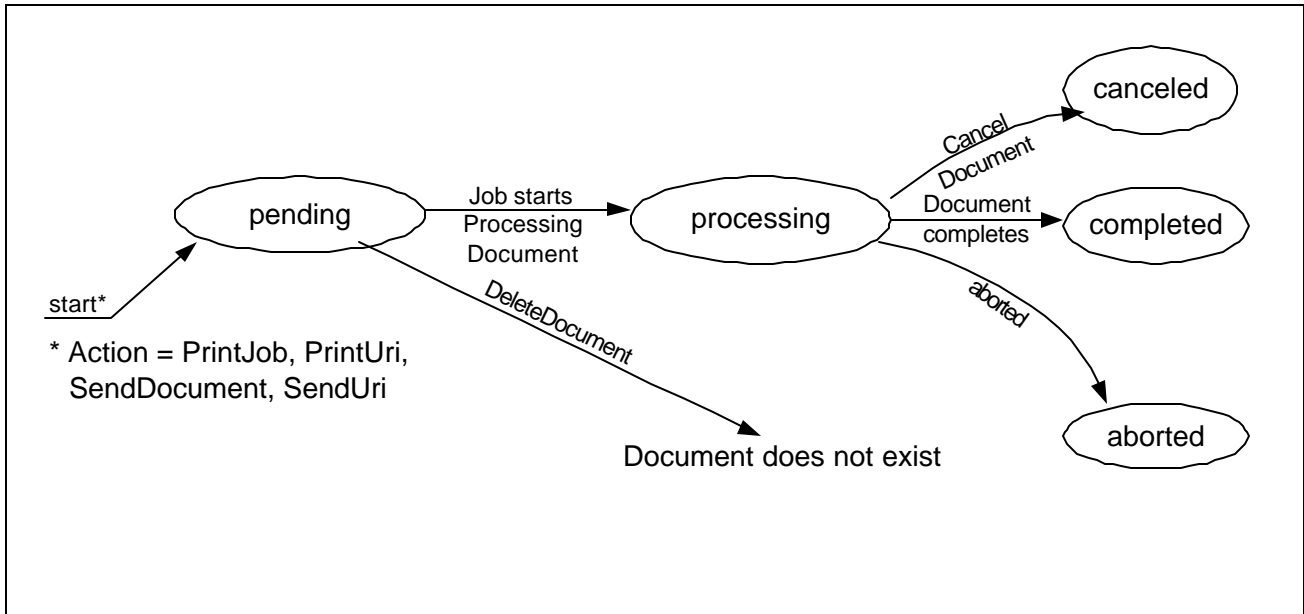


214
215

216 **Figure 7 Document Attributes**

217 **2.3.2 The “DocumentState” attribute and the Document Life Cycle**

218 The “DocumentState” attribute is one of the most important Documentattributes. Figure 6 shows
 219 the values of the “DocumentState” attribute and the Documentlife cycle as affected by Actions and
 220 job processing. Documents are not active objects and their life cycle is closely tied to the lifecycle
 221 of a Job. Documents basically have three states. The first is waiting to be processed by a Job (i.e.
 222 pending). The second state is from the time the Job first starts processing the Document(i.e
 223 processing) and until it reaches its terminating state. The last state for a Document is its terminal
 224 state (i.e. completed, canceled, aborted)



225

226 **Figure 8 "DocumentState" Attribute and Document object life Cycle**

227

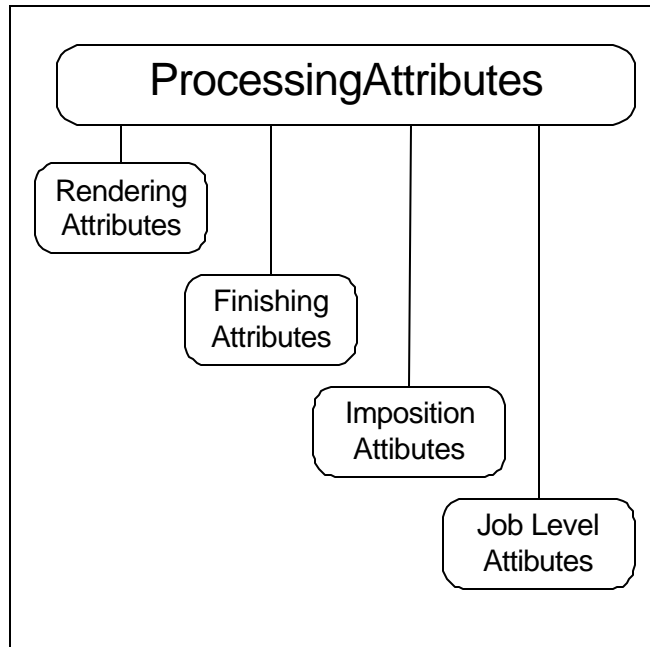
228

229 **2.4 Processing Attributes**

230 Figure 10 shows the Processing Attributes. The semantics of the attributes are summarized in
 231 **Table 3** along with a brief description of each attribute. The Processing attributes are split into
 232 four categories as shown in Figure 9:

- 233 1) Rendering Attributes identify the different rendering attributes that determine the quality
 234 and resolution of how marks are made on the page.
- 235 2) Finishing Attributes define how multiple physical sheets are manipulated to create final
 236 output products. The output could be a job, document or page depending on the defined
 237 solution interface.
- 238 3) Imposition Attributes identify how the logical pages look on the MediaSheet.
- 239 4) Job Level Attributes are processing instructions specific to the Job level. These attributes
 240 are meaningless at the Document level.

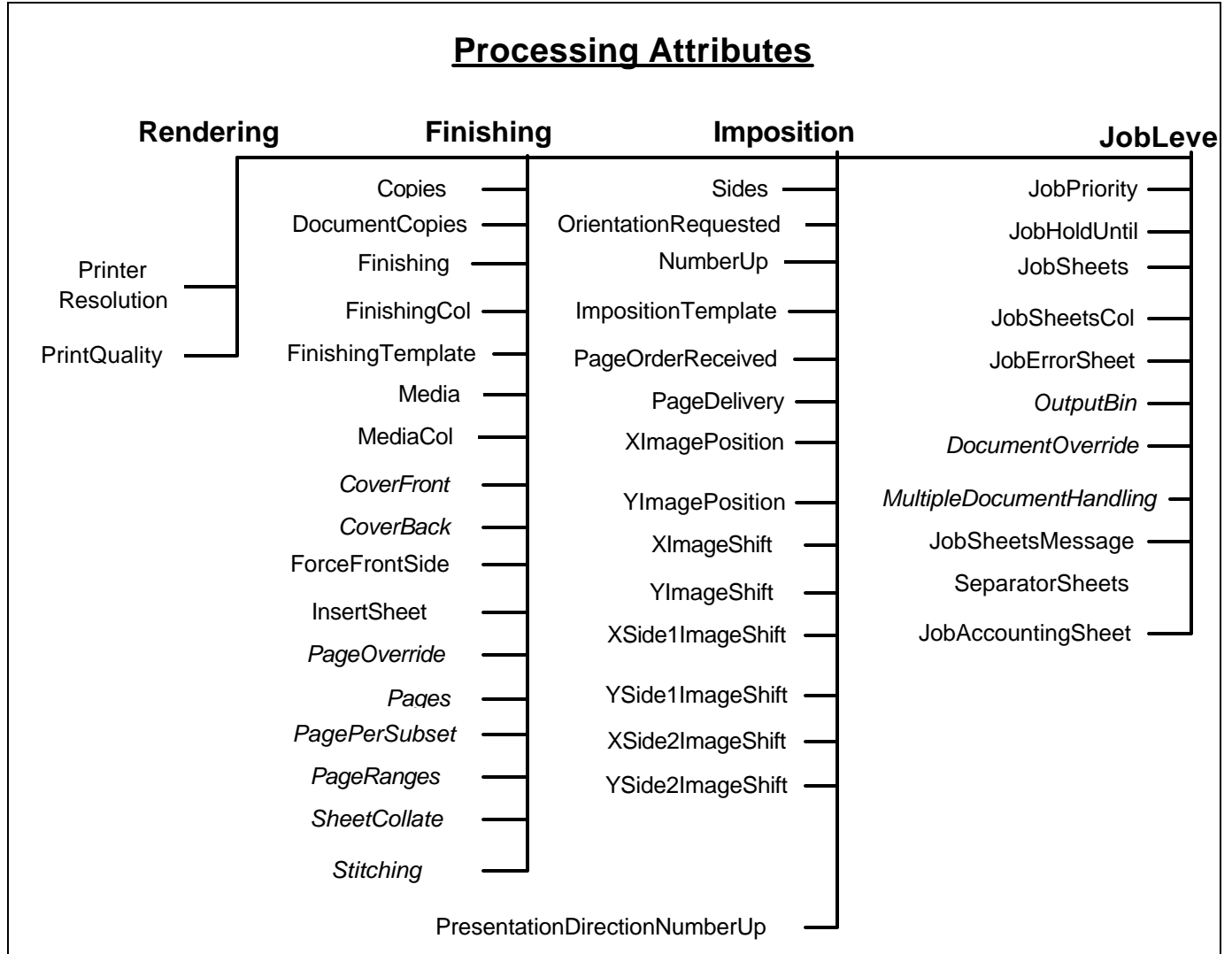
PWG Semantic Model



241

242

Figure 9 - Processing Categories



243
244

245

Figure 10 Processing Attributes

246 **3 Actions**

247 The PWG has defined a number of operations that affect Printers, Jobs and their document. Below
 248 is a description of the semantics of these Actions. Naturally different protocol bindings will use
 249 differing subsets of the Actions or define new ones. Another difference will be the precise
 250 parameters to the Actions. Below is an abstract definition of the Actions. **ISSUE 5: Need to add**
 251 **Document actions(GetDocumentAttribute, CancelDocument, CancelCurrentDocument,**
 252 **DeleteDocument, GetDocuments, SetDocumentAttribute, ValidateDocument from PSI and PWG**
 253 **Document object work in progress.**

254 **3.1 Action Summary**

255 This table summarizes the actions defined for the Job and Printer. See section 3 for more details.

PWG Semantic Model

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			

256

Table 2 - Summary of Actions

257 **3.2 Job Creation and document submission Actions**

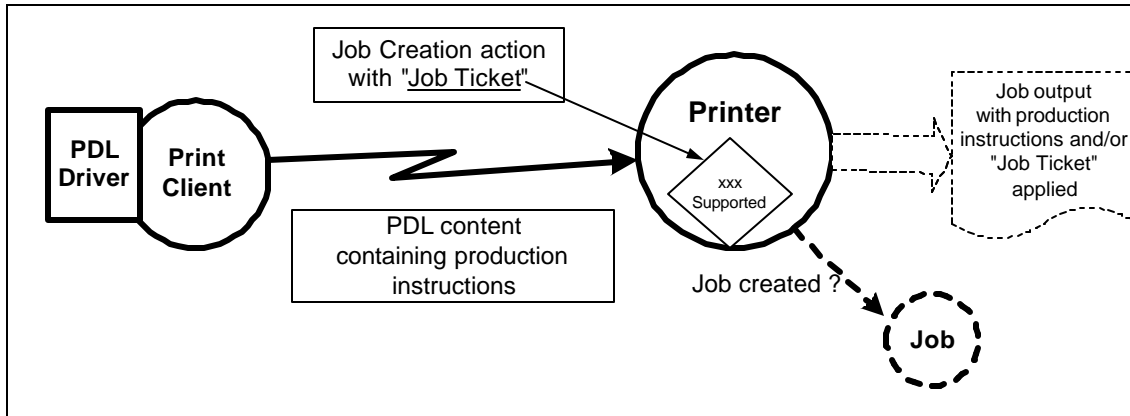
258 This section describes the Job Creation actions that create a Job and the ones that create add
 259 Document to a Job. The Job Creation actions are: PrintJob, PrintUri, and CreateJob. The PrintJob
 260 action also submits the Document. The PrintUri action submits a URI reference to the Document
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

264 Production instructions contained in the arguments of the Job Creation action is combined with
 265 Printer supplied information to create a Job instance.

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

271 A concept that is important in the PWG model is a set of production instructions that can be applied
 272 to a print job. Examples of these instructions include the number of Copies and the media to use.
 273 These instructions are often referred to as a Job Ticket. The Job Ticket is made up of the Job
 274 Attributes (see section 2.2.1), the “Processing” attributes (see section 2.4), and Document
 275 Attributes in a Job Creation operation.

PWG Semantic Model



276

277

Figure 11 Production Instruction Processing

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

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

292 The PWG model allows a client to control the Printer's acceptance of a job submission based on
293 the job request and the Printer's current configured capabilities as follows. When the client
294 supplies a 'true' value for the "AttributeFidelity" Job Processing attribute, the Printer must reject
295 the job unless the Printer supports *all* of the supplied Job Processing attributes and values. When
296 the client supplies a 'false' value or omits the attribute, the Printer must accept the job submission
297 and ignore or substitute attributes and values, respectively, that it does not support. Note that the
298 "AttributeFidelity" Job Processing attribute covers only the creation of the Job. It is
299 implementation specific how a Printer handles processing a job when the Printer encounters
300 unsupported production instructions in the document content.

301 3.2.1 PrintJob

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

306 **3.2.2 PrintUri**

307 ([rfc2911] §3.2.2) Identical to the PrintJob operation (see section 3.2.1) except that a client
308 supplies a URI reference to the document data.

309 **3.2.3 CreateJob**

310 ([rfc2911] §3.2.4) Similar to the PrintJob operation (see section 3.2.1), except that in the CreateJob
311 request the Client does not supply Document Data. The client supplies a single set of Job
312 Processing attributes that the Printer applies to the Output Document(s) of the job. The
313 “MultipleDocumentHandling” Job Processing attribute controls whether the Printer produces
314 separate Output Documents or combines the Input Documents into a single Output Document (see
315 section 18).

316 **3.2.3.1 The “MultipleDocumentHandling” Job Processing attribute**

317 When a client submits a job with more than one Input Document, the
318 “MultipleDocumentHandling” Job attribute allows the client to specify whether the Printer is to (1)
319 produce corresponding separate Output Documents or (2) combine the Input Documents into a
320 single Output Document. For example, the ‘single-document’ and ‘single-document-new-sheet’
321 values allow the client to staple all of the Input Documents into a single Output Document, with the
322 latter value forcing each Input Document to start on a new sheet (useful when doing two-sided
323 printing). When requesting multiple Copies, the ‘separate-document-uncollated-Copies’ value
324 results in the Copies of each Input Document being together in an Output set, while the ‘separate-
325 document-collated-Copies’ value keeps a copy of each Input Document together in an Output set.
326 For example, a job with Input Documents A, B, C and “Copies” = 2 will result in A, A, B, B, C, C
327 or A, B, C, A, B, C, respectively. If the Printer supports multiple documents per job, the Printer
328 must support this Job Processing attribute with at least one value.

329 **3.2.4 SendDocument**

330 ([rfc2911] §3.3.1) Submits the entire Document Content for the next Input Document of a job
331 created by a previous CreateJob action (see section 3.2.3).

332 **3.2.5 SendUri**

333 ([rfc2911] §3.3.2) Identical to the SendDocument operation (see section 3.2.4) except that a client
334 supplies a URI reference to the Document Content data, instead of supplying the document content.

335 **3.2.6 ValidateJob**

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

339 **3.3 Job Control Actions**

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

342 **3.3.1 CancelJob**

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

345 **3.3.2 HoldJob**

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

348 **3.3.3 ReleaseJob**

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

350 **3.3.4 RestartJob**

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

352 **3.4 Status and information Actions**

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

355 **3.4.1 GetJobs**

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

360 **3.4.2 GetPrinterAttributes**

361 ([rfc2911] §3.2.5) Returns the values of the requested attributes and/or attribute groups of a
362 Printer.

363 **3.4.3 GetJobAttributes**

364 ([rfc2911] §3.3.4) Returns the values of the requested attributes and/or attribute groups of a Job.

365 **3.5 Printer Control Actions**

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

368 **3.5.1 PausePrinter**

369 ([rfc2911] §3.2.7) Stops the Printer object from scheduling jobs.

370 **3.5.2 ResumePrinter**

371 ([rfc2911] §3.2.8) Resume the scheduling of Jobs in the Printer.

372 **3.5.3 PurgeJobs**

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

374

375 **4 Summary of attributes**

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

378 For each attribute, the tables contain the attribute name, whether the attribute is multi-valued, its
379 syntax, constraints, a short description and a reference to the Document where the semantics of the
380 attribute is completely specified:

381 **4.1 Processing Attributes**

382

Table 3 - Processing Attributes

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
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
	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		<i>complex</i>		[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. (<i>Includes InputDocuments/OutputDocuments, DocumentCopies, DocumentFormat, DocumentName, Compression, DocumentNaturalLanguage, PageRanges, and any other processing attribute that affects documents</i>)			
Finishing	Yes	String	Type2 keyword	[rfc2911] §4.2.6

PWG Semantic Model

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
	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 (<i>Includes FinishingTemplate, Stitching</i>)			
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.			
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

PWG Semantic Model

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
				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)
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)
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)
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=1023	[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

PWG Semantic Model

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
				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
				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.

PWG Semantic Model

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
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) ISSUE1: Resolve definition of media size (string(UpnP) vs. xy(PWG) vs. xy&unit(?))			
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
	Controls whether Input Document in multi-Documents 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-Documents Jobs. (keywords: single-Documents, separate-Documents-uncollated-Copies, separate-Documents-collated-Copies, single-Documents-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)			

PWG Semantic Model

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
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>) ISSUE2: Check FSG definition of PageOverride				
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
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)				

PWG Semantic Model

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
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)			
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 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.			
Xside2ImageShift		Integer		[PWG5100.3] §3.19.5
	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.			
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.			

PWG Semantic Model

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
Yside1ImageShift		Integer		[PWG5100.3] §3.19.8
	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.			
Yside2ImageShift		Integer		[PWG5100.3] §3.19.9
	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.			

383

384 **4.2 Job Attributes**

385

Table 4- Job Attributes

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
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)			

PWG Semantic Model

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
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") (ISSUE3a: 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) http://www.company.com/pub/fileToPrint.pdf ") (ISSUE3b: was JobDocumentAccessErrors)			
Impressions		Integer	0:MAX	[rfc2911] §4.3.17.2
	The total size in number of impressions in all the Job's Document(s). (ISSUE3c: was JobImpressions)			
ImpressionsCompleted		Integer	0:MAX	[rfc2911] §4.3.18.2
	The number of impressions completed for the job so far. (ISSUE3d: 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

PWG Semantic Model

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
				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
				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 2.2.2). 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, job-incoming, job-data-insufficient, Document-access-error, submission-interrupted, job-outgoing, job-hold-until-specified, resources-are-not-ready, printer-stopped-partly, printer-stopped, job-interpreting, job-queued, job-transforming, job-queued-for-marker, job-printing, job-canceled-by-user, job-canceled-by-operator, job-canceled-at-device, aborted-by-system, unsupported-compression, compression-error, unsupported-Document-format, Document-format-error, processing-to-stop-point, service-off-line, job-completed-successfully, job-completed-with-warnings, job-completed-with-errors, job-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. (ISSUE3e: 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. (ISSUE3f: was JobKOctetsProcessed)
MediaSheets		Integer	0:MAX	[rfc2911] §4.3.17.3
				The total number of media sheets to be produced for this job. . (ISSUE3f: was JobMediaSheets)
MediaSheetsCompleted		Integer	0:MAX	[rfc2911] §4.3.18.3
				The media-sheets completed marking and stacking for the entire job so far. (ISSUE3g: was JobMediaSheetsCompleted)
MoreInfo		String	uri	[rfc2911] §4.3.4

PWG Semantic Model

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
URI used to obtain information intended for end user consumption about this specific Job. (example: “ http://www.company.com/printer/embeddedjobpage ”). (ISSUE3h: was JobMoreInfo)				
NumberOfDocuments		Integer	0:MAX	[rfc2911] §4.3.12
The number of Documents in the job.				
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” (ISSUE3i: 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.. (ISSUE3j: was Job WarningCount)				

386

387 **4.3 Document Attributes**

388

Table 5 – Document Attributes

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				

PWG Semantic Model

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
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
	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") (ISSUE3j: 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) http://www.company.com/pub/fileToPrint.pdf ") (ISSUE3k: 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.			

PWG Semantic Model

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
DocumentNaturalLanguage		String	Maxlength=127	[rfc2911] §3.2.1.1
	Identifies the Natural Language of the Document			
DocumentState		String	Type1 keyword	ISSUE3I: New
	The current state of the document. See also DocumentStateReasons attribute below. (keywords: pending, processing, canceled, aborted, completed) ISSUE4: Unnecessary states dropped			
DocumentStateReasons	Yes	String	type2 keyword	ISSUE5: 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) ISSUE6:job- removed from values			
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. (ISSUE3I: was JobImpressions)			
ImpressionsCompleted		Integer	0:MAX	[rfc2911] §4.3.18.2
	The number of impressions completed for the document so far. (ISSUE3m: 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. (ISSUE3n: 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. (ISSUE3o: 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

PWG Semantic Model

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
				The amount of time (in seconds) that the Printer has been up and running. See Printer attribute “PrinterUpTime” (ISSUE3p: was JobPrinterUpTime)
MediaSheets		Integer	0:MAX	[rfc2911] §4.3.17.3
				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. (ISSUE3r: was JobMediaSheetsCompleted)
MoreInfo		String	uri	[rfc2911] §4.3.4
				URI used to obtain information intended for end user consumption about this specific Job. (example: “ http://www.company.com/printer/embeddedjobpage ”). (ISSUE3s: 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. (ISSUE3t: was Job WarningCount)

389

390 **4.4 Printer Attributes**

391

Table 6 - Printer Attributes

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				

PWG Semantic Model

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
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
	Identifies the set of supported Compression algorithms for Document content. (keywords: none, deflate, gzip, compress)			
DeviceId		String		See Appendix 8.1
	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	MimeType [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	MimeType	
	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-Document per job Printer must implement this attribute and have a value of 'true'. A single Document per job Printer may either not support this attribute or support it with a value of 'false'.			

PWG Semantic Model

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
MultipleOperationTimeOut		Integer	1:MAX	[rfc2911] §4.4.31
	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 production 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: " http://www.company.com/printer/installerProgram ")			
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")			

PWG Semantic Model

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
PrinterMessageFromOperator		String	Maxlength=127	[rfc2911] §4.4.25
	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: “ http://www.company.com/printer/embeddedwebpage ”)			
PrinterMoreInfoManufacturer		String	uri	[rfc2911] §4.4.10
	URI used to obtain more information for end user consumption about this type of device. (example: “ http://www.xerox.com/go/xrx/template/012.jsp?Xcntry=USA&Xlang=en_US&prodID=7700 ”, “ http://www.lexmark.com/US/products/overview/0,1224,MjQ5fDE=,00.html ”)			
PrinterName		String	Maxlength=127	[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 section2.1.2). 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
Description (values)				
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 additiona 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 additiona information. (keywords: none, ssl3, tls)				

392

393 **5 Status Codes**

394 This Appendix lists the status codes that the Printer returns in each action response.

395 The following status codes are returned when the Printer accepts the action request and indicates
396 some degree of success:

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

398 successful-ok-ignored-or-substituted-attributes - Action succeeded but some unsupported attributes
399 were ignored or substituted.

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

402

403 The following status codes are returned when the Printer rejects the action indicating some error on
404 the part of the Client:

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

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

PWG Semantic Model

- 409 client-error-not-authenticated - The request requires user authentication. The client may try again
410 with suitable authentication.
- 411 client-error-not-authorized - The requester is not authorized to perform the request. The Client
412 should not try again.
- 413 client-error-not-possible - The action cannot be performed, because of the state of the target object.
- 414 client-error-timeout - The client did not produce a subsequent request within the time that the
415 Printer was prepared to wait.
- 416 client-error-not-found - The target object was not found.
- 417 client-error-gone - The target object is no longer available.
- 418 client-error-request-entity-too-large - The request and/or the Document Content is too large.
- 419 client-error-request-value-too-long - A attribute value in the request is longer than the Printer
420 supports.
- 421 client-error-document-format-not-supported - The document format is not supported.
- 422 client-error-attributes-or-values-not-supported - An attribute and/or value is not supported and must
423 be in order to carry out the request. The Printer must return the unsupported attributes or
424 values in the Unsupported Attributes group.
- 425 client-error-uri-scheme-not-supported - The URI scheme is not supported.
- 426 client-error-charset-not-supported - The charset is not supported.
- 427 client-error-conflicting-attributes - Some supplied attributes are conflicting. The Printer must
428 return them in the Unsupported Attributes group.
- 429 client-error-compression-not-supported - The compression of the Document Content is not
430 supported.
- 431 client-error-compression-error - An error occurred when uncompressing the Document Content.
- 432 client-error-document-format-error - An error occurred when interpreting the Document Content.
- 433 client-error-document-access-error - An error occurred when the Printer attempted to access the
434 Document Content through the URI supplied.
435
- 436 The following status codes are returned when the Printer rejects the action indicating some error on
437 the part of the Printer:
- 438 server-error-internal-error - An unexpected internal error occurred.
- 439 server-error-operation-not-supported - The Printer does not support the requested action.
- 440 server-error-service-unavailable - The Printer is unable to service the request at this time due to
441 overloading or maintenance. The client should try again later as per the “message”
442 Operation attribute.
- 443 server-error-version-not-supported - The Printer doesn’t support the requested major version of the
444 protocol and returns the closest version that it does support.
- 445 server-error-device-error - The Printer encountered a device error that causes it to be unable to
446 accept a new request. For example, a paper jam for a Printer that doesn’t spool and so
447 cannot accept a new job submission until the jam is fixed.
- 448 server-error-temporary-error - A temporary error such as a buffer full write error, a memory
449 overflow, or a disk full condition.
- 450 server-error-not-accepting-jobs - The Printer is not currently accepting jobs. Its
451 “PrinterIsAcceptingJobs” Printer Description attribute is ‘false’.
- 452 server-error-busy - A temporary error indicating that the Printer is too busy processing jobs and/or
453 other requests. A Client should try again later.

PWG Semantic Model

454 server-error-job-canceled - The job has been canceled by an operator or aborted by the system. For
455 example, while the Client is transmitting the Document Content to the Printer.
456 server-error-multiple-document-jobs-not-supported - The Printer doesn't support multiple
457 document jobs and the client attempted to supply a second SendDocument or SendUri
458 request. The Printer's "MultipleDocumentJobsSupported" Printer Description attribute is
459 'false'.
460

461 **6 Change Log**

462 5/16/02 PJZ original draft
463 5/23/02 TH re-organize draft with comments from Melinda Grant
464 5/26/02 TH detailed review of the draft
465 5/29/02 PJZ Incorporated comments prior to initial release
466 6/4/02 SAA Modified to split the Job Attributes into 3 categories:
467 1) Processing Attributes
468 2) Content Attributes
469 3) Job Attributes

470

471 The Processing Attributes were further split into 3 subcategories:

472 1) Rendering attributes
473 2) Imposition Attributes
474 3) Finishing Attributes

475 Added attributes from UPnP Print Basic service template: MediaSize, MediaType,
476 DeviceId attributes.

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

481 Modified Printer Description Attributes with the following:

482 1) Added in DeviceId.
483 2) Changed Document* to Content*.
484 3) Removed VersionsSupported and OperationsSupported since these are
485 dependent on the interface used in specific solutions.

486 6/17/02 PJZ Added high level description of PWG Action semantics and Printer state
487 transitions. Returned VersionsSupported and OperationsSupported.

PWG Semantic Model

488 8/16/02 PJZ Changed Content back to document, Added PWG5100.1, PWG5100.2,
489 PWG5100.3, PWG5100.4, job-progress to model. Filled out document object, added "Job Level"
490 subcategory to Processing attributes

491 **7 References**

492 [rfc1123] RFC 1123 " Requirements for Internet Hosts -- Application and Support ", October 1989,
493 Branden, R.

494 [rfc2046] RFC 2046 "Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types",
495 November 1996, Freed, N. and N. Borenstein

496 [rfc2048] RFC 2048 "Multipurpose Internet Mail Extension (MIME) Part Four: Registration
497 Procedures", November 1996, Freed, N., Klensin, J. and J. Postel

498 [rfc2911] RFC 2566 "Internet Printing Protocol/1.0 Model and Semantics", March 1999 and RFC
499 2911 "Internet Printing Protocol/1.1 Model and Semantics", September 2000, T. Hastings,
500 R. Herriot, R. Debry, S. Isaacson, P. Powell

501 [PWG5100.2] IEEE-ISTO 5100.2-2001, "Internet Printing Protocol (IPP): output-bin attribute
502 extension", February 7, 2001, Hastings, T., and R. Bergman,
503 <ftp://ftp.pwg.org/pub/pwg/standards/pwg5100.2.pdf>

504 [PWG5100.3] IEEE-ISTO 5100.3-2001, "Internet Printing Protocol (IPP): Production Printing
505 Attributes - Set1", February 12, 2001, Ocke, K., Hastings, T.,
506 <ftp://ftp.pwg.org/pub/pwg/standards/pwg5100.3.pdf>

507 [PWG5100.4] IEEE-ISTO 5100.4-2001, "Internet Printing Protocol (IPP): Override Attributes for
508 Documents and Pages", February 7, 2001, Herriot, R., Ocke, K.,
509 <ftp://ftp.pwg.org/pub/pwg/standards/pwg5100.4.pdf>

510 [PWG5101.1] IEEE-ISTO 5101.1-2001 Media Standardized Names <work in progress>,
511 <ftp://ftp.pwg.org/pub/pwg/standards/pwg5101.1.pdf> , .doc, .rtf for standardized names

512 [job-prog]"Internet Printing Protocol (IPP): Job Progress Attributes", July 17, 2001, Hastings, T.,
513 Lewis, H., and R. Bergman, <draft-ietf-ipp-job-prog-03.txt> work in progress.

514 [ntfy] "Internet Printing Protocol/1.1: Event Notifications and Subscriptions", November 19, 2001,
515 Herriot, R., Hastings, T., Shepherd, M., deBry, R., Isaacson, S., Martin, J., and R.
516 Bergman,<draft-ietf-ipp-not-spec-08.txt>.

517 [ops-set2] "Internet Printing Protocol (IPP): Job and Printer Administrative Operations", July 17,
518 2001, Kugler, C, Hastings, T., Lewis, H., <draft-ietf-ipp-ops-set2-03.txt>.

519

520

520 **8 Appendix A – UPnP Definitions**

521 **8.1 DeviceID**

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

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

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

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

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

```
540
541 MANUFACTURER:ACME Manufacturing;
542 COMMAND SET:PCL,PJL,PS,XHTML-Print+xml;
543 MODEL:LaserBeam 9;
544 COMMENT:Anything you like;
545 ACTIVE COMMAND SET:PCL;
```

546

547 (See IEEE 1284-2000 clause 7.6)

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

551 **9 Appendix B – IPP Mapping**

552 **9.1 Action Parameter Overview**

553 IPP Actions may contain a number of parameters. The first parameter is always the Operation
 554 Attributes for the Action. The Operation Attributes contains common information such as the
 555 target of the action (Job or Printer), a version number, or a sequence id to tie the request and

556 response together. Other information is Action-specific such as the name of the Job to be created
557 or a filter that controls the information to be returned in a query. The sections below describe the
558 Operation Attributes and any other Action specific parameters.

559 **9.2 Job Creation Actions**

560

561 **9.2.1 PrintJob**

562 ([rfc2911] §3.2.1)

563 **PrintJobRequest(Operation Attributes, [Job Processing Attributes], [Job Finishing**
564 **Attributes], [Document Attributes], Document Data)**

565 **Operation Attributes:**

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

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

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

569 see section 2.2.1.

570 **[Job Processing Attributes]:**

571 Any Job Processing Attribute (see section 2.4) or vendor/site specific extension.

572 **[Job Description Attributes]:**

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

574

575 **[Job Finishing Attributes]:**

576 Any Job Finishing Attribute (see section 2.4) or vendor/site specific extension.

577 **[Document Attributes]:**

578 Any Document Attributes for the single document sent (see section 2.4) or

579 vendor/site specific extension.

580

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

582

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

PWG Semantic Model

584 **Operation Attributes :**
585 **statusCode:** Results of the action (see Appendix section 9.6).
586 *[statusMessage]: Localized text description of the status code.*
587 *[detailedStatusMessage]: Text for detailed and technical information about the job.*
588 **[Unsupported Attributes]:** any unsupported or conflicting attributes and or attribute
589 values. May be returned on success or failure.
590 **Job Attributes:**
591 **JobUri, JobId, JobState, JobStateReasons, [JobStateMessage],**
592 *[NumberOfInterveningJobs]* See section 2.2.1.

593 **9.2.2 PrintUri**

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

596 **9.2.3 CreateJob**

597 ([rfc2911] §3.2.4) Similar to the PrintJob operation (see section 9.2), except that in the CreateJob
598 request the Client does not supply Document Data. The client supplies a single set of Job
599 Processing attributes that the Printer applies to the Output Document(s) of the job.

600 **9.2.4 SendDocument**

601 ([rfc2911] §3.3.1) Submits the entire Document Content for the next Input Document of a job
602 created by a previous CreateJob action (see section 9.2.3).

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

604 **Operation Attributes:**

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

606 **[requestingUserName]:** see section 2.2.1.

607 **[Document Attributes]:**

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

609
610 **SendDocumentResponse(Operation Attributes, [Unsupported Attributes], Job Attributes)**

PWG Semantic Model

611 **Operation Attributes :**
612 **statusCode:** Results of the action (see Appendix section 9.6).
613 *[statusMessage]:* Localized text description of the status code
614 *[detailedStatusMessage]:* Text for detailed and technical information.
615 **[Unsupported Attributes]:** any unsupported or conflicting attributes and or attribute
616 values. May be returned on success or failure.
617 **Job Attributes:**
618 **JobUri, JobId, JobState, JobStateReasons , [JobStateMessage],**
619 *[NumberOfInterveningJobs]* See section .

620 **9.2.5 SendUri**

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

623 **9.2.6 ValidateJob**

624 ([rfc2911] §3.2.3) The calling sequence is similar to PrintJob (see section 9.2) except the request
625 does not contain the Document Data and the response does not contain the Job Attributes.

626 **9.3 Job Control Actions**

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

629 **9.3.1 CancelJob**

630 ([rfc2911] §3.3.3)

631 **CancelJobRequest(Operation Attributes)**

632 **Operation Attributes:**

633 **JobUri(uri)** or (**PrinterUri(uri)** and **JobId(integer)**): The target job.

634 **[requestingUserName]:** see section 2.2.1.

635 *[message(string)]:* Message from the Client to the Printer Operator. Utilized in an
636 implementation specific manner.

637

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

PWG Semantic Model

639 **Operation Attributes :**
640 **statusCode:** Results of the action (see Appendix section 9.6).
641 *[statusMessage]: Localized text description of the status code.*
642 *[detailedstatusMessage]: Text for detailed and technical information about the job*
643 **[Unsupported Attributes]:** any unsupported or conflicting attributes and or attribute
644 values. May be returned on success or failure.

645 **9.3.2 HoldJob**

646 ([rfc2911] §3.3.5) The request calling sequence is similar to CancelJob (see section 9.3.1) except
647 that the “jobHoldUntil” attribute may be in the “Operation Attributes”. The response sequence is
648 the same as CancelJob.

649 **9.3.3 ReleaseJob**

650 ([rfc2911] §3.3.6) The calling sequence is the same as CancelJob (see section 9.3.1).

651 **9.3.4 RestartJob**

652 ([rfc2911] §3.3.7) The request calling sequence is similar to CancelJob except that the
653 “jobHoldUntil” attribute may be in the “Operation Attributes”. The response sequence is the same
654 as CancelJob (see section 9.3.1).

655 **9.4 Status and information Actions**

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

658 **9.4.1 GetJobs**

659 ([rfc2911] §3.3.4)

660 **GetJobsRequest(Operation Attributes)**

661 **Operation Attributes:**

662 **PrinterUri(uri):** The target printer containing the jobs

663 **[requestingUserName]:** see section 2.2.1.

664 **[requestedAttributes (string(multivalued))]:** set of Job Attribute and/or Attribute
665 Group names to be returned for each Job. Default = ‘JobUri’ and ‘JobId’.

666 **[whichJobs(string)]:** Allows user to restrict jobs returned to completed or
667 active/queued states. (keywords: completed, not-completed (Default)).

668 **[myJobs(boolean)]:** Allows user to restrict jobs returned to just the user’s jobs or
669 all jobs. Default = ‘false’.

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

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

672 **Operation Attributes :**
673 **statusCode:** Results of the action (see Appendix section 9.6).
674 *[statusMessage]: Localized text description of the status code.*
675 *[detailedstatusMessage]: Text for detailed and technical information about the job.*
676 **Unsupported Attributes:** any unsupported or conflicting attributes and or attribute value s.
677 May be returned on success or failure.
678 **Job Attributes(sequence of requested attributes/values (multivalued)):** A list of jobs each
679 containing the requested attributes

680 **9.4.2 GetPrinterAttributes**

681 ([rfc2911] §3.2.5)

682 **GetPrinterAttributesRequest(Operation Attributes)**

683 **Operation Attributes:**

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

685 **[requestingUserName]:** see section 2.2.1.

686 **[requestedAttributes (string(multivalued))]:** set of Printer Attribute and/or
687 Attribute Group names to be returned. Default = ‘all’.

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

691 **GetPrinterAttributesResponse(Operation Attributes, [Unsupported Attributes], Printer**
692 **Attributes)**

693 **Operation Attributes :**

694 **statusCode:** Results of the action (see Appendix section 9.6).

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

696 *[detailedstatusMessage]: Text for detailed and technical information about the*
697 *Printer.*

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

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

701 **9.4.3 GetJobAttributes**

702 ([rfc2911] §3.3.4) .

703 **GetJobAttributesRequest(Operation Attributes)**

704 **Operation Attributes:**

705 **JobUri(uri) or (PrinterUri(uri) and JobId(integer)):** The target job

706 **[requestingUserName]:** see section 2.2.1.

707 **[requested-attributes (string(multivalued))]:** set of Job Attribute and/or Attribute
708 Group names to be returned for each Job. Default = ‘all’.

709 **GetJobAttributesResponse(Operation Attributes, [Unsupported Attributes], Job Attributes)**

PWG Semantic Model

710 **Operation Attributes :**
711 **statusCode:** Results of the action (see Appendix section 9.6).
712 *[statusMessage]: Localized text description of the status code.*
713 *[detailedstatusMessage]: Text for detailed and technical information about the job.*
714 **[Unsupported Attributes]:** any unsupported or conflicting attributes and or attribute
715 values. May be returned on success or failure.
716 **Job Attributes(requested attribute/values(multivalued)):** The requested attributes and
717 their values)

718 **9.5 Printer Control Actions**

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

721 **9.5.1 PausePrinter**

722 ([rfc2911] §3.2.7)

723 **PausePrinterRequest(Operation Attributes)**

724 **Operation Attributes:**

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

726 **[requestingUserName]:** see section 2.2.1.

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

728 **Operational Attributes :**

729 **statusCode:** Results of the action (see Appendix section 9.6).

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

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

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

734 **9.5.2 ResumePrinter**

735 ([rfc2911] §3.2.8) The calling sequence is the same as PausePrinter (see section 9.5.1).

736 **9.5.3 PurgeJobs**

737 ([rfc2911] §3.2.9) The calling sequence is the same as PausePrinter (see section 9.5.1).

738 **9.6 Changes to remove some IPP specific aspects**

739 This section lists some changes to remove some IPP specific aspects from the PWG Semantic
740 Model. Any attribute name containing “ipp” has had the “ipp” removed. The IPP operation names
741 have the hyphens removed to be the PWG action names and the operations supported are mixed
742 keywords, not integer enum values. All attributes names have had the first letter capitalized and
743 the ‘-’ character removed and the character following the ‘-’ has been capitalized. The keyword
744 attribute values defined remain unchanged and are all lower case, except for the ones that specify
745 other attributes names (which are changed to be the mixed case without hyphens). **ISSUE6: What**

PWG Semantic Model

746 **about the case and hyphens in status code names (and removing the integer values)?** The term
747 “object” is sometimes changed to “data class”. **ISSUE7: Why? and Why not done consistently?**
748 The term “operation” has been changed to “action” to use the term more frequently used with
749 XML.

750 The aspects of the model that deal with globalization (i.e. character set & language) have been
751 removed. **ISSUE8: Should this be described generically in this document** Globalization will be
752 addressed in a protocol specific binding of this semantic model. The Printer globalization attributes
753 are charsetConfigured, charsetSupported, naturalLanguageConfigured, naturalLanguageSupported
754 and generatedNaturalLanguageSupported.

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

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