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The Printer Working Group (PWG)

7

Semantic Model

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

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

19



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21 Working Draft, October 31, 2003

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23 Semantic Model

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27 This version of the PWG Proposed Standard is available electronically at:

28 **<ftp://ftp.pwg.org/pub/pwg/Semantic-Model/wd-sm10-20031031.pdf>, .doc**

29 This document is a Working Draft for an IEEE-ISTO PWG Candidate Standard. For a definition
30 of a "PWG Candidate Standard" and its transition to a "PWG Standard", see:

31 <ftp://ftp.pwg.org/pub/pwg/general/pwg-process.pdf>. After approval by the PWG (by a Last Call) to
32 transition a PWG Working Draft to a PWG Candidate Standard, the resulting PWG Candidate
33 Standard will be available electronically at: <ftp://ftp.pwg.org/pub/pwg/cs/>. After approval by the
34 PWG (by a Last Call) to transition a PWG Candidate Standard to a PWG Standard, the resulting
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81 vendors, and print management application developers. The group is chartered to make printers and the applications and operating systems
82 supporting them work together better. All references to the PWG in this document implicitly mean "The Printer Working Group, a Program of the
83 IEEE ISTO." In order to meet this objective, the PWG will document the results of their work as open standards that define print related protocols,
84 interfaces, procedures and conventions. Printer manufacturers and vendors of printer related software will benefit from the interoperability provided
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86 In general, a PWG standard is a specification that is stable, well understood, and is technically
87 competent, has multiple, independent and interoperable implementations with substantial
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89 For additional information regarding the Printer Working Group visit: <http://www.pwg.org>

90 **Contact information:**

91 Semantic Model Web Page: <http://www.pwg.org/sm/>
92 Semantic Model Mailing List: sm@pwg.org

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95 2) leave the subject line blank
96 3) put the following two lines in the message body:
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98 end

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103 **the mailing list rejects mail from non-subscribers, so you must subscribe to the mailing list in**
104 **order to send a question or comment to the mailing list.**

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218

219 1 Introduction

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

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

228 2 Terminology

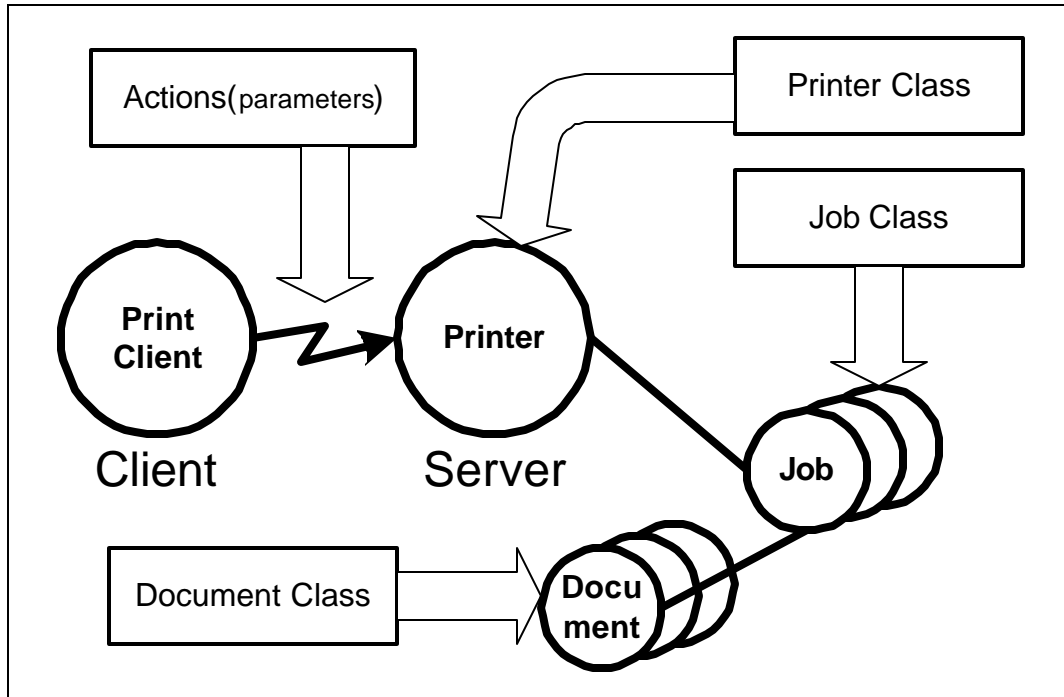
Action	A request that a Print Client makes to an object to perform some activity. The object returns a response to the Print Client that contains some information about the effect of the action on the object.
Data Class	A template for data describing an object and representing its state. Each Element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

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

229

230 **3 Model Overview**

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



238

239 **Figure 1 Model Overview**

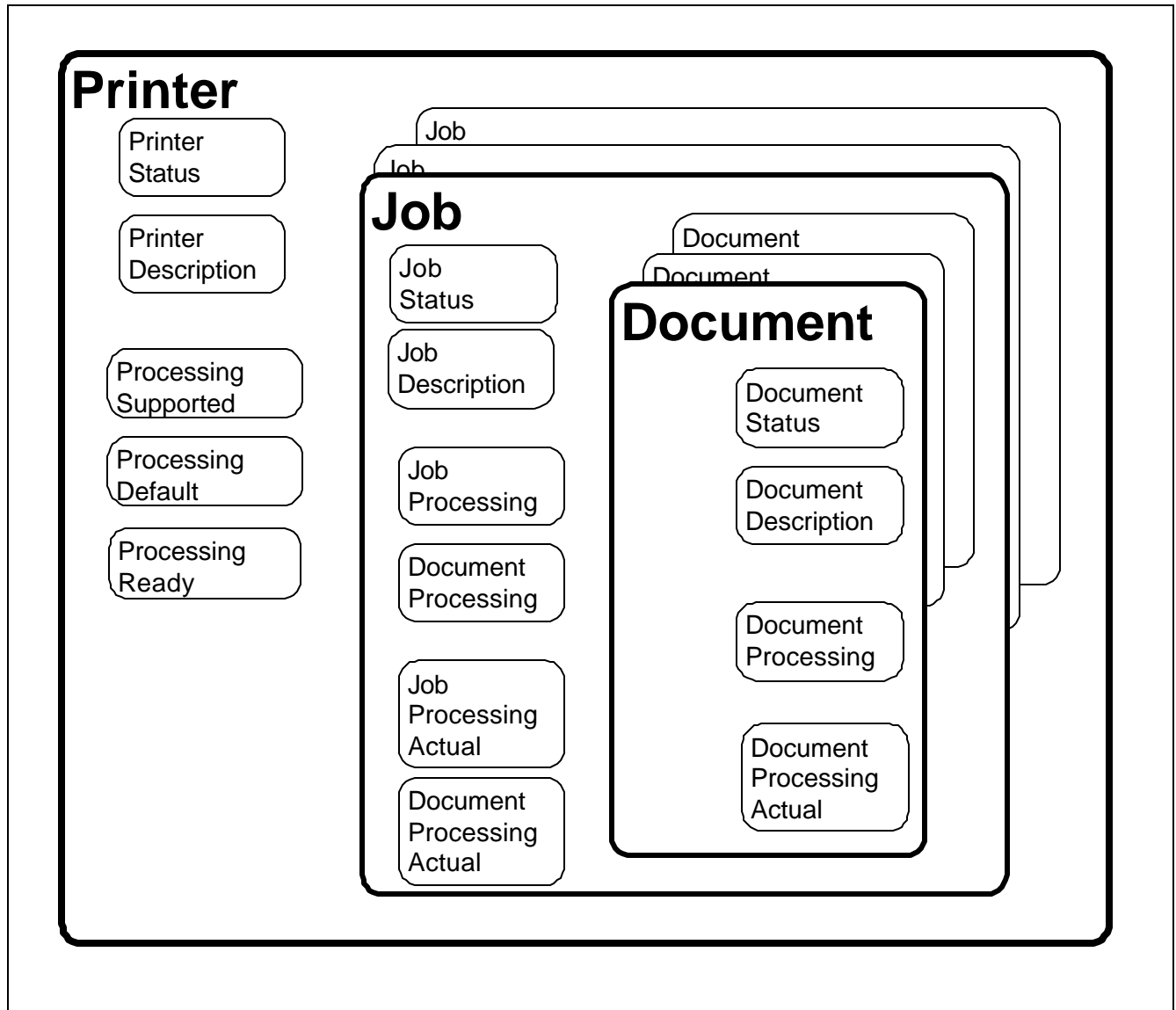
240 The objects are represented in the semantic model as data classes. The methods are represented as a
 241 set of actions that act upon those data classes. The actions permit the creation and control of Jobs

242 and documents as well as the submission of Document data. The content of a Document is
243 included in the submission or can be accessed via a URL reference. There are also actions to query
244 a Printer, Job or Document to access their Elements or to list their contained objects.

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

246 4 Data Classes

247 This section describes the data classes in the PWG semantic model. Some of the classes are taken
248 from the model and semantics of IPP [rfc2911]. Figure 2 shows the data classes, their elements
249 and the containment relationship between the classes



250
251

252

Figure 2 Data Classes

253 **4.1 Naming of Classes, Elements and Values**

254 The Action, Class, Element and Value keywords are shown here with mixed case for readability.
 255 For the purpose of matching, the case can be ignored. The names of clesses, elements and values
 256 must differ by more than just case. For example there can not be two values for JobStateReasons
 257 that differ only by case such as JobPrinting and jobprinting.

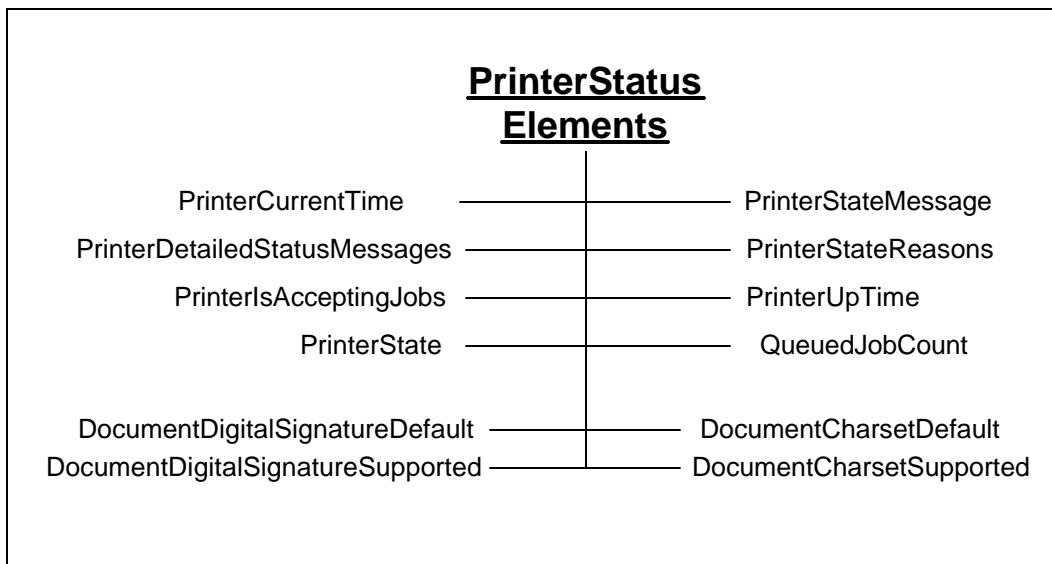
258 Specific mapping, of the Semantic Model, can mandate policy on case sensitivity. Mappings that
 259 impose case sensitivity for matching, such as XML, may simplify their implementations.
 260 Mappings that ignore case results in a server that will accept slightly malformed (i.e. case does not
 261 agree) requests. In either mapping, the keywords are semantically identical.

262 **4.2 Printer Object Class**

263 The Printer class is represented by a collection of elements as shown in Figure 2. The Printer
 264 Elements are presented in detail in Table 6. The printer object also contains elements that describe
 265 the valid processing element values. (See section 4.5 for processing elements) The Printer class is
 266 the container for Jobs.

267 **4.2.1 Printer Status Elements**

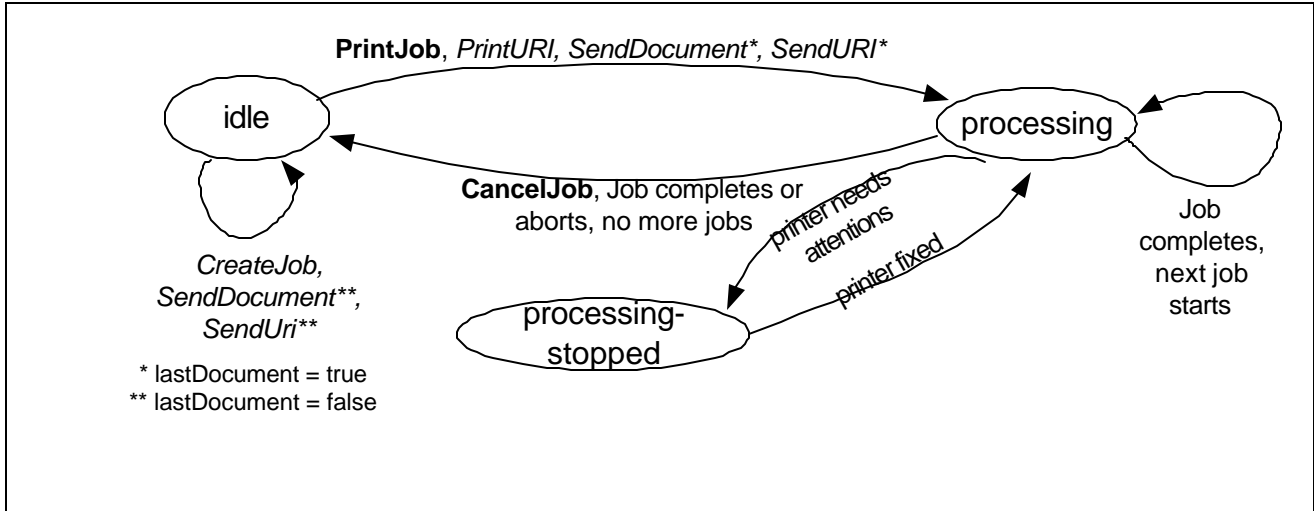
268 Figure 3 below shows the Printer Status Elements. These elements represent the state of the printer
 269 such as the number of jobs or existing error conditions. Automata change the values of the
 270 elements in this group. End Users cannot directly modify their values. The End User can affect the
 271 values of these elements through actions (e.g. PausePrinter can change the value of
 272 PrinterIsAcceptingJobs”). The semantics of the elements are summarized in Table 6.



273

274 **Figure 3 Printer Status Elements**

275 The “PrinterState” element is one of the most important Printer Status elements. Figure 4 shows
 276 the values of the “PrinterState” element and the Printer life cycle as affected by actions on the
 277 Printer and job processing.

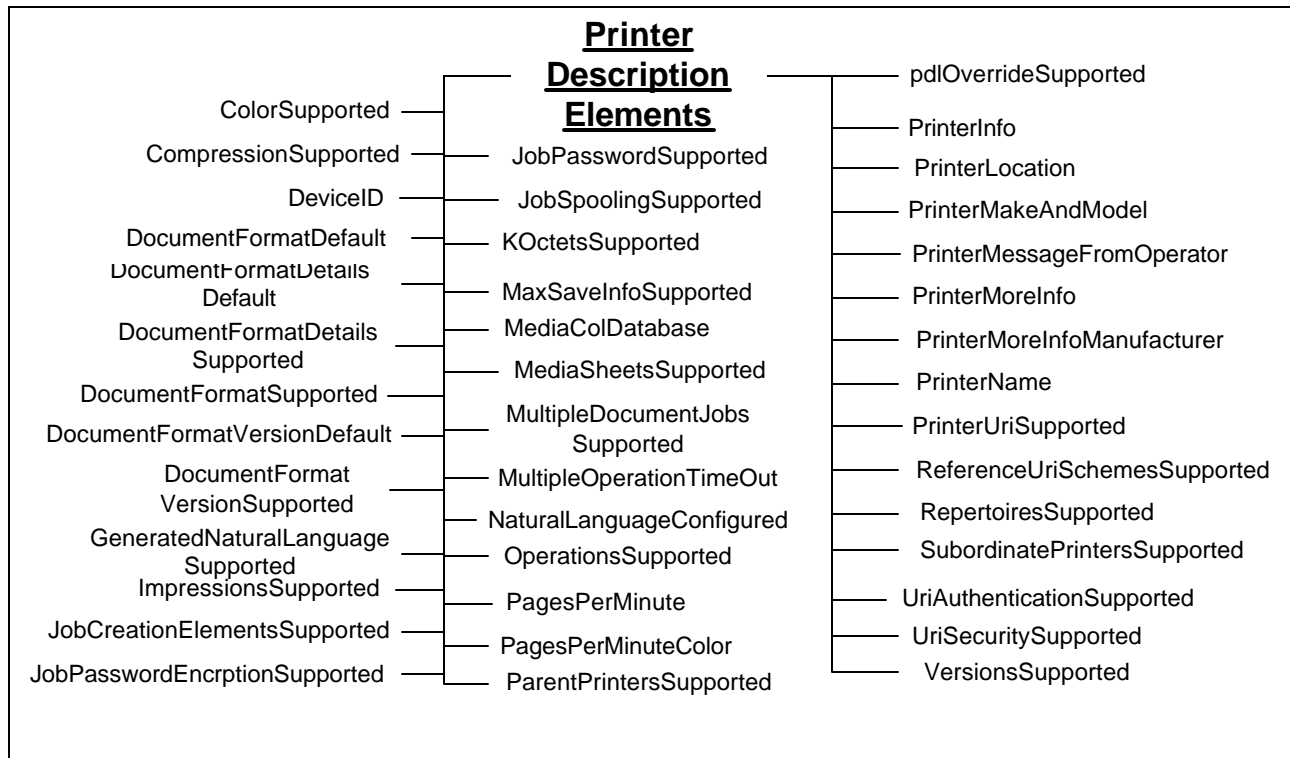


278
279

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

281 **4.2.2 Printer Description Elements**

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



287
288

289 **Figure 5 Printer Description Elements**

290 **4.2.3 Printer Defaults, Supported and Ready Processing Elements**

291 See section 4.5 below for the elements that may comprise these groups. Processing Elements are
 292 the union of Job Processing Elements and Document Processing Elements. If a Processing element
 293 (e.g. Media) is supported, the Printer must have an associated Processing Supported Element (e.g.
 294 MediaSupported) and Processing Default Element (e.g. MediaDefault) Printer element. There may
 295 be an associated Processing Ready Element (e.g. MediaReady) Printer element. By retrieving the
 296 Printer Processing elements, a Client can determine all the Job and Document Processing elements
 297 and values that may be used in creating Jobs and Documents.

298 All Processing Supported, Processing Ready and Processing Default Elements have an associated
 299 Processing Element. There are Printer Description Elements with a “Supported” suffix (e.g.
 300 ImpressionsSupported). While they do list the valid values for the base element (e.g. Impressions),
 301 they are not Processing Supported Elements. The difference is the containing group for the base
 302 element. Note that the Impressions element is a member of the Job and Document Description
 303 groups.

304 **4.2.3.1 Processing Supported Elements**

305 These elements list all the currently configured valid values for each Job Processing Element and
 306 Document Processing Element. Though the Printer is configured to support the feature, human
 307 intervention may be required to process the job (e.g. selected paper may have to be loaded into a
 308 tray).

309 The syntax for Processing Elements Supported is multi-valued when the associated processing
 310 element is a string. When syntax of the processing element is an integer, the syntax of the
 311 corresponding Processing Supported Element is usually RangeOfInteger that indicates the
 312 minimum and maximum values supported by the Printer. However, there are some exceptions as
 313 indicated in Table 1.

314 **Table 1-Integer syntax whose ProcessingElementSupported syntax isn’t RangeOfInteger**

“xxx” element name	“xxx” syntax	“xxxSupported” syntax
JobPriority	Integer	Integer (Max value)
Copies	Integer	Integer (Max value)
PageRanges	RangeOfInteger (Multivalued)	Boolean (are PageRanges supported)

315 **4.2.3.2 Processing Default Elements**

316 These elements give the default value for the associated processing instruction if the Processing
 317 Element of the job and document are not supplied and the instructions is not embedded in the PDL.
 318 The syntax for the Processing Default Elements is the same as the corresponding Processing
 319 Element. The only exception is that the PageRanges element does not have a PageRangesDefault
 320 element.

321 **4.2.3.3 Processing Ready Elements**

322 These elements give the features available without human intervention. The syntax for a
323 Processing Ready Element is the same as the corresponding Processing Element.

324 **4.3 Job Object Class**

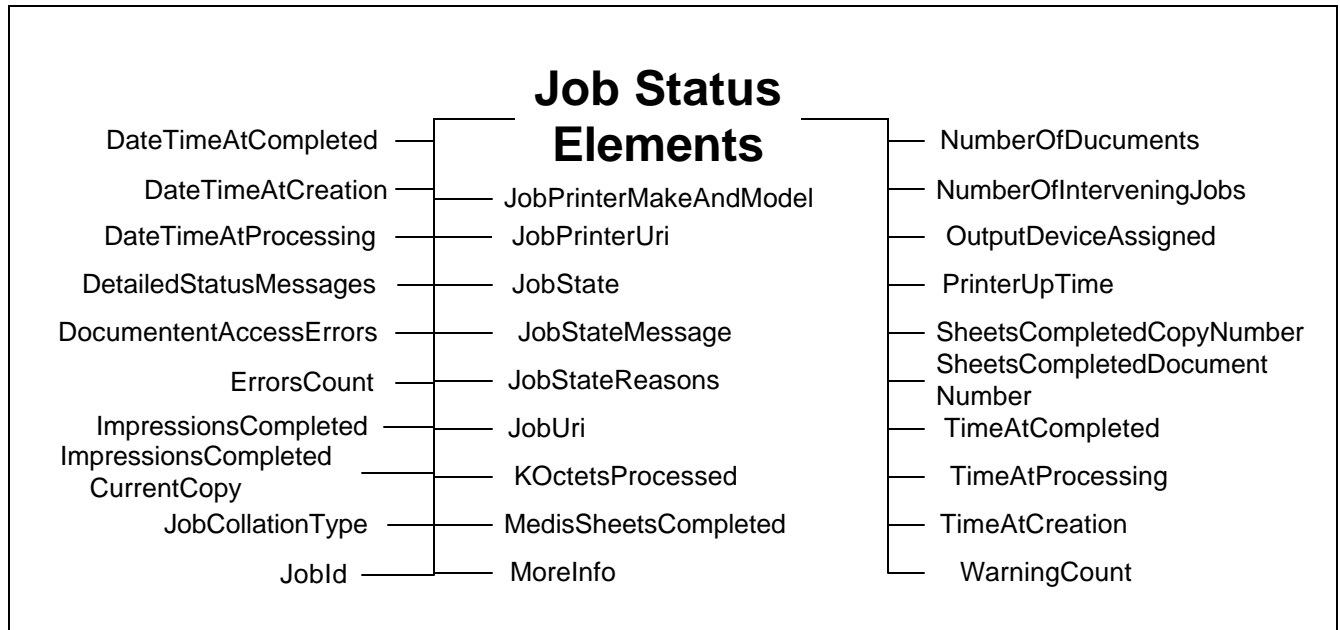
325 The Job object class is represented by a collection of elements divided into six groups as shown in
326 Figure 2. The Job class also contains the document class

- 327 Job Status Elements – See Section 4.3.1
- 328 Job Description Elements – See section 4.3.2.
- 329 Job Processing Elements – See section 4.5.1
- 330 Document Processing Elements – See section 4.5.2
- 331 Job Processing Actual Elements – See section 4.6.1
- 332 Document Processing Actual Elements – See section 4.6.2

333 **4.3.1 Job Status Elements**

334 Figure 6 below shows the Job Status Elements. These elements reflect the status of the Job as a
335 whole. Automata primarily control the elements in this group. Clients cannot directly modify their
336 values. The Client can affect the values of these elements through actions (e.g. CancelJob can
337 change the value of JobStateReasons”). The semantics of the Job Status elements are summarized
338 in Table 4.

339



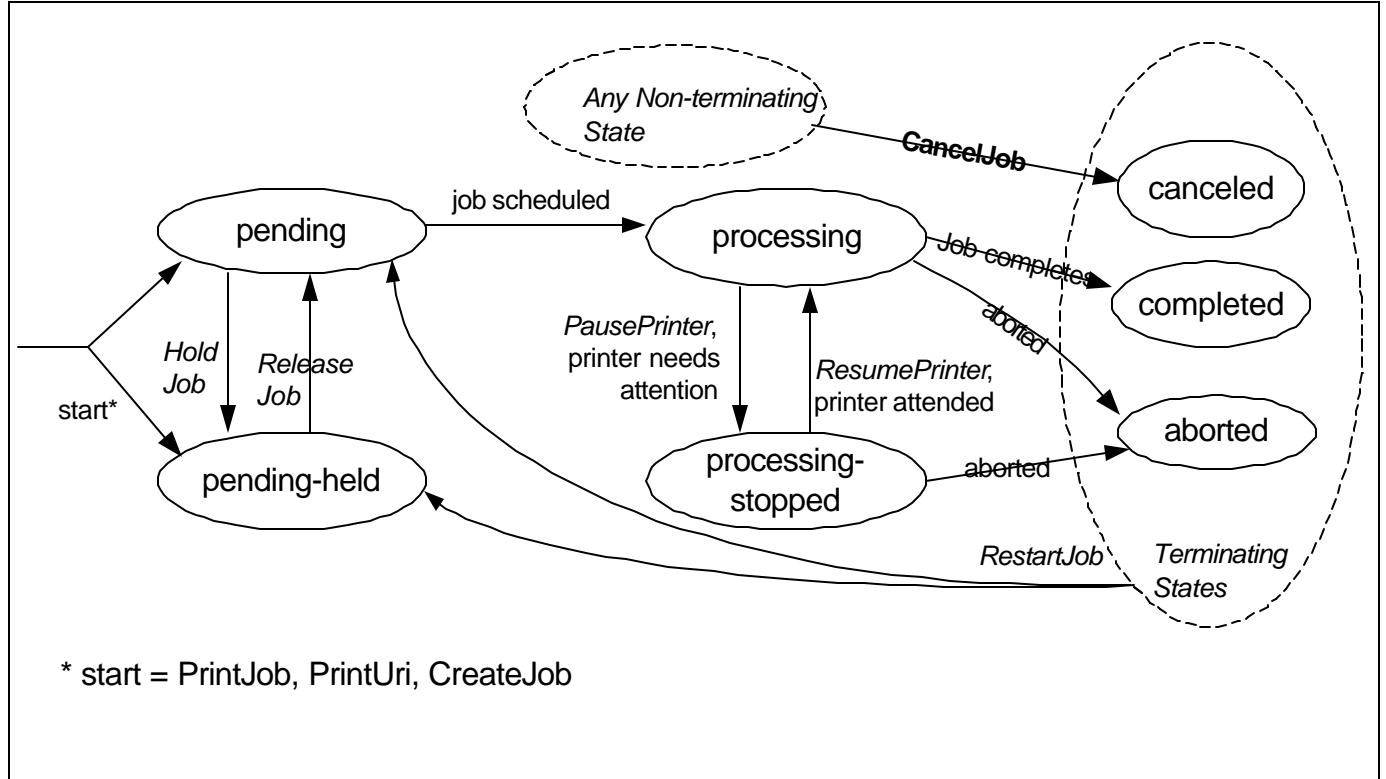
340
341

342

Figure 6 Job Status Elements

343 **4.3.1.1 The Job Life Cycle**

344 The "JobState" element is one of the most important Job Status elements. Figure 7 shows the
 345 values of the "JobState" element and the Job life cycle as affected by actions on the Job, Printer,
 346 and job processing.



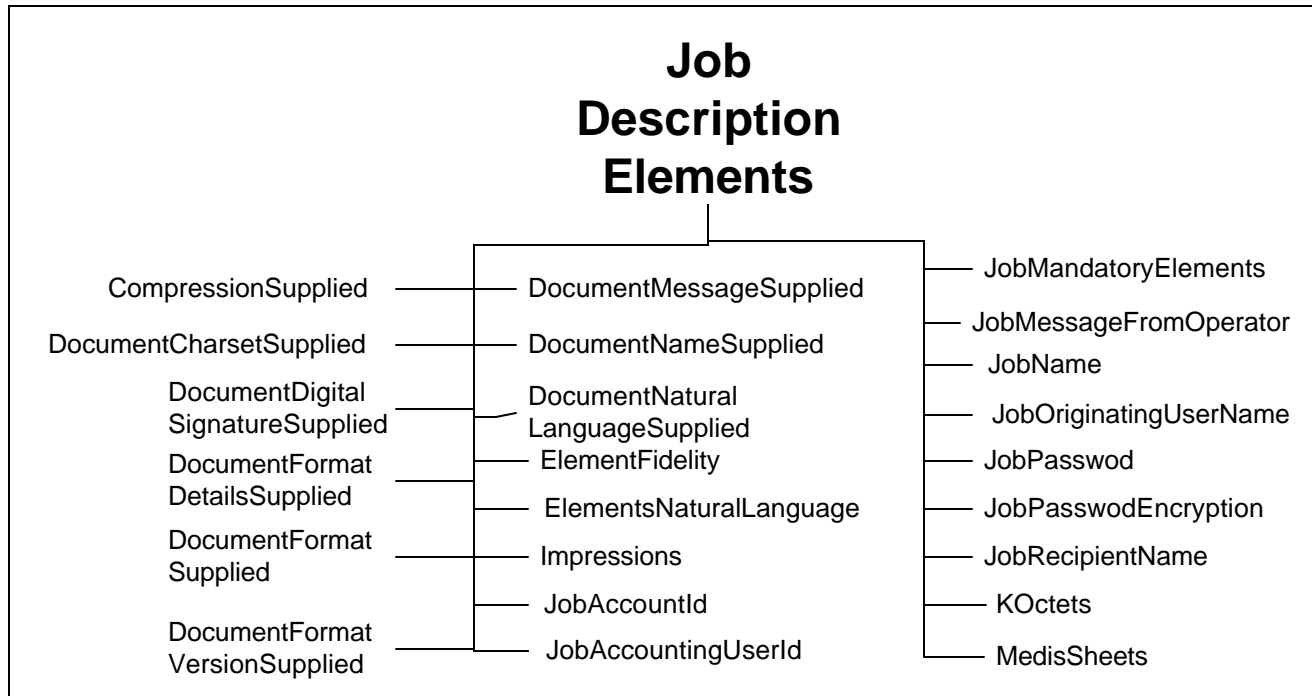
347
 348

349 **Figure 7 The "JobState" Job Element and the Job object life cycle**

350 **4.3.2 Job Description Elements**

351 Figure 8 below shows the Job Description Elements. These elements contain information supplied
 352 by the Client at Job creation that describes the Job such as its name. The Printer may modify the
 353 value of some of the elements in this group (e.g. "KOctets") if more reliable data is obtained. The
 354 semantics of the Job Description elements are summarized in Table 4.

355



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358

Figure 8 Job Description Elements

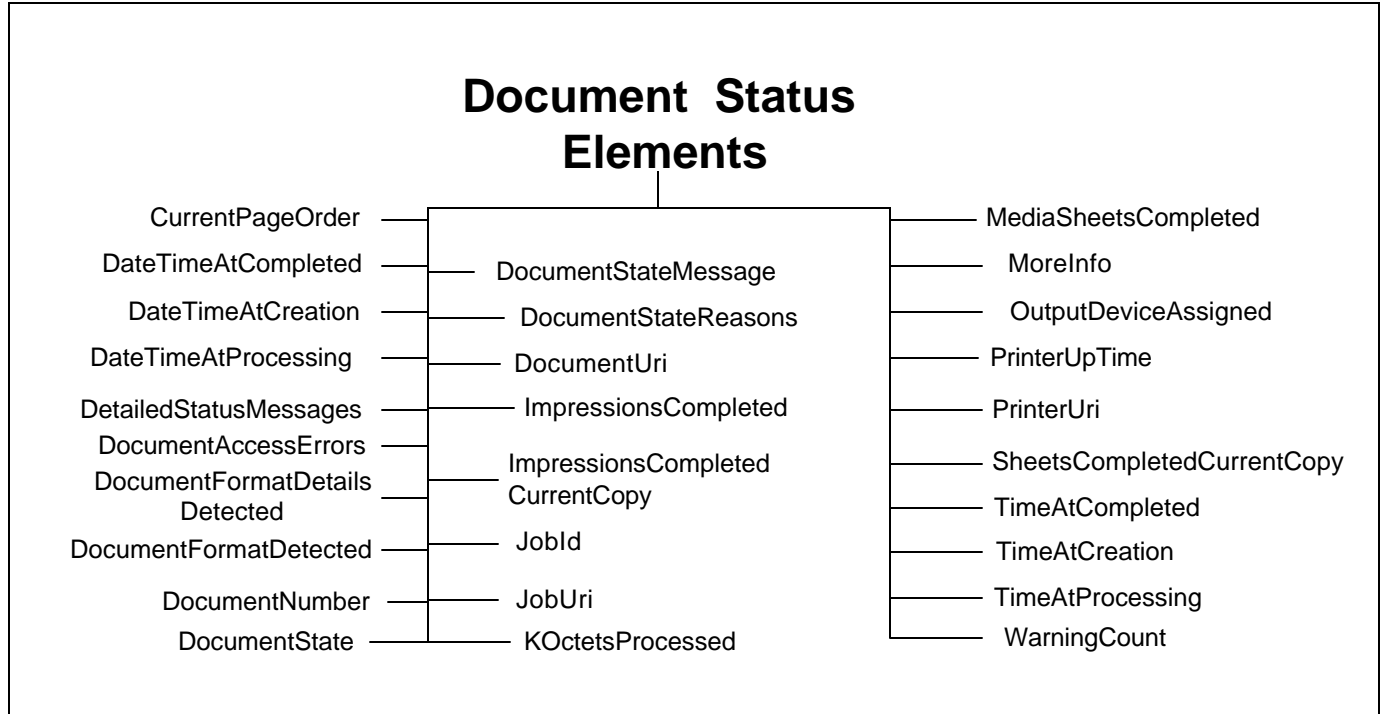
359 **4.4 Document Object Class**

360 The Document object class is represented by a collection of elements divided into four groups as
361 shown in Figure 2. The Document class contains the document class

- 362 Document Status Elements – See Section 4.4.1.
- 363 Document Description Elements – See section 4.4.2.
- 364 Document Processing Elements – See section 4.5.2
- 365 Document Processing Actual Elements – See section 4.6.2

366 **4.4.1 Document Status Elements**

367 Figure 9 shows the Document Status Elements. These elements reflect the status of each
368 Document individually. Automata primarily control the elements in this group. Clients cannot
369 directly modify their values. The Client can affect the values of these elements through actions
370 (e.g. CancelDocument can change the value of DocumentState”). The semantics of the Document
371 Status elements are summarized Table 5.



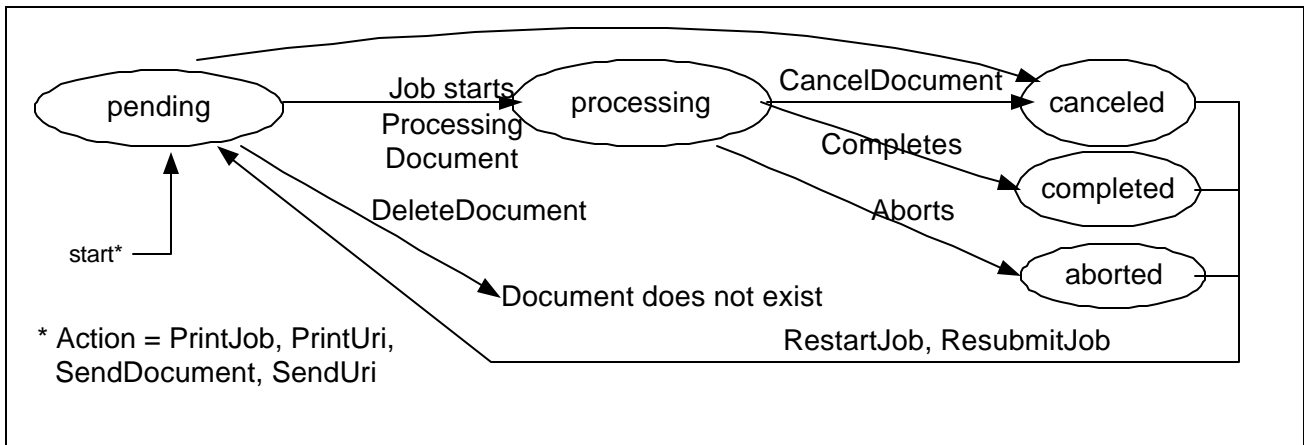
372
373

374

Figure 9 Document Status Elements

375 **4.4.1.1 The Document Life Cycle**

376 The "DocumentState" element is one of the most important Document Status Elements. Figure 10
 377 shows the values of the "DocumentState" element and the Document life cycle as affected by
 378 Actions and job processing. Documents are not active objects and their life cycle is closely tied to
 379 the lifecycle of a Job. Documents basically have three states. The first is waiting to be processed
 380 by a Job (i.e., pending). The second state is from the time the Job first starts processing the
 381 Document (i.e., processing) and until it reaches its terminating state. The last state for a Document
 382 is its terminal state (i.e., completed, canceled, aborted)



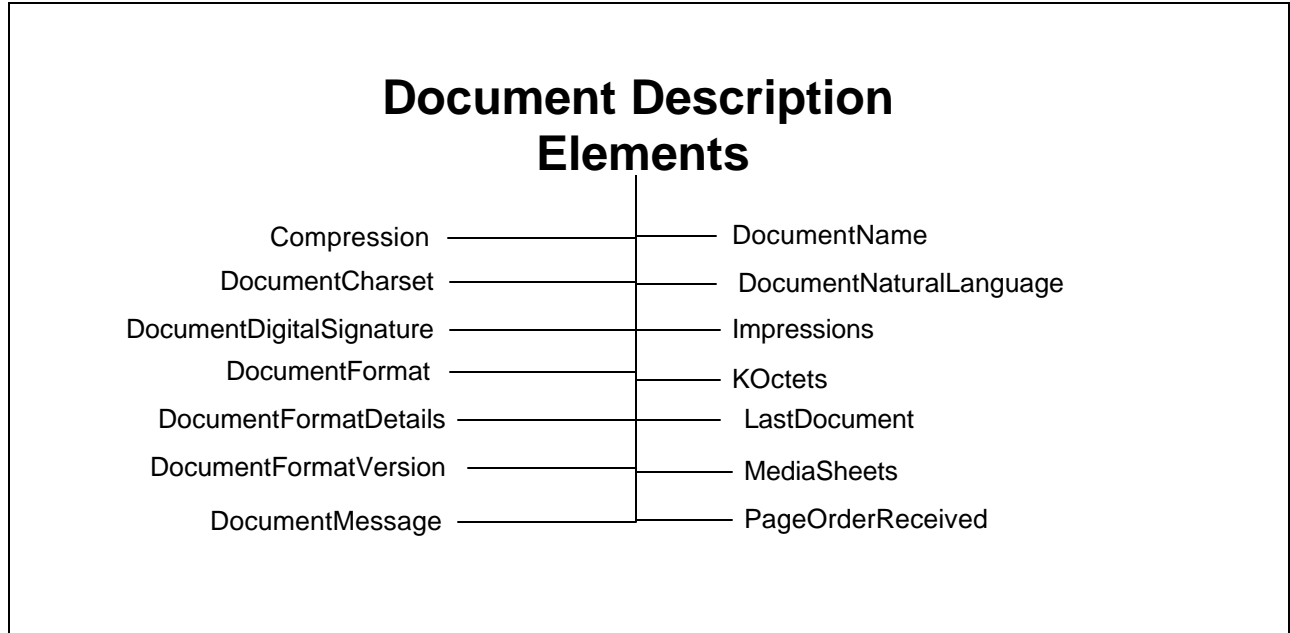
383
384

385

Figure 10 "DocumentState" Element and Document object life Cycle

386 **4.4.2 Document Description Elements**

387 **Figure 11** below shows the Document Description Elements. These elements contain information
388 supplied by the Client at Document creation that describes the document such as its size. The
389 Printer may modify the value of some of the elements in this group (e.g. “KOctets”) if more
390 reliable data is obtained. The semantics of the Document Description elements are summarized in
391 Table 5.



392
393

394 **Figure 11 Document Description Elements**

395 **4.5 Processing Elements**

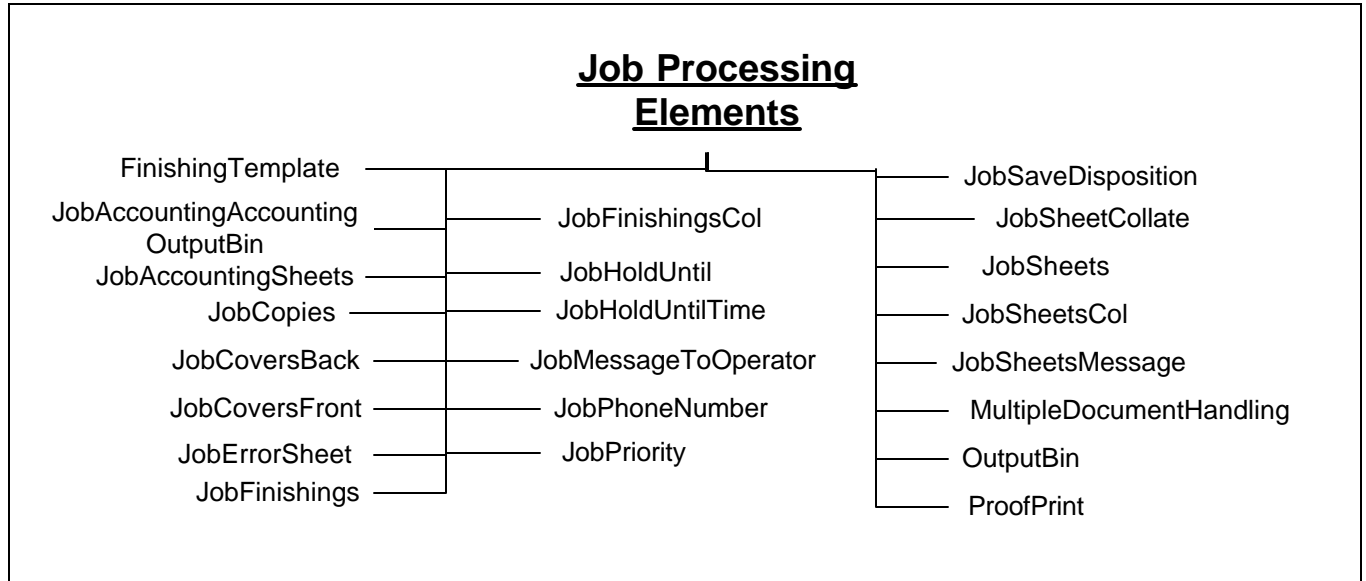
396 Processing elements are instructions that the Client supplies to the Printer to be applied to jobs and
397 documents. They indicate such things as the priority for scheduling a job or the number of copies
398 for a document. A Printer should support each Processing Element that represents a feature of the
399 Printer. The Processing elements are split into two groups. One groups applies to Jobs and the
400 other to Documents.

- 401 1) Job Processing Elements are processing instructions applied the Job level. See section
- 402 4.5.1.
- 403 2) Document Processing Elements are specific to documents. See section 4.5.2.

404 **4.5.1 Job Processing Elements**

405 Figure 12 shows the Job Processing Elements. These elements define features supplied by the
406 Client at Job creation. The Printer applies these elements to the Job as a whole (e.g., “JobPriority”)
407 as opposed to each document in the Job (e.g., “Media”). The semantics of the Job Processing
408 elements are summarized in Table 3.

409



410
411

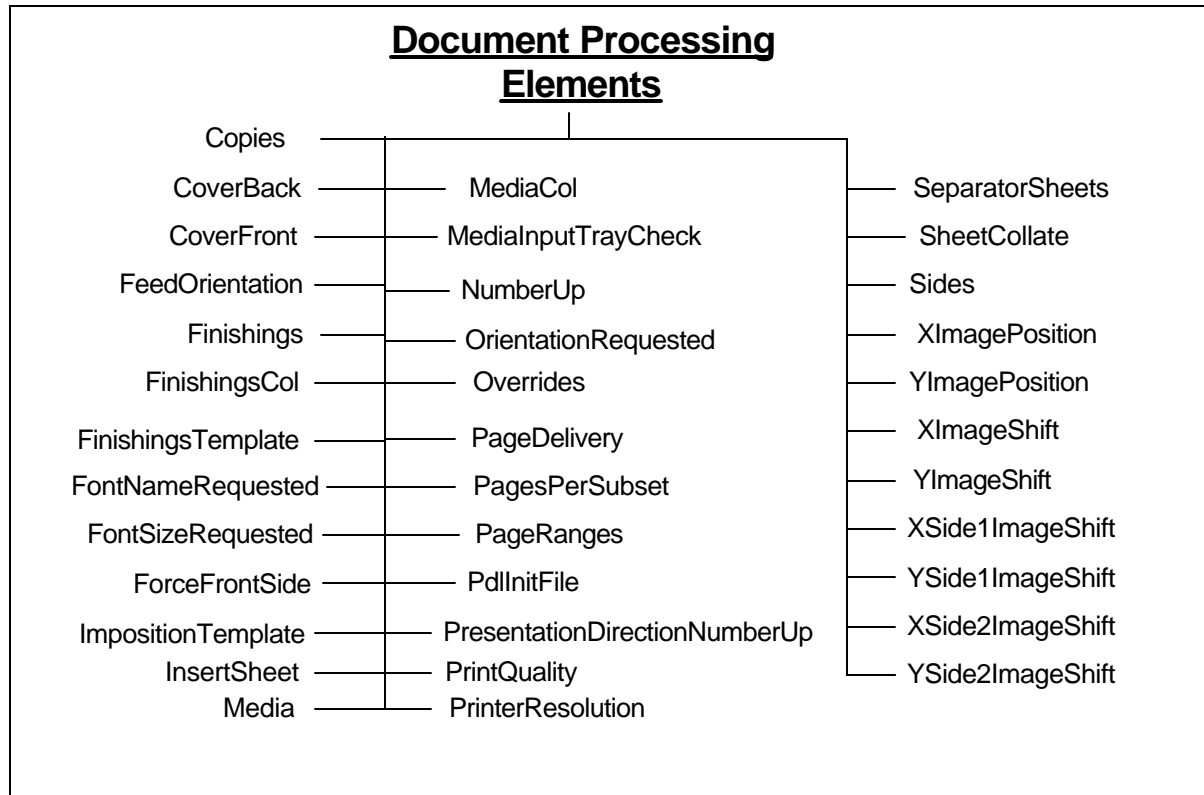
412

Figure 12 Job Processing Elements

413 **4.5.2 Document Processing Elements**

414 Figure 13 shows the Document Processing Elements. These elements define features supplied by
 415 the Client at Document creation. The Printer applies these element to each Document individually
 416 (e.g. “copies”) to create final output products. Included in these elements is how multiple physical
 417 sheets are manipulated or how the logical pages look on the output media or they determine the
 418 quality and resolution of how marks are made on a page. The semantics of the Document
 419 Processing elements are summarized in Table 3.

420 The Client supplies Document Processing Elements at the Job or Document level. If these
 421 elements are supplied at the Job level, the Printer applies them as the default values for all the
 422 Documents in the Job. If the elements are supplied at the Document level, the Printer applies them
 423 only to that Document.



424

425

Figure 13 Document Processing Elements

426 **4.6 Processing Actual Elements**

427 See section 4.5 above for the elements that may map to elements in these groups. The Processing
 428 Actual elements are optional Job and Document element that records what processing elements
 429 were used in a Job and its Documents. The mapping between the Processing element and the
 430 Processing Actual element is by taking the Processing element name and appending the suffix
 431 “Actual”. The Processing Actual elements are always multivalued.

432 Any Processing element may have a related ProcessingActual element that shows what was applied
 433 to the Job or Document. It is not necessary for the Printer to support the Processing element for it
 434 to support the associated ProcessingActual element. By retrieving the Printer Processing Actual
 435 elements after a job completes, a Client can determine all the Job and Document Processing
 436 elements and values that were used in processing the Job and its Documents. (See [actual])

437 **4.6.1 Job Processing Actual Elements**

438 See section 4.5.1 above for the base elements that map to elements in this group. The Job
 439 Processing Actual Element can only appear in the Job object.

440 **4.6.2 Document Processing Actual Elements**

441 See section 4.5.2 above for the base elements that map to elements in this group. The Document
 442 Processing Actual Element can appear in the Job and Document objects.

443 **5 Actions**

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

448 The Print Service Interface [PSI] has introduced additional operations or PSI specific mappings of
 449 existing actions. These are included below to show a concrete mapping of the PWG Semantic
 450 Model and an application specific extension of the model. Consult the PSI specification [PSI] for
 451 the exact definitions.

452 This table summarizes the actions defined for the Job and Printer. The rest of section 5 provides
 453 more details on the semantic of the actions.

Job Creation and Document submission	Job and Document Control	Status and Information access	Printer Control
CreateJob	CancelCurrentJob	GetDocumentElements	ActivatePrinter
PrintJob	CancelDocument	GetDocuments	DeactivatePrinter
PrintUri	CancelJob	GetJobElements	DisablePrinter
SendDocument	DeleteDocument	GetJobs	EnablePrinter
SendURI	HoldJob	GetPrinterElements	HoldNewJobs
ValidateDocument	PromoteJob	GetPrinterSettableElement Values	PausePrinter
ValidateJob	ReleaseJob		PausePrinterAfter CurrentJob
	ReprocessJob		PurgeJobs
	RestartJob		ReleaseHeldNew Jobs
	ResumeJob		RestartPrinter
	ScheduleJobAfter		ResumePrinter
	SetDocumentElements		SetPrinterElements
	SetJobElements		ShutdownPrinter
	SuspendCurrentJob		StartupPrinter

454

Table 2 - Summary of Actions

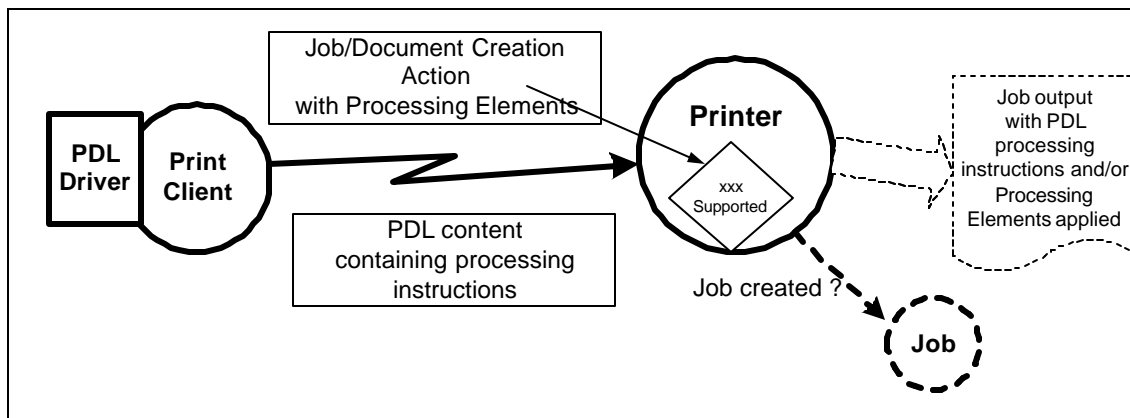
455 **5.1 Job Creation and document submission Actions**

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

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

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

469 A concept that is important in the PWG model is a set of instructions that can be applied to a print
 470 job. Examples of these instructions include the number of copies and the media to use. These
 471 instructions are referred to as Processing Elements. The Processing Elements are made up of the
 472 Job Processing Elements (see section 4.5.1) and the Document Processing Elements (see section
 473 4.5.2) sent in a Job or Document Creation Action.



474

Figure 14 Processing Instruction Processing

475

476 In the real world, processing instructions are also contained in the document content for a job.
 477 Page Description Languages (PDL) such as PostScript® and PCL® often contain processing
 478 instructions. Some environments use a printer specific driver to generate the PDL stream based on
 479 feature selections made through a user interface. Given that processing instructions can occur in
 480 both the PDL and in an associated Job, the PWG model allows a Printer to declare its capability to
 481 resolve this conflict. The Printer’s element “PdlOverride” declares if an attempt will be made to
 482 override the instructions in the PDL with the instructions in the Job.

483 There are a wide variety of capabilities in Printers. An instance of a Printer is to subject to changes
 484 in its configured capabilities. An example would be an administrative change in the media the

485 Printer supports or disabling two-sided printing. Clients need not check the capabilities of a Printer
486 before creating their Job Processing Elements and submitting a job. Since this is a client/server
487 paradigm, it is always possible that the capabilities could change after checking a Printer's
488 capabilities and before a Job is submitted. On the other hand, a client may use the Printer's
489 configured capabilities to create their Job Processing Elements and submit a job.

490 The PWG model allows a client to control the Printer's acceptance of a job submission based on
491 the job request and the Printer's current configured capabilities as follows. When the client
492 supplies a 'true' value for the "ElementFidelity" Job Processing element, the Printer must reject the
493 job unless the Printer supports *all* of the supplied Job Processing elements and values. When the
494 client supplies a 'false' value or omits the element, the Printer must accept the job submission and
495 ignore or substitute elements and values, respectively, that it does not support. Note that the
496 "ElementFidelity" Job Processing element covers only the creation of the Job. It is implementation
497 specific how a Printer handles processing a job when the Printer encounters unsupported
498 processing instructions in the document content.

499 **5.1.1 CreateJob**

500 ([rfc2911] §3.2.4) Similar to the PrintJob operation (see section 5.1.3), except that in the CreateJob
501 request the Client does not supply Document Data. The client supplies a single set of Job
502 Processing elements that the Printer applies to the Output Document(s) of the job. The
503 "MultipleDocumentHandling" Job Processing element controls whether the Printer produces
504 separate Output Documents or combines the Input Documents into a single Output Document (see
505 section 25).

506 **5.1.2 CloseJob**

507 ([doc-obj] section 4.3) Closes a print job that was created with a CreateJob operation (see section
508 5.1.1) and one or more SendDocument and/or SendUri operations (see sections 5.1.5 and 5.1.6)
509 This action sets the LastDocument element (see section 4.4.2) of the last Document in the Job to
510 'true'. CloseJob is semantically equivalent to a SendDocument or SendUri action with the
511 LastDocument element set to True. An explicit CloseJob is preferable to the implied closing of a
512 Job using SendDocument or SendUri and the LastDocument element set to True.

513 **5.1.3 PrintJob**

514 ([rfc2911] §3.2.1) Submit a print job with only one document and supply the document content
515 data. If the Printer accepts the job, it creates the Job object and returns a unique "JobId" element
516 for the Printer and a globally unique "JobUri" element. The Printer also sets the corresponding Job
517 elements with these values.

518 **5.1.4 PrintUri**

519 ([rfc2911] §3.2.2) Identical to the PrintJob operation (see section 5.1.3) except that a client
520 supplies a URI reference to the document data.

521 **5.1.4.1 The “MultipleDocumentHandling” Job Processing element**

522 When a client submits a job with more than one Input Document, the
523 “MultipleDocumentHandling” Job element allows the client to specify whether the Printer is to (1)
524 produce corresponding separate Output Documents or (2) combine the Input Documents into a
525 single Output Document. For example, the ‘single-document’ and ‘single-document-new-sheet’
526 values allow the client to staple all of the Input Documents into a single Output Document, with the
527 latter value forcing each Input Document to start on a new sheet (useful when doing two-sided
528 printing). When requesting multiple Copies, the ‘separate-document-uncollated-Copies’ value
529 results in the Copies of each Input Document being together in an Output set, while the ‘separate-
530 document-collated-Copies’ value keeps a copy of each Input Document together in an Output set.
531 For example, a job with Input Documents A, B, C and “Copies” = 2 will result in A, A, B, B, C, C
532 or A, B, C, A, B, C, respectively. If the Printer supports multiple documents per job, the Printer
533 must support this Job Processing element with at least one value.

534 **5.1.5 SendDocument**

535 ([rfc2911] §3.3.1, [doc-obj] §3) Submits the entire Document Content for the next Input Document
536 of a job created by a previous CreateJob action (see section 5.1.1).

537 **5.1.6 SendUri**

538 ([rfc2911] §3.3.2, [doc-obj] §3) Identical to the SendDocument operation (see section 5.1.5)
539 except that a client supplies a URI reference to the Document Content data, instead of supplying
540 the document content.

541 **5.1.7 ValidateDocument**

542 ([doc-obj] §3) This operation is used only to verify capabilities of a Printer object against whatever
543 elements are supplied by the client in the ValidateDocument request. By using the
544 ValidateDocument action a client can validate that an identical SendDocument or SendUri would
545 be accepted.

546 **5.1.8 ValidateJob**

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

550 **5.2 Job and Document Control Actions**

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

553 **5.2.1 CancelCurrentJob**

554 ([admin-ops] §4.2) Allows a client to cancel the current Job in the “processing” or “processing-
555 stopped” state.

556 5.2.2 CancelDocument

557 ([doc-obj] §3) Prevents the processing of the specified Document if the Document has not yet been
558 processed. Stops the processing of any active Document in an implementation specific manner.

559 5.2.3 CancelJob

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

562 5.2.4 DeleteDocument

563 ([doc-obj] §3) Removes the Document and its content from the Job.

564 5.2.5 HoldJob

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

567 5.2.6 PromoteJob

568 ([admin-ops] §4.4.1) Allows a client to make the pending target job be processed after the current
569 job completes.

570 5.2.7 ReleaseJob

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

572 5.2.8 ReprocessJob

573 ([admin-ops] §4.1) Allows a client to re-process a copy of a job retained after processing was
574 completed. This operation is the similar to RestartJob except that a new job that is a copy of the
575 target job is created and processed.

576 5.2.9 RestartJob

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

578 5.2.10 ResumeJob

579 ([admin-ops] §4.3.2) Resume the job at the point where it was suspended.

580 5.2.11 ScheduleJobAfter

581 ([admin-ops] §4.4.2) Request the target job be processed immediately after the specified job

582 5.2.12 SetDocumentElements

583 ([doc-obj] §3) Set the values of the supplied Document Processing and Document Description
584 elements of the indicated Document. (Was SetDocumentAttributes)

585 **5.2.13 SetJobElements**

586 ([rfc3380] §4.2) Set the values of the supplied Job Processing, Document Processing and Job
587 Description elements of the indicated Job. (Was SetJobAttributes)

588 **5.2.14 SuspendCurrentJob**

589 ([admin-ops] §4.4.2) Stop the current job and allow other jobs to be processed instead.

590 **5.3 Status and information Actions**

591 This section describes the actions that allow a client to obtain status and elements of Jobs and
592 Printers: GetJobs, GetPrinterElements, GetJobElements and GetPrinterSupportedValues.

593 **5.3.1 GetDocumentElements**

594 ([doc-obj] §3) Returns the requested Document elements or element groups in the indicated
595 Document in the indicated Job. (Was GetDocumentAttributes)

596 **5.3.2 GetDocuments**

597 ([doc-obj] §3) Returns the requested Document elements or element groups in all Documents in
598 the indicated Job.

599 **5.3.3 GetJobElements**

600 ([rfc2911] §3.3.4) Returns the values of the requested job elements and/or element groups of a Job
601 (i.e., Job Description, Job Status, Job Processing and Document Processing). (Was
602 GetJobAttributes)

603 **5.3.4 GetJobs**

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

608 **5.3.5 GetPrinterElements**

609 ([rfc2911] §3.2.5) Returns the values of the requested printer elements and/or element groups of a
610 Printer (i.e. Printer Status, Printer Description, Processing Supported, Processing Default,
611 Processing Ready). (Was GetPrinterAttributes)

612 **5.3.6 GetPrinterSettableElementValues**

613 ([rfc3380] §4.3) Returns the possible values of each of the requested Printer Processing and Printer
614 Description elements that may be set with the SetPrinterElements action. (Was
615 GetPrinterSupportedValues)

616 **5.4 Printer Control Actions**

617 This section describes actions which allow a client to control a Printer and may require operator
618 credentials: PausePrinter, ResumePrinter, PurgeJobs, DisablePrinter, EnablePrinter, and
619 SetPrinterElements.

620 **5.4.1 ActivatePrinter**

621 ([admin-ops] §3.4.2) The Printer will now start sending jobs to its Output Devices or Subordinate
622 Printers and begin accepting all requests.

623 **5.4.2 DeactivatePrinter**

624 ([admin-ops] §3.4.1) The Printer will now stop sending any more jobs to its Output Devices or
625 Subordinate Printers and begin refusing all requests except ActivatePrinter, SendDocument, and
626 SendUri requests and query requests.

627 **5.4.3 DisablePrinter**

628 ([adm-ops] §3.1.1) Prevents the Printer from accepting any more Job Creation operations. The
629 Printer sets the PrinterIsAcceptingJobs Printer Status element to 'false'.

630 **5.4.4 EnablePrinter**

631 ([adm-ops] §3.1.2) Allows the Printer to start accepting Job Creation operations. The Printer sets
632 the PrinterIsAcceptingJobs Printer Status element to 'true'.

633 **5.4.5 HoldNewJobs**

634 ([admin-ops] §3.3.1) Complete the current 'pending' and 'processing' Jobs but do not start
635 processing any subsequently created Jobs.

636 **5.4.6 PausePrinter**

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

638 **5.4.7 PausePrinterAfterCurrentJob**

639 ([admin-ops] §3.2.1) Stops the Printer from starting to send jobs to any of its Output Devices or
640 Subordinate Printers.

641 **5.4.8 PurgeJobs**

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

643 **5.4.9 ReleaseHeldNewJobs**

644 ([admin-ops] §3.3.2) Undo the effect of HoldNewJobs and release all Jobs held as a consequence
645 of HoldNewJobs.

646 5.4.10 RestartPrinter

647 ([admin-ops] §3.5.1) This action has the effect of a software re-boot.

648 5.4.11 ResumePrinter

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

650 5.4.12 SetPrinterElements

651 ([rfc3380] §4.1) Set the values of the supplied Printer Processing and Printer Description elements.
652 (Was SetPrinterAttributes)

653 5.4.13 ShutdownPrinter

654 ([admin-ops] §3.5.2) Stop processing jobs without losing any jobs and make the Printer no longer
655 available for any Actions.

656 5.4.14 StartupPrinter

657 ([admin-ops] §3.5.3) Allows a hosted implementation of the Printer to be started after the host is
658 available.

659 6 Globalization

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

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

673 There are also strings with specific formats. These formats are URI, URI Scheme, MIME, IEEE
674 1284 and DateTime. Any semantic element whose string value must adhere to one of the previous
675 formats is excluded from this discussion.

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

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

682 **7 Summary of elements**

683 This section summarizes the elements for the Document, Job and Printer objects. Included in the
 684 definition are the processing elements that can be applied at either the Job or Document level. For
 685 each element, the tables contain the element name, whether the element is multi-valued, its syntax,
 686 constraints, a short description and a reference to the Document where the semantics of the element
 687 is completely specified. The basic syntax types are “Boolean”, “String” and “Integer”. “Complex”
 688 types are a container for elements of any type. Members are listed in the description field.
 689 “RangeOfInteger” is a complex type that contains “Upperbound” and “Lowerbound” integer value
 690 members. “Resolution” is a complex type that contains “CrossFeedDir” and “FeedDir” integer
 691 value members and a “Units” string value member.

692 **7.1 Processing Elements (Job and Document)**

693 * Group key: J=Job Processing Elements, D=Document Processing Elements

694 Table 3 - Processing Elements (Job and Document)

Processing Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
Copies		Integer	1:MAX	D	[rfc2911] §4.2.5
The number of copies of the Output Document(s) to be printed. (See also JobCopies Job element)					
CoverBack		<i>complex</i>		D	[PWG5100.3] §3.1
The back cover to apply this Document. (<i>Includes Media/MediaCol, CoverType</i>)					
CoverFront		<i>complex</i>		D	[PWG5100.3] §3.1
The front cover to apply to this Document. (<i>Includes Media/MediaCol, CoverType</i>)					
CoverType		String	Type2 keyword	D	[PWG5100.3] §3.1.2
Indicates if covers are requested and which sides will contain print stream pages. (Keywords: NoCover, PrintNone, PrintFront, PrintBack, PrintBoth) (See CoverBack & CoverFront for use)					
DocumentCopies	Yes	RangeOfInteger		J	[PWG5100.4] §5.1.3
Specifies which copies of a Document to apply the override Processing elements. (See Overrides for use)					
DocumentNumbers	Yes	RangeOfInteger	1:MAX	D	[PWG5100.4] §5.1.2
Specifies the documents in a Job for override processing. (See Overrides for use)					
FeedOrientation		String	Type3 keyword	D	[prod-print2] §5.1
Specifies the media edge that is fed into the print engine from the paper tray. (<i>Keywords: LongEdgeFirst, ShortEdgeFirst</i>).					

Processing Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
Finishings	Yes	String	Type2 keyword	D	[rfc2911] §4.2.6 [PWG5100.1] §2
	Identifies the finishings that the Printer uses for each copy of the Output Document. (See also JobFinishings Job element) (<i>Keywords: Bale, Bind, BindBottom, BindLeft, BindRight, BindTop, BookletMaker, Cover, EdgeStitch, EdgeStitchBottom, EdgeStitchLeft, EdgeStitchRight, EdgeStitchTop, Fold, JogOffset, None, Punch, SaddleStitch, Staple, StapleBottomLeft, StapleBottomRight, StapleDualBottom, StapleDualLeft, StapleDualRight, StapleDualTop, StapleTopLeft, StapleTopRight, Trim</i>)				
FinishingsCol		complex		D	[PWG5100.3] §3.2
	Enables an end user to specify detailed finishing options not possible with the “Finishings” element for the Output Document. (See also JobFinishingsCol Job element) (<i>Includes FinishingTemplate, Stitching</i>)				
FinishingTemplate		String	Maxlength=1023	J,D	[PWG5100.3] §3.2.1
	A string specifying some particular finishing operation. (See FinishingsCol/JobFinishingsCol for use)				
FontNameRequested		String	Maxlength=255	D	[prod-print2] §5.2
	Specifies the font name if the document data is in a format that does not have inherent font information (e.g., ‘text/plain’), otherwise, this element is ignored.				
FontSizeRequested		Integer	1:MAX	D	[prod-print2] §5.3
	Specifies the font size in points (1/72 of an inch) if the document data is in a format that does not have inherent font information (e.g., ‘text/plain’), otherwise, this element is ignored.				
ForceFrontSide	Yes	Integer	1:MAX	D	[PWG5100.3] §3.3
	Forces the specified pages to be printed on the front side of a sheet of media. The pages of the output document start at 1.				
ImpositionTemplate		String	Type2 keyword	D	[PWG5100.3] §3.4
	Specifies imposition method for laying out finished page images onto the surface of output media. (<i>Keywords: None, Signature</i>)				
InsertAfterPageNumber		Integer	0:MAX	D	[PWG5100.3] §3.5.1
	Specifies the input page after which the Insert Sheet will be placed. Pages are numbered starting at 1. A 0 value means in front of the first page. (See InsertSheet for use)				
InsertCount		Integer	0:MAX	D	[PWG5100.3] §3.5.2
	Specifies the number of Insert Sheet to insert. (See InsertSheet for use)				

Processing Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
InsertSheet	Yes	complex		D	[PWG5100.3] §3.5
Specifies how Insert Sheets are to be inserted into the sequence of media sheets that are produced for each copy of the documents. (<i>Includes InsertAfterPageNumber, InsertCount, Media/MediaCol</i>)					
JobAccountingOutputBin		String	Type3 keyword	J	[PWG5100.3] §3.8.3
Specifies the output bin where the accounting sheet is to be placed. (See JobAccountingSheet for use) (<i>Keywords: Top, Middle, Bottom, Side, Left, Right, Center, Rear, FaceUp, FaceDown, Large-Capacity, MyMailbox, StackerN, MailboxN, TrayN</i> *Note: N is replaced by a cardinal number, *Note: See [PWG5100.2 §2.1 for description of keywords)					
JobAccountingSheets		complex		J	[PWG5100.3] §3.8
Specifies the accounting sheet for a job. (<i>Includes JobAccountingSheetsType, Media/ MediaCol, JobAccountingOutputBin</i>).					
JobAccountingSheetsType		String	Type3 keyword	J	[PWG5100.3] §3.8.1
Specifies the accounting sheet format for a job. (See JobAccountingSheets for use) (<i>Keywords: None, Standard</i>)					
JobCopies		Integer	1:MAX	J	[jobx] §4.1.1
The number of copies of the Job to be printed. (See also Copies Document Processing element)					
JobCoverBack		complex		J	[jobx] §4.1.2
The back cover to apply this Job. (<i>Includes Media/MediaCol, CoverType</i>)					
JobCoverFront		complex		J	[jobx] §4.1.3
The front cover to apply to this Job. (<i>Includes Media/MediaCol, CoverType</i>)					
JobErrorSheet		complex		J	[PWG5100.3] §3.9
Specifies the error sheet for a job. (<i>Includes JobErrorSheetType, JobErrorSheetWhen, Media/MediaCol</i>).					
JobErrorSheetType		String	Type3 keyword	J	[PWG5100.3] §3.9.1
Specifies the error sheet format for a job. (See JobErrorSheet for use) (<i>Keywords: None, Standard</i>)					
JobErrorSheetWhen		String	Type2 keyword	J	[PWG5100.3] §3.9.2
Specifies the accounting sheet format for a job. (See JobErrorSheet for use) (<i>Keywords: OnError, Always</i>)					

Processing Element Name	Multivalued	Syntax	Constraint	Group*	Reference
	Description (values)				
JobFinishings	Yes	String	Type2 keyword	J	[jobx] §4.1.4
	Identifies the finishing that the Printer uses for each job copy of the Job. (See also Finishings Document element) (<i>Keywords: None, Staple, Punch, Cover, Bind, SaddleStitch, EdgeStitch, StapleTopLeft, StapleBottomLeft, StapleTopRight, StapleBottomRight, EdgeStitchLeft, EdgeStitchTop, EdgeStitchRight, EdgeStitchBottom, StapleDualLeft, StapleDualTop, StapleDualRight, StapleDualBottom</i>)				
JobFinishingCol		complex		J	[jobx] §4.1.5
	Enables an end user to specify detailed finishing options not possible with the "JobFinishings" element. (See also FinishingsCol Document element) (<i>Includes FinishingTemplate, Stitching</i>)				
JobHoldUntil		String	Type3 keyword	J	[rfc2911] §4.2.2
	Specifies the named time period during which the Job must become a candidate for printing. (keywords: NoHold, Indefinite, DayTime, Evening, Night, Weekend, SecondShift, ThirdShift)				
JobHoldUntilTime		String	DateTime [rfc1123]	J	[prod-print2] §5.4
	Specifies the date and time after which the Job must become a candidate for printing. (example: Fri, 03 May 2002 08:49:37 GMT)				
JobMessageToOperator		String	Maxlength=1023	J	[PWG5100.3] §3.10
	Message from the end user to indicate something about the processing of this Job. (example: "Call 555-1234 before running this job")				
JobPhoneNumber		String	Maxlength=127	J	[prod-print2] §5.5
	Contains the contact telephone number for this Job.				
JobPriority		Integer	1:100	J	[rfc2911] §4.2.1
	Priority for scheduling the Job. A higher value specifies a higher priority.				
JobSaveDisposition		Complex		J	[prod-print2] §5.7
	Specifies that the Printer is to save the job as a file that can be re-printed on demand anytime in the future using the Print-URI operation (see section 5.1.4.) (<i>Includes SaveDisposition, SaveInfo</i>)				
JobSheets		String	type3 keyword	J	[rfc2911] §4.2.3 [PWG5100.3] §6.2
	Specifies which job start/end sheet(s), will be printed with a job. (<i>Keywords: None, Standard, JobStartSheet, JobEndSheet, JobBothSheets, FirstPrintStreamPage</i>)				
JobSheetsCol		complex		J	[PWG5100.3] §3.11
	Allows the client to specify the media for the JobSheet. (<i>Includes JobSheets, Media/MediaCol</i>)				
JobSheetMessage		String	Maxlength=1023	J	[PWG5100.3] §3.12
	Conveys a message that is delivered with the job.				

Processing Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
Media		String	type3 keyword	D	[rfc2911] §4.2.11
	The name of the medium that the Printer uses for all impressions of the Job. (<i>Keyword examples: na_letter_8.5x11in, iso_a4_210x297mm, na_monarch_3.875x7.5in, choice_iso_a4_210x297mm_na_letter_8.5x11in. See [pwg5101.1]</i>)				
MediaCol		complex		D	[PWG5100.3] §3.13
	Enables a client end user to submit a list of media characteristics to the Printer as a way to more completely specify the media to be used than the Media element. (<i>Includes MediaBackCoating, MediaColor, MediaFrontCoating, MediaGrain, MediaHoleCount, MediaInfo, MediaKey, MediaMaterial, MediaOrderCount, MediaPrePrinted, MediaRecycled, MediaSize, MediaThickness, MediaTooth, MediaType, MediaWeightMetric</i>)				
MediaBackCoating		String	Type3 keyword	D	[PWG5100.3] §3.13.10
	Indicates the pre-process coating applied to the back of the media. (See MediaCol for use) (<i>Keywords: None, Glossy, HighGloss, SemiGloss, Satin, Matte</i>)				
MediaColor		String	Type3 keyword	D	[PWG5100.3] §3.13.4
	Indicates the desired color of the media being specified. (See MediaCol for use) (<i>Keywords: no-color, white, pink, yellow, blue, green, buff, goldenrod, red, gray, ivory, orange (See [pwg5101.1] §4)</i>)				
MediaFrontCoating		String	Type3 keyword	D	[PWG5100.3] §3.13.10
	Indicates the pre-process coating applied to the front of the media. (See MediaCol for use) (<i>Keywords: None, Glossy, HighGloss, SemiGloss, Satin, Matte</i>)				
MediaGrain		String	Type3 keyword	D	[prod-print2] §8.4.2
	Indicates the grain of the media. (See MediaCol for use) (<i>Keywords: XDirection, YDirection</i>)				
MediaHoleCount		Integer	0:MAX	D	[PWG5100.3] §3.13.6
	Indicates the number of pre-drilled holes in the desired media. (See MediaCol for use)				
MediaInfo		String	Maxlength=255	D	[PWG5100.3] §3.13.3
	Specifies information that helps describe the media instance. Intended for human consumption. (See MediaCol for use)				
MediaInputTrayCheck		String	Type3 keyword	D	[PWG5100.3] §3.14
	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" element. (<i>Keywords: Top, Middle, Bottom, Side, LargeCapacity, Envelope, Main, Manual. See [RFC2911] Appendix C</i>)				
MediaKey		String	Type3 keyword	D	[PWG5100.3] §3.13.1
	The name of the media represented as a keyword. The media that MediaKey represents is a named collection of MediaCol elements and their values. Identical values of MediaKey and the Media Document Processing element represent the same media. (See MediaCol for use)				

Processing Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
MediaMaterial		String	Type3 keyword	D	[prod-print] §8.4.3
	The material of the media. (See MediaCol for use) (<i>Keywords: Aluminum, DryFilm, Paper, Polyester, WetFilm</i>)				
MediaOrderCount		Integer	1:MAX	D	[PWG5100.3] §3.13.7
	Indicates the number of sheets, within an ordered sequence of sheets; after which the sequence begins to repeat. (See MediaCol for use)				
MediaPrePrinted		String	Type3 keyword	D	[PWG5100.3] §3.13.11
	Indicates the pre-printed characteristics of the desired media. (See MediaCol for use) (<i>Keywords: Blank, PrePrinted, LetterHead</i>)				
MediaRecycled		String	Type3 keyword	D	[PWG5100.3] §3.13.10
	Indicates the recycled characteristics of the media. (See MediaCol for use) (<i>Keywords: None, Standard</i>)				
MediaSize		Complex		D	[PWG5100.3] §3.13.8
	Explicitly specifies the numerical media width and height dimensions in hundredth of a millimeter. (See MediaCol for use) (<i>Includes XDimension, YDimension</i>)				
MediaSizeName		String	Type3 keyword	D	[doc-obj] §8.1.
	The medium size that the Printer uses for all impressions of the Job. (See MediaCol for use) (<i>Keywords: na_letter_8.5x11in. See [pwg5101.1] §5</i>)				
MediaThickness		Integer	1:MAX	D	[prod-print2] §8.4.4
	The thickness of the media in units of one hundredth of a millimeter. This unit is equivalent to 1/2540 th of an inch. (See MediaCol for use)				
MediaTooth		String	Type3 keyword	D	[prod-print2] §8.4.1
	The tooth (or roughness) of the media. (See MediaCol for use) (<i>Keywords: Fine, Medium, Coarse</i>)				
MediaType		String	Type3 keyword	D	[PWG5100.3] §3.13.2
	The medium type that the Printer uses for all impressions of the Job. (See MediaCol for use) (<i>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</i>)				
MediaWeightMetric		Integer	0:MAX	D	[PWG5100.3] §3.13.9
	Indicates the weight of the desired media rounded to the nearest whole number of grams per square meter. (See MediaCol for use)				

Processing Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
MultipleDocumentHandling		String	type2 keyword	J	[rfc2911] §4.2.4
Controls whether Input Document in multi-Documents are combined into a single Output Document or are kept as separate Output Documents Useful for application of Finishing and the placement of one or more print-stream pages into impressions and onto media sheets for multi-Documents Jobs. (<i>Keywords: SingleDocument, SeparateDocumentUncollatedCopies, SeparateDocumentCollatedCopies, SingleDocumentNewSheet</i>)					
NumberUp		Integer	1:MAX	D	[rfc2911] §4.2.9
Indicates the number of Input pages that the Printer is to image on one impression.					
OrientationRequested		String	type2 keyword	D	[rfc2911] §4.2.10
The desired orientation for printed pages for document formats that don't have a built-in orientation. (<i>Keywords: Portrait, Landscape, ReverseLandscape, ReversePortrait</i>)					
OutputBin		String	Type2 keyword	J,D	[PWG5100.2] §2.1 [doc-obj] §8.1
Specifies the output bin where the job is to be delivered. (<i>Keywords: Bottom, Center, FaceDown, FaceUp, LargeCapacity, Left, MailboxN*, Middle, MyMailbox, Rear, Right, Side, StackerN*, Top, TrayN*</i> . *Note: N is replaced by a cardinal number)					
OutputDevice		String	Maxlength=255	J,D	[jobx] §4.2.1 [doc-obj] §8.1
Specifies the device where the pages of of a Job/Document will be printed.					
Overrides	Yes	complex		D	[PWG5100.4] §5.2
Provides for the overriding of processing instructions on a page basis. (<i>Includes Pages DocumentNumbers, DocumentCopies and any processing element that affects pages</i>)					
PageDelivery		String	Type2 keyword	D	[PWG5100.3] §3.15
Indicates whether the pages of the job are to be delivered to the output bin or finisher in the same page order as the original document and face up or face down. . See the PageOrderReceived Document Description element and the CurrentPageOrder Document Status element. (<i>Keywords: ReverseOrderFaceDown, ReverseOrderFaceUp, SameOrderFaceDown, SameOrderFaceUp, SystemSpecified</i>)					
Pages	yes	RangeOfInteger	1:MAX	D	[PWG5100.4] §5.2.4
Specifies a range of pages in the document PDL data. (See Overrides for use)					
PagesPerSubset	yes	Integer	1:MAX	D	[PWG5100.4] §5.3
Combines all of the Pages of all of the Documents into a single stream of -Pages. Then the Printer partitions that single stream into contiguous subsets of -Pages according to the list of integers. The list of integers is cyclical. When the last integer in the list is reached, the next subset uses the first in the list. Common use of subsets is a single value in the list.					

Processing Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
PageRanges	yes	RangeOfInteger	1:MAX	D	[RFC2911] §4.2.7
Specifies a range of pages in the document data to be output.					
PdInitFile	Yes	Complex		D	[prod-print2] §5.8
Controls initialization of the Printer's Page Description Language (PDL) interpreter. (Includes PdInitFileEntry, PdInitFileLocation, PdInitFileName)					
PdInitFileEntry		String	Maxlength=255	D	[prod-print2] §5.8.1.3
Specifies an entry point within the init file at which the PDL interpreter starts. (See PdInitFile for use)					
PdInitFileLocation		String	Maxlength=1023	D	[prod-print2] §5.8.1.1
Contains a URL that specifies the path to the directory where the initialization file for the Printer's PDL interpreter will be found. (See PdInitFile for use)					
PdInitFileName		String	Maxlength=255	D	[prod-print2] §5.8.1.2
Specifies the name of the PDL interpreter's initialization file within the directory specified by the PdInitFileLocation element. (See PdInitFile for use)					
PresentationDirectionNumberUp		String	Type2 keyword	D	[PWG5100.3] §3.17
Specifies the placement order of the page images on a Finished-Page Image with the "number-up" element. (<i>Keywords: TorightTobottom, TobottomToright, ToleftTobottom, TobottomToleft, TorightTotop, TotopToright, ToleftTotop</i>)					
PrintContent Optimize		String	type2 keyword	J,D	[jobx] §4.2.2 [doc-obj] §8.1
directs the type of optimization/processing that will be performed on the Document content. It does not necessarily mean the value describes the content.. (<i>Keywords: Photo, Graphics, Text, TextAndGraphics</i>)					
PrintQuality		String	type2 keyword	D	
The print quality that the Printer uses for the Job. (<i>Keywords: Draft, Normal, High</i>)					
PrinterResolution		resolution		D	RFC2911] §4.2.12
The resolution that Printer uses for the Job in cross-feed and feed direction in units of dpi or dpcm.					
ProofPrint		Complex		J	[prod-print2] §5.9
Specifies the elements for zero or more proof prints of the job that are to be printed prior to the printing the full run of the job. (Includes ProofPrintCopies , Media/MediaCol and any other Processing elements).					

Processing Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
ProofPrintCopies		Integer	0:MAX	J	[prod-print2] §5.9.1
Specifies the number of proof prints to be printed prior to the printing the full run of the job. (See ProofPrint for use)					
SaveDisposition		String	type3 keyword	J	[prod-print2] §5.7.1.1
Specifies whether the Printer must print and/or save the job. (See JobSaveDisposition for use) (<i>Keywords: None, PrintSave, SaveOnly</i>)					
SaveDocumentFormat		String	MimeMediaType [rfc2046], [rfc2048]	J	[prod-print2] §5.7.1.2.3.3
Indicates the document format in which the Printer saves the Document Data. (See DocumentFormat Document Description element) (See SaveInfo for use)					
SaveInfo	Yes	complex		J	[prod-print2] §5.7.1.2
Contains sets of elements that each tells the Printer how to create each copy of the saved job. (See JobSaveDisposition for use) (<i>Includes SaveLocation, SaveName, SaveDocumentFormat</i>)					
SaveLocation		String	Maxlength=1023	J	[prod-print2] §5.7.1.2.3.1
Specifies the path to the directory as a URI where the Printer saves the Document Data and other Job information. (See SaveInfo for use)					
SaveName		String	Maxlength=255	J	[prod-print2] §5.7.1.2.3.2
Specifies the name of the saved job in the directory specified by the “save-location” member element. The value may be a relative path. (See SaveInfo for use)					
SeparatorSheets		complex		D	[PWG5100.3] §3.18
Specifies the separator sheets to be printed with the Document. (<i>Includes SeparatorSheetsType, Media/MediaCol</i>)					
SeparatorSheetsType		String	Type3 keyword	D	[PWG5100.3] §3.18.1
Specifies the separator sheets type. (See SeparatorSheets for use) (<i>Keywords: None, SlipSheets, StartSheet, EndSheet, BothSheets</i>)					
SheetCollate		String	Type2 keyword	D	[rfc3381] §3.1
Specifies if the media sheets of each copy of each printed document in a job are to be in sequence. (<i>Keywords: Uncollated, Collated</i>)					
Sides		String	type2 keyword	D	[rfc2911] §4.2.8
Indicates how an impression is to be placed upon the side(s) of the media. (<i>Keywords: OneSided, TwoSidedLongEdge, TwoSidedShortEdge, TwoSidedLongEdge</i>)					

Processing Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
Stitching		complex		D	[PWG5100.3] §3.2.2
Provides detailed stitching parameters. (See FinishingsCol/JobFinishingsCol for use) (<i>Includes StitchingReferenceEdge, StitchingOffset, StitchingLocations</i>)					
StitchingLocations	yes	Integer	0:MAX	D	[PWG5100.3] §3.2.2.3
The distance along the stitching axis where a stitch will be placed in hundredths of a millimeter. (See Stitching for use)					
StitchingOffset		Integer	0:MAX	D	[PWG5100.3] §3.2.2.2
The perpendicular distance from the reference edge to the stitching axis in hundredths of a millimeter. (See Stitching for use)					
StitchingReferenceEdge		String	type2 keyword	D	[PWG5100.3] §3.2.2.1
Specifies the stitching reference edge of the output media. (See Stitching for use) (<i>Keyword: Bottom, Top, Left, Right</i>)					
XDimension		Integer	0:MAX	D	[PWG5100.3] §3.13.8.1
Size of the media in hundredths of a millimeter along the bottom edge. (See MediaSize for use)					
XImagePosition		String	type2 keyword	D	[PWG5100.3] §3.19.2
Causes the specified point of the Finished-Page Image to be positioned at a specified location. (<i>Keywords: None, Center, Left, Right</i>)					
XImageShift		Integer	MIN:MAX	D	[PWG5100.3] §3.19.3
Causes the Finished-Page Image to be shifted in position with respect to the x-axis of the media. The unit of measure for this element is hundredths of a millimeter. The sign of the value indicates the direction of the shift.					
Xside1ImageShift		Integer	MIN:MAX	D	[PWG5100.3] §3.19.4
Causes each Finished-Page Image that would be placed on the front side of a sheet to be shifted in position with respect to the x-axis of the media. The unit of measure for this element is hundredths of a millimeter. The sign of the value indicates the direction of the shift.					
Xside2ImageShift		Integer	MIN:MAX	D	[PWG5100.3] §3.19.5
Causes each Finished-Page Image that would be placed on the backside of a sheet to be shifted in position with respect to the x-axis of the media. The unit of measure for this element is hundredths of a millimeter. The sign of the value indicates the direction of the shift.					
YDimension		Integer	0:MAX	D	[PWG5100.3] §3.13.8.2
Size of the media in hundredths of a millimeter along the left edge. (See MediaSize for use)					

Processing Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
YImagePosition		String	type2 keyword	D	[PWG5100.3] §3.19.6
Causes the specified point of the Finished-Page Image to be positioned at a specified location. (Keywords: None, Center, Top, Bottom)					
YImageShift		Integer	MIN:MAX	D	[PWG5100.3] §3.19.7
Causes the Finished-Page Image to be shifted in position with respect to the y-axis of the media. The unit of measure for this element is hundredths of a millimeter. The sign of the value indicates the direction of the shift.					
Yside1ImageShift		Integer	MIN:MAX	D	[PWG5100.3] §3.19.8
Causes each Finished-Page Image that would be placed on the front side of a sheet to be shifted in position with respect to the y-axis of the media. The unit of measure for this element is hundredths of a millimeter. The sign of the value indicates the direction of the shift.					
Yside2ImageShift		Integer	MIN:MAX	D	[PWG5100.3] §3.19.9
Causes each Finished-Page Image that would be placed on the backside of a sheet to be shifted in position with respect to the y-axis of the media. The unit of measure for this element is hundredths of a millimeter. The sign of the value indicates the direction of the shift.					

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696 **7.2 Job Elements (Status and Description)**

697 * Group Key: S=Status, D=Description

698 **Table 4- Job Elements (Status and Description)**

Job Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
CompressionSupplied		String	Type2 keyword	D	[jobx] §5.2.1
Default compression algorithm used for the Documents Data. (Keywords: None, Deflate, Gzip, Compress)					
DateTimeAtCompleted		String	DateTime [rfc1123]	S	[rfc2911] §4.3.14.7
Indicates the date and time at which the Job completed. (example: Fri, 03 May 2002 08:49:37 GMT)					
DateTimeAtCreation		String	DateTime [rfc1123]	S	[rfc2911] §4.3.14.5
Indicates the date and time at which the Job was created . (example: Fri, 03 May 2002 08:49:37 GMT)					

Job Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
DateTimeAtProcessing		String	DateTime [rfc1123]	S	[rfc2911] §4.3.14.6
Indicates the date and time at which the Job first began processing. (example: Fri, 03 May 2002 08:49:37 GMT)					
DetailedStatusMessage	Yes	String	Maxlength=1023	S	[rfc2911] §4.3.10
Specifies additional detailed and technical information about the job. Intended for use by the system administrator or other experienced technical persons and so is not localized by the Printer. (example: "PostScript error: stack overflow") (Was JobDetailedStatusMessage)					
DocumentAccessErrors	Yes	String	Maxlength=1023	S	[rfc2911] §4.3.11
Information about each Document access error for this job encountered by the Printer. (example: "(404) http://www.company.com/pub/fileToPrint.pdf ") (Was JobDocumentAccessErrors)					
DocumentCharsetSupplied		String	Maxlength=63	D	[jobx] §5.2.2
The default charset of the Documents content					
DocumentDigitalSignatureSupplied		String	Type2 keyword	D	[jobx] §5.2.3
The type of digital signature, if any, used in the Document Content. (<i>Keywords:</i> dss, none, pgp, smime, xmldsig)					
DocumentFormatDetailsSupplied	Yes	Complex	Complex	D	[jobx] §5.2.4
Summarizes the default distinct contained document formats when Document contains multiple files, i.e., the Document is a container DocumentFormat, such as 'multipart/related' or 'application/zip'. For example, a container containing 100 PostScript files and 1 PCL file would have two sets of values. (<i>Includes DocumentSourceApplicationName, DocumentSourceApplicationVersion, DocumentSourceOsName, DocumentSourceOsVersion, DocumentFormat, DocumentFormatDeviceId, DocumentFormatVersion, DocumentNaturalLanguage.</i>)					
DocumentFormatSupplied		String	MimeMediaType [rfc2046], [rfc2048]	D	[jobx] §5.2.5
The default Document format (i.e., PDL) for Documents in the 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. The values "application/zip" and "multipart/related" are container formats for which DocumentContainerSummary gives additional information about the contained files. (<i>Examples: application/octet-stream, application/postscript, application/vnd.hp-PCL, "text/plain; charset=utf-8", application/zip, multipart/related</i>)					

Job Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
DocumentFormatVersionSupplied		String	Maxlength=127	D	[jobx] §5.2.6
The default level or version of the DocumentFormat. Values are either from the prtInterpreterLangLevel [rfc1759] or a standard designation. (examples: “3” for DocumentFormat=application/postscript’ “5e” for DocumentFormat=application/vnd.hp-pcl; “ISO 12639-1:1996” for TIFF/IT Profile 1)					
DocumentMessageSupplied		String	Maxlength=1023	D	[jobx] §5.2.7
A message from either (1) the user to the operator about the Documents or (2) from the operator, system administrator, or "intelligent" process to indicate to the end user the reasons for modification or other management action taken on the Documents.					
DocumentNameSupplied		String	Maxlength=255	D	[jobx] §5.2.8
The default name for the Documents in the Job to be used in an implementation specific manner.					
DocumentNaturalLanguageSupplied		String	Maxlength=127	D	[jobx] §5.2.9
Identifies the default Natural Language for the Documents in the Job.					
ElementFidelity		Boolean		D	[rfc2911] §15.1, [doc-obj] §8.1.1
Allows a user to control whether or not the Printer MUST honor <i>all</i> supplied Processing elements in the Job Creation operation. For a ‘true’ value the Printer rejects the job submission if any of the supplied Processing element values are unsupported. For a ‘false’ value the Printer MUST accept the job submission and do best effort. Default = ‘false’ NOTE: Use “JobMandatoryElements” to explicitly specify a <i>subset</i> of the supplied elements that the Printer MUST honor. (Was IPPAttributeFidelity)					
ElementsNaturalLanguage		String	Natural language	D	[rfc2911] §4.3.20
Indicates the natural language of the elements with string syntax that were set by the End User. (Was AttributesNaturalLanguage)					
ErrorsCount		Integer	MIN:MAX	S	[jobx] §5.1.1
The total number of errors that a Printer has generated while processing and printing a Job’s Document(s).					
Impressions		Integer	0:MAX	D	[rfc2911] §4.3.17.2
The total size in number of impressions in all the Job’s Document(s). (Was JobImpressions)					
ImpressionsCompleted		Integer	0:MAX	S	[rfc2911] §4.3.18.2
The number of impressions completed for the Job so far. (Was JobImpressionsCompleted)					
ImpressionsCompletedCurrentCopy		Integer	0:MAX	S	[rfc3381] §4.4
The number of impressions completed for the current iteration of this Job so far.					

Job Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
JobAccountId		String	Maxlength=255	D	[PWG5100.3] §3.6
Account associated with this Job.					
JobAccountingUserID		String	Maxlength=255	D	[PWG5100.3] §3.7
Specifies the User ID associated with the "JobAccountId".					
JobCollationType		String	Type2 keyword	S	[rfc3381] §4.1
Identifies the collation type of the Job. (<i>Keywords: Other, Unknown, UncollatedSheets, UncollatedDocuments, CollatedDocuments</i>)					
JobId		Integer	1:MAX	S	[rfc2911] §4.3.2
The Printer sets this to the ID of this Job , which is unique for the Printer.					
JobMandatoryElements	Yes	String	Type3 keyword	D	[doc-obj] §8.1
Allows a user to list which Processing elements the Printer must honor. The Printer rejects the job submission if <i>any</i> of the listed elements are unsupported or contain values that the Printer does not support. All of the remaining supplied elements are best effort. This element is ignored if ElementFidelity is supplied with a 'true' value. (See [rfc2911] §15.1) (<i>Keywords: None and any Processing element names. Member elements of collection elements are named as Attr.Member. For example, JobSheetsCol.Media</i>) NOTE: New element to align fidelity with FSG work was JobMandatoryAttributes).					
JobMessageFromOperator		String	Maxlength=127	D	[rfc2911] §4.3.16
Message to the end user indicating the reasons for any management action taken on this Job. (example: "Job canceled due to length", "Pick job up in mailbox")					
JobName		String	Maxlength=255	D	[rfc2911] §4.3.5
The Printer sets this to the client-supplied end-user friendly name for the Job, else the Printer must generate a name from other information. (example: "license agreement memo")					
JobOriginatingUserName		String	Maxlength=255	D	[rfc2911] §4.3.6
The Printer sets this element to the most authenticated printable name that it can obtain (example: "John Doe", \authDomain\John Doe")					
JobPassword		String	Maxlength=255	D	[prod-print2] §4.1
Contains a password supplied by the client encrypted according to method specified by the client in the JobPasswordEncryption element.					
JobPasswordEncryption		String	Type3 keyword	D	[prod-print2] §4.2
Specifies the type of encryption that the client is used for the supplied value of the JobPassword element. (<i>Keywords: None, Md2, Md4, Md5, Sha</i>)					

Job Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
JobPrinterMakeAndModel		String	Maxlength=127	S	[prod-print] §6.1
	Identifies the make and model of the output device that saved this Job according to the JobSaveDisposition Job Processing element.				
JobPrinterUri		String	uri	S	[rfc2911] §4.3.3
	The Printer set this to the URI of Printer that created this Job. (example: ipp://www.company.com/printer)				
JobState		String	Type1 keyword	S	[rfc2911] §4.3.7
	The current state of this Job (see section 4.3.1.1). See also JobStateReasons element below. (<i>Keywords: Pending, Pending-Held, Processing, ProcessingStopped, Canceled, Aborted, Completed</i>)				
JobStateMessage		String	Maxlength=1023	S	[rfc2911] §4.3.6
	Specifies information about the "JobState" and "JobStateReasons" elements in human readable text localized by the Printer according to the natural language supplied in the client's query request. (example: "Job completed successfully with warnings" for an English request)				
JobStateReasons	Yes	String	type2 keyword	S	[rfc2911] §4.3.8
	Provides additional information about this Job's current state. (<i>Keywords: AbortedBySystem, CanceledAtDevice, CanceledByOperator, CanceledByUser, CompletedSuccessfully, CompletedWithErrors, CompletedWithWarnings, CompressionError, DigitalSignatureDidNotVerify, DigitalSignatureTypeNotSupported, DocumentAccessError, DocumentFormatError, ErrorsDetected, Incoming, Interpreting, JobDataInsufficient, JobDigitalSignatureWait, JobHoldUntilSpecified, JobPasswordWait, JobRestartable, JobResuming, JobSavedSuccessfully, JobSaveError, JobSaving, JobScheduling, JobSpooling, JobStreaming, JobSuspended, JobSuspendedByOperator, JobSuspendedBySystem, JobSuspendedByUser, JobSuspending, None, Outgoing, PrinterStopped, PrinterStoppedPartly, Printing, ProcessingToStopPoint, ProofPrintWait, Queued, QueuedForMarker, QueuedInDevice, ResourcesAreNotReady, ResourcesAreNotSupported, ServiceOffLine, Spooling, Streaming, SubmissionInterrupted, Transforming, UnsupportedCompression, UnsupportedDocumentFormat, WarningsDetected</i>)				
JobUri		String	uri	S	[rfc2911] §4.3.1
	The Printer sets this to the URI for this Job. (example: ipp://www.company.com/printer/jobs/22) The URI is globally unique.				
KOctets		Integer	0:MAX	D	[rfc2911] §4.3.17.1
	The total size of this Job's Document(s) in integral units of 1024 octets. (Was JobKOctets)				
KOctetsProcessed		Integer	0:MAX	S	[rfc2911] §4.3.18.1
	the total number of octets processed in integral units of 1024 octets so far. (Was JobKOctetsProcessed)				

Job Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
MediaSheets		Integer	0:MAX	D	[rfc2911] §4.3.17.3
The total number of media sheets to be produced for this Job's Document(s). . (Was JobMediaSheets)					
MediaSheetsCompleted		Integer	0:MAX	S	[rfc2911] §4.3.18.3
The media-sheets completed marking and stacking so far. (Was JobMediaSheetsCompleted)					
MoreInfo		String	uri	S	[rfc2911] §4.3.4
URI used to obtain information intended for end user consumption about this specific Job/Document. (example: " http://www.company.com/printer/embeddedjobpage ") . (Was JobMoreInfo)					
NumberOfDocuments		Integer	0:MAX	S	[rfc2911] §4.3.12
The number of Documents in this Job.					
NumberOfInterveningJobs		Integer	0:MAX	S	[rfc2911] §4.3.15
The number of jobs that are "ahead" of this Job assuming the current scheduled order.					
OutputDeviceAssigned		String	Maxlength=127	S	[rfc2911] §4.3.13
Identifies the output device to which the Printer has assigned this Job (example: "Pete's Printer")					
PrinterUpTime		Integer	1:MAX	S	[rfc2911] §4.3.14.4
The amount of time (in seconds) that the Printer has been up and running. See Printer element "PrinterUpTime" (Was JobPrinterUpTime)					
SheetsCompletedCopyNumber		Integer	0:MAX	S	[rfc3381] §4.2
Number of the copy being stacked for the current Document.					
SheetsCompletedDocumentNumber		Integer	0:MAX	S	[rfc3381] §4.3
Number of the document in this Job currently being stacked. . The Documents in a Job are numbered 1, 2, 3. A 0 value means no Document is currently being stacked.					
TimeAtCompleted		Integer	MIN:MAX	S	[rfc2911] §4.3.14.3
The time at which the Job completed in "PrinterUpTime" seconds.					
TimeAtCreation		Integer	MIN:MAX	S	[rfc2911] §4.3.14.1
The time at which the Job was created in "PrinterUpTime" seconds.					
TimeAtProcessing		Integer	MIN:MAX	S	[rfc2911] §4.3.14.2
The time at which the Job first began processing in "PrinterUpTime" seconds.					

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

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700 **7.3 Document Elements (Status and Description)**

701 * Group Key: S=Status, D=Description. Reference is given to the Job Description attribute in
 702 [rfc2911] and [pwg5100.n] even when the [doc-obj] has a corresponding Document Description
 703 attribute defined, since the definitions are so parallel. Reference is given to [doc-obj] when the
 704 element is defined therein only.

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Table 5 – Document Elements (Status and Description)

Document Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
Compression		String	Type2 keyword	D	[rfc2911] §4.4.32
Compression algorithm used on the Document Data, if any. (<i>Keywords: None, Deflate, Gzip, Compress</i>)					
CurrentPageOrder		String	Type2 keyword	S	[PWG5100.3] §4.1
Indicates the page order of the pages in the document data. Initially set to PageOrderReceived and updated if data is transformed. (<i>Keywords: 1ToNOrder, NTo1Order</i>)					
DateTimeAtCompleted		String	DateTime [rfc1123]	S	[rfc2911] §4.3.14.7
Indicates the date and time at which this Document completed. (example: Fri, 03 May 2002 08:49:37 GMT)					
DateTimeAtCreation		String	DateTime [rfc1123]	S	[rfc2911] §4.3.14.5
Indicates the date and time at which this Document was created . (example: Fri, 03 May 2002 08:49:37 GMT)					
DateTimeAtProcessing		String	DateTime [rfc1123]	S	[rfc2911] §4.3.14.6
Indicates the date and time at which this Document first began processing. (example: Fri, 03 May 2002 08:49:37 GMT)					
DetailedStatusMessage	Yes	String	Maxlength=1023	S	[rfc2911] §4.3.10
Specifies additional detailed and technical information about this Document. Intended for use by the system administrator or other experienced technical persons. (example: "PostScript error: stack overflow") (Was JobDetailedStatusMessage)					

Document Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
DocumentAccessErrors	Yes	String	Maxlength=1023	S	[rfc2911] §4.3.11
Information about each Document access error for this Document encountered by the Printer. (example: “(404) http://www.company.com/pub/fileToPrint.pdf ”) (Was JobDocumentAccessErrors)					
DocumentCharset		String	Maxlength=63	D	[jobx] §3.2.2 [doc-obj] §9.1.10
The charset of the Document content					
DocumentDigitalSignature		String	Type2 keyword	D	[jobx] §3.2.3 [doc-obj] §9.1.11
The type of digital signature, if any, used in the Document Content. (<i>Keywords</i> : dss, none, pgp, smime, xmldsig)					
DocumentFormat		String	MimeMediaType [rfc2046], [rfc2048]	D	[rfc2911] §3.2.1.1 [doc-obj] §9.1.12
The Document format (i.e., PDL) for this Document. The value “application/octet-stream” has a special meaning. This value is used to indicate that a Printer is capable of auto-sensing the format of the Document. The values “application/zip” and “multipart/related” are container formats for which DocumentContainerSummary gives additional information about the contained files. (<i>Examples</i> : <i>application/octet-stream</i> , <i>application/postscript</i> , <i>application/vnd.hp-PCL</i> , “ <i>text/plain; charset=utf-8</i> ”, <i>application/zip</i> , <i>multipart/related</i>)					
DocumentFormatDetails	Yes	Complex		D	[jobx] §3.2.5 [doc-obj] §9.1.13
Summarizes the distinct contained document formats when the Document contains multiple files, i.e., the Document is a container DocumentFormat, such as ‘multipart/related’ or ‘application/zip’. For example, a container containing 100 PostScript files and 1 PCL file would have two sets of values. (<i>Includes DocumentSourceApplicationName, DocumentSourceApplicationVersion, DocumentSourceOsName, DocumentSourceOsVersion, DocumentFormat, DocumentFormatDeviceId, DocumentFormatVersion, DocumentNaturalLanguage</i>).					
DocumentFormatDetails Detected	Yes	Complex		S	[doc-obj] §9.1.14
Generated by the Printer to indicate the actual document format details of the Document object. (<i>Includes DocumentCreatorApplicationName, DocumentCreatorApplicationVersion, DocumentCreatorOsName, DocumentCreatorOsVersion, DocumentFormat, DocumentFormatDeviceId, DocumentFormatVersion, DocumentNaturalLanguage</i>).					

Document Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
DocumentFormatDetected		String	mimeMediaType [rfc2046], [rfc2048]	S	[doc-obj] §9.1.15
	The Printer sets this to the actual DocumentFormat that the Printer detects when auto-sensing the document format, i.e., when the DocumentFormat is omitted or supplied as 'application/octet-stream'. (example: 'application/postscript')				
DocumentFormatDeviceId		String	Maxlength=127	D	[doc-obj] §9.1.13
	Identifies the type of device for which the document was formatted, including manufacturer and model, following the IEEE 1284-2000 Device ID string. (example: MANUFACTURER:ACME Co.;COMMAND SET:PS;MODEL:LaserBeam 9;) (See DocumentFormatDetails for use)				
DocumentFormatVersion		String	Maxlength=127	D	[doc-obj] §9.1.16
	The level or version of the DocumentFormat. Values are either from the prtInterpreterLangLevel [rfc1759] or a standard designation. (examples: "3" for DocumentFormat=application/postscript "5e" for DocumentFormat=application/vnd.hp-pcl; ISO 12639-1:1996 for TIF/IT Profile 1)				
DocumentFormatVersion Detected		String	Maxlength=127	S	[doc-obj] §9.1.17
	The Printer sets this to the actual DocumentFormat level or version that the Printer detects when auto-sensing the document format, i.e., when the DocumentFormat is omitted or supplied as 'application/octet-stream'. (examples: "3" for DocumentFormat=application/postscript "5e" for DocumentFormat=application/vnd.hp-pcl; ISO 12639-1:1996 for TIF/IT Profile 1)				
DocumentMessage		String	Maxlength=1023	D	[doc-obj] §9.1.20
	A message from either (1) the user to the operator about the Document or (2) from the operator, system administrator, or "intelligent" process to indicate to the end user the reasons for modification or other management action taken on the Document.				
DocumentName		String	Maxlength=255	D	[rfc2911] §3.2.1.1
	Name for this Document to be used in an implementation specific manner.				
DocumentNaturalLanguage		String	Maxlength=127	D	[rfc2911] §3.2.1.1 [doc-obj] §9.1.22
	Identifies the primary Natural Language of this Document.				
DocumentNumber		integer		S	[PWG5100.4] §9.2, [doc-obj] §9.1.23
	The order of this document within a job starting at a base of 1.				

Document Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
PrinterUri		String	Maxlength=1023	S	[doc-obj] §9.1.24
The Printer sets this to the URI of the Printer, i.e., a copy of the Job's JobPrinterUri element. (example: ipp://www.company.com/printers/myprinter) (was DocumentPrinterUri)					
DocumentSourceApplicationName		String	Maxlength=255	D	[doc-obj] §9.1.13
The name of the application that created the document, without its version number. (examples: "Photoshop", "Microsoft Word") (See DocumentFormatDetails for use)					
DocumentSourceApplicationVersion		String	Maxlength=127	D	[doc-obj] §9.1.13
The version of the application that created the document, without its name. (examples: 'V3.0.', 'V6.0') (See DocumentFormatDetails for use)					
DocumentSourceOsName		String	Maxlength=40	D	[doc-obj] §9.1.13
The name of the operating system, without version number, on which the document was generated (see IANA [os-names]). (examples: 'LINUX', 'MACOS', 'NETWARE', 'WINDOWS') (See DocumentFormatDetails for use)					
DocumentSourceOsVersion		String	Maxlength=127	D	[doc-obj] §9.1.13
The version of the operating system, without its name, on which the document was generated (see IANA [os-names]). (examples: For LINUX = '1.0', '2.4'; For WINDOWS = '95', 'NT', 'NT-4', '2000', 'XP') (See DocumentFormatDetails for use)					
DocumentState		String	Type1 keyword	S	[doc-obj] §9.1.25
The current state of this Document. See also DocumentStateReasons element below. (Keywords: Pending, Processing, Canceled, Aborted, Completed)					
DocumentStateMessage		String	Maxlength=1023	S	[doc-obj] §9.1.26
Specifies information about the "DocumentState" and "DocumentStateReasons" elements of this Document in human readable text localized by the Printer according to the language supplied in the client's query request. (Example: "Document completed successfully with warnings" for an English request)					
DocumentStateReasons	Yes	String	type2 keyword	S	[doc-obj] §9.1.27
Provides additional information about this Document's current state. (Keywords: None, AbortedBySystem, CanceledAtDevice, CanceledByOperator, CanceledByUser, CompletedSuccessfully, CompletedWithErrors, CompletedWithWarnings, CompressionError, DocumentAccessError, DocumentFormatError, Incoming, Interpreting, Outgoing, Printing, Queued, QueuedForMarker, QueuedInDevice, ResourcesAreNotReady, ResourcesAreNotSupported, Spooling, Streaming, SubmissionInterrupted, Transforming, UnsupportedCompression, UnsupportedDocumentFormat, WarningsDetected)					

Document Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
DocumentUri		String	Maxlength=1023	D	[rfc2911] §3.2.2 [doc-obj] §9.1.28
Reference to the Document to be printed (Print by reference) supplied by the Client.					
ElementsCharset		String	Charset	D	[rfc2911] §4.3.19
Indicates the coded character set and encoding method of the elements in this Document object with string syntax that were set by the End User. (Was AttributesCharset)					
ElementsNaturalLanguage		String	Natural language	D	[rfc2911] §4.3.20
Indicates the natural language of the elements in this Document object with string syntax that were set by the End User. (Was AttributesNaturalLanguage)					
ErrorsCount		Integer	MIN:MAX	S	[doc-obj] §9.1.29
The total number of errors that a Printer has generated while processing and the Document.					
Impressions		Integer	0:MAX	D	[rfc2911] §4.3.17.2
The total size in number of impressions in this Document. (Was JobImpressions)					
ImpressionsCompleted		Integer	0:MAX	S	[rfc2911] §4.3.18.2
The number of impressions completed for this Document so far. (Was JobImpressionsCompleted)					
ImpressionsCompletedCurrentCopy		Integer	0:MAX	S	[rfc3381] §4.4
The number of impressions completed for the current iteration of this Document so far.					
JobId		integer	1:MAX	S	[doc-obj] §9.1.18
The Printer sets this to the ID of the Job containing this Document, i.e., a copy of the Job's JobId. The ID is unique for the Printer. (Was DocumentJobId)					
JobUri		String	Maxlength=1023	S	[doc-obj] §9.1.19
The Printer sets this to the URI for the job, i.e., a copy of the Job's JobUri. The URI is globally unique. (example: ipp://www.company.com/printers/myprinter/jobs/22) (Was DocumentJobUri)					
KOctets		Integer	0:MAX	D	[rfc2911] §4.3.17.1
The total size of this Document in integral units of 1024 octets. (Was JobKOctets)					
KOctetsProcessed		Integer	0:MAX	S	[rfc2911] §4.3.18.1
the total number of octets processed in integral units of 1024 octets so far. (Was JobKOctetsProcessed)					
LastDocument		Boolean		D	[rfc2911] §3.3.1
Has a 'true' value if this Document is the last Input Document for the Job. Default = 'false'.					

Document Element Name	Multivalued	Syntax	Constraint	Group*	Reference
Description (values)					
MediaSheets		Integer	0:MAX	D	[rfc2911] §4.3.17.3
The total number of media sheets to be produced for this Document. (was JobMediaSheets)					
MediaSheetsCompleted		Integer	0:MAX	S	[rfc2911] §4.3.18.3
The media-sheets completed marking and stacking for this Document so far. (Was JobMediaSheetsCompleted)					
MoreInfo		String	uri	S	[rfc2911] §4.3.4
URI used to obtain information intended for end user consumption about this specific Document. (example: " http://www.company.com/printer/embeddedjobpage "). (Was JobMoreInfo)					
OutputDeviceAssigned		String	Maxlength=127	S	[rfc2911] §4.3.13
Identifies the output device to which the Printer has assigned this Job (example: "Pete's Printer")					
PageOrderReceived		String	Type2 keyword	D	[PWG5100.3] §3.16
Indicates the order of pages in this Document data as supplied with the job. (<i>Keywords: 1ToNOrder, NTo1Order</i>)					
PrinterUpTime		Integer	1:MAX	S	[rfc2911] §4.3.14.4
The amount of time (in seconds) that the Printer has been up and running. (See Printer element "PrinterUpTime") (Was JobPrinterUpTime)					
SheetsCompletedCopyNumber		Integer	0:MAX	S	[rfc3381] §4.2
Number of the copy being stacked for this Document.					
TimeAtCompleted		Integer	MIN:MAX	S	[rfc2911] §4.3.14.3
The time at which this Document completed.					
TimeAtCreation		Integer	MIN:MAX	S	[rfc2911] §4.3.14.1
The time at which this Document was created in "PrinterUpTime" seconds.					
TimeAtProcessing		Integer	MIN:MAX	S	[rfc2911] §4.3.14.2
The time at which this Document first began processing.					
WarningCount		Integer	MIN:MAX	S	[PWG5100.4] §6.1
The total number of warnings that a Printer has generated while processing and printing the Document. (Was JobWarningCount)					

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707 **7.4 Printer Elements (Status and Description)**

708 * Group Key: S=Status, D=Description

709

Table 6 - Printer Elements (Status and Description)

Printer Element Name	Multivalued	Syntax	Constraint	Group*	reference
Description (values)					
ColorSupported		boolean		D	[rfc2911] §4.4.26
Indicates if this Printer is capable of any type of color printing at all, including highlight color.					
CompressionSupported	Yes	String	Type3 keyword	D	[rfc2911] §4.4.32
Identifies the set of Compression algorithms for Document content that this Printer supports. (Keywords: None, Deflate, Gzip, Compress)					
DeviceId		String	IEEE 1284	D	See Appendix 13.1
An identifier based on IEEE 1284 to identify the device that the Printer represents. Often used to load an appropriate driver on the client device. (example: “MANUFACTURER:ACME;COMMAND SET:PCL,PJL,PS,XHTML- Print+xml;MODEL:LaserBeam 9;COMMENT:example;ACTIVE COMMAND SET:PCL”)					
DocumentCharsetDefault		String	Maxlength=63	S	[jobx] §7.1
The default charset for Document content					
DocumentCharsetSupported	Yes	String	Maxlength=63	S	[jobx] §7.2
The allowed charsets for Document content					
DocumentCreationElementsSupported	Yes	String	Type2 keyword	S	[doc-obj] §10.1
The Processing and Description elements that are allowed in a Document Creation operation (e.g. SendDocument, SendUri)					
DocumentDigitalSignatureDefault		String	Type2 keyword	S	[jobx] §7.3
The default type of digital signature, if any, used in the Document Content. (Keywords: dss, none, pgp, smime, xmldsig)					
DocumentDigitalSignatureSupported		String	Type2 keyword	S	[jobx] §7.4
The allowed types of digital signature, if any, for the Document Content. (Keywords: dss, none, pgp, smime, xmldsig)					
DocumentFormatDefault		String	MimeMediaType [rfc2046], [rfc2048]	D	[rfc2911] §4.4.21
The document format (i.e. PDL) that this Printer has been configured to assume if the client does not specify a document format in any of the actions that supply document content for a Job. The value “application/octet-stream” has a special meaning. This value is used to indicate that a Printer is capable of auto-sensing the format of the document. (examples: application/octet-stream, application/postscript, application/vnd.hp-PCL, “text/plain; charset=utf-8”)					

Printer Element Name	Multivalued	Syntax	Constraint	Group*	reference
Description (values)					
DocumentFormatDetailsDefault		Complex	Complex	D	[jobx] §7.5
	The default distinct contained document formats when Document contains multiple files, i.e., the Document is a container DocumentFormat, such as ‘multipart/related’ or ‘application/zip’. (Includes DocumentSourceApplicationName, DocumentSourceApplicationVersion, DocumentSourceOsName, DocumentSourceOsVersion, DocumentFormat, DocumentFormatDeviceId, DocumentFormatVersion, DocumentNaturalLanguage).				
DocumentFormatDetailsSupported	YES	String	Type2 keyword	D	[jobx] §7.6
	Lists the type2 keyword names of the member attributes of DocumentFormatDetails that the Printer supports. (Examples: DocumentCreatorApplicationName, DocumentCreatorApplicationVersion, DocumentCreatorOsName, DocumentCreatorOsVersion, DocumentFormat, DocumentFormatDeviceId, DocumentFormatVersion, DocumentNaturalLanguage).				
DocumentFormat Supported	YES	String	MimeMediaType [rfc2046], [rfc2048]	D	[rfc2911] §4.4.22 .
	Identifies both the Document and Image formats supported by this Printer. Specifies the set of Document formats that the Printer supports. (examples: application/octet-stream, application/postscript, application/vnd.hp-PCL, “text/plain; charset=utf-8”). Also specifies the set of Image formats that the Printer supports. (examples: ‘image/jpeg’ which is a registered MIME Media Type with IANA.				
DocumentFormatVersionDefault		String	Maxlength=127	D	[jobx] §7.7
	The default level or version of the DocumentFormats that the Printer will use if not supplied by the Client in DocumentFormatDetails. (examples: “3” for DocumentFormat=application/postscript’ “5e” for DocumentFormat=application/vnd.hp-pcl; “ISO 12639-1:1996” for TIFF/IT Profile 1)				
DocumentFormatVersionSupported	YES	String	Maxlength=127	D	[jobx] §7.8
	The level or version of the DocumentFormats that the Printer will accept if supplied by the Client in DocumentFormatDetails. (examples: “3” for DocumentFormat=application/postscript’ “5e” for DocumentFormat=application/vnd.hp-pcl; “ISO 12639-1:1996” for TIFF/IT Profile 1)				
GeneratedNaturalLanguageSupported	YES	String	Natural Language	D	[rfc2911] §4.4.20
	Identifies the natural language(s) that the Printer supports in returned values of messages generated by the Printer, that is, the JobStateMessage, DocumentStateMessage, and PrinterStateMessage elements.				
ImpressionsSupported		RangeOfInteger	0:MAX	D	[rfc2911] §4.4.34
	Specifies the upper and lower bounds for the number of impressions allowed per job. (Was JobImpressionsSupported)				

Printer Element Name	Multivalued	Syntax	Constraint	Group*	reference
Description (values)					
JobCreationElementsSupported	YES	String	Type2 keyword	D	[prod-print1] §7.1
Identifies the set of Job Processing and Job Description elements (but not member elements) that this Printer will accept in a JobCreation action (Was JobCreationAttributesSupported)					
JobPasswordEncryptionSupported	Yes	String	type3 keyword	D	[prod-print1] §7.3
Identifies which encryption methods this Printer supports as values of the JobPasswordEncryption Job Description element for Secure Print. (<i>Keywords: None, Md2, Md4, Md5, Sha</i>)					
JobPasswordSupported		Integer	0:MAX	D	[prod-print1] §7.2
Indicates the maximum length that this Printer will accept for the unencrypted password which the client will encrypt as the value of the JobPassword Description Element.					
JobSpoolingSupported		String	type2 keyword	D	[prod-print1] §7.4
Indicates whether or not the Printer spools Jobs before interpreting the document data (RIPing). (<i>Keywords: Spool, Stream, Automatic</i>)					
KOctetsSupported		RangeOfInteger	0:MAX	D	[rfc2911] §4.4.33
Specifies the allowable upper and lower bounds of the total size per Job in integral units of 1024 octets that this Printer will accept. (Was JobKOctetsSupported)					
MaxSaveInfoSupported		Integer	1:MAX	D	[prod-print1] §7.5
Identifies the maximum number of SaveInfo member element collections that this Printer can accept in a job request.					
MediaColDatabase	Yes	Complex		D	[prod-print1] §7.6
Identifies all of the Media supported by this Printer using a collection value for each which identifies the media characteristics. This element is not returned when 'all' is requested. (<i>Includes any of the MediaCol member elements</i>)					
MediaSheetsSupported		RangeOfInteger	0:MAX	D	[rfc2911] §4.4.35
Specifies the upper and lower bounds for the number of media sheets allowed per job by this Printer. (Was JobMediaSheetsSupported)					
MultipleDocumentJobsSupported		boolean		D	[rfc2911] §4.4.16
Indicates whether this Printer supports more than one Document per job, i.e., more than one SendDocument and/or SendUri request per job. A multi-Document per job Printer must implement this element and have a value of 'true'. A single Document per job Printer may either not support this element or support it with a value of 'false'.					

Printer Element Name	Multivalued	Syntax	Constraint	Group*	reference
Description (values)					
MultipleOperationTimeout		Integer	1:MAX	D	[rfc2911] §4.4.31
	Identifies the minimum time (in seconds) that this multi-Document per job Printer will wait between actions on an open job before timing out. The actions can add Document to the open Job or close the Job. Timeouts are handled in an implementation specific manner. Multi-Document per job Printers must implement this element. The recommended value is greater than 60 and less than 240.				
NaturalLanguageConfigured		String	Natural language	D	[rfc2911] §4.4.19
	Indicates the natural language of the elements with string syntax that were set by the Administrator or Manufacturer.				
OperationsSupported	Yes	String	type2 keyword	D	[rfc2911] §4.4.15
	The set of supported actions for the Printer and Job. (Keywords: PrintJob, PrintUri, CreateJob, SendDocument, SendURI, ValidateJob, ValidateDocument, CancelJob, HoldJob, ReleaseJob, RestartJob, SetJobElements, SetDocumentElements, CancelDocument, DeleteDocument, GetJobs, GetPrinterElements, GetJobElements, GetDocuments, GetDocumentElements, GetPrinterSupportedValues, PausePrinter, ResumePrinter, PurgeJobs, DisablePrinter, EnablePrinter, SetPrinterElements).				
PagesPerMinute		Integer	0:MAX	D	[rfc2911] §4.4.36
	Specifies the nominal number of pages per minute which may be generated by this Printer.				
PagesPerMinuteColor		Integer	0:MAX	D	[rfc2911] §4.4.37
	Specifies the nominal number of pages per minute which may be generated by this Printer when printing color.				
ParentPrintersSupported	Yes	String	Uri	D	[admin-ops] §7.2
	Contains the URI of the non-leaf Printer for which this Printer is the immediate subordinate.				
PdloverrideSupported		String	type2 keyword	D	[rfc2911] §4.4.28
	Expresses the ability of this Printer to (1) guaranteed, (2) attempt to, or (3) not attempt to override a Document's processing instructions with Job Processing Elements. (<i>Keywords: Attempted, Guaranteed, NotAttempted</i>)				
PrinterCurrentTime		String	DateTime [rfc1123]	S	[rfc2911] §4.4.30
	Indicates the current date and time. (example: Fri, 03 May 2002 08:49:37 GMT)				
PrinterDetailedStatusMessages	Yes	String	Maxlength=1023	S	[prod-print2] §7.7
	Specifies additional detailed and technical information about this Printer for the technical staff.				

Printer Element Name	Multivalued	Syntax	Constraint	Group*	reference
Description (values)					
PrinterDriverInstaller		String	Uri	D	[rfc2911] §4.4.8
	Intended for consumption by automata to locate the driver installer for this Printer object. (example: " http://www.company.com/printer/installerProgram ") Note: This element has not been used by any known implementation and is therefore deprecated.				
PrinterInfo		String	Maxlength=127	D	[rfc2911] §4.4.6
	Descriptive information about this Printer object.(example: "Out of courtesy for others, please print only small (1-5 page) jobs at this printer")				
PrinterIsAcceptingJobs		Boolean		S	[rfc2911] §4.4.23
	Indicates whether this Printer is currently able to accept jobs.				
PrinterLocation		String	Maxlength=127	D	[rfc2911] §4.4.5
	Identifies the location of the device that this Printer represents. (<i>Example: Pete's Office</i>)				
PrinterMakeAndModel		String	Maxlength=127	D	[rfc2911] §4.4.9
	Identifies the make and model of the device that this Printer object represents. (<i>Example: "Xerox Phaser 7700", "HP LaserJet 1000", "Lexmark Optra Color 45"</i>)				
PrinterMessageFromOperator		String	Maxlength=127	D	[rfc2911] §4.4.25
	End user information for this Printer. (<i>Example: "printer unavailable until 1pm due to preventive maintenance"</i>)				
PrinterMoreInfo		String	uri	D	[rfc2911] §4.4.7
	URI used to obtain information intended for end user consumption about this specific Printer. (<i>Example: "http://www.company.com/printer/embeddedwebpage"</i>)				
PrinterMoreInfoManufacturer		String	uri	D	[rfc2911] §4.4.10
	URI used to obtain more information for end user consumption about this type of device that this Printer represents. (<i>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"</i>)				
PrinterName		String	Maxlength=127	D	[rfc2911] §4.4.4
	The end-user friendly name of this Printer object. (example: "Pete's Printer")				
PrinterState		String	type1 keyword	S	[rfc2911] §4.4.11
	Identifies the current state of the device(s) that this Printer represents (see Figure 4). (See "PrinterStateReasons" below) (<i>Keywords: Idle, Processing, Stopped</i>)				

Printer Element Name	Multivalued	Syntax	Constraint	Group*	reference
Description (values)					
PrinterStateMessage		String	Maxlength=1023	S	[rfc2911] §4.4.13
	Information about the "printer-state" and "printer-state-reasons" elements in human readable text localized by the Printer according to the natural language supplied in the client's query request. (Example: "Printer stopped due to paper jam" for an English request)				
PrinterStateReasons	Yes	String	type2 keyword	S	[rfc2911] §4.4.12
	Augments the "printer-state" element to give more detailed information about this Printer's state. Each keyword value may have a suffix to indicate its level of severity. The three suffixes (levels) are: "Report" (least severe), "Warning", and "Error" (most severe). Keywords without suffixes are assumed to be "Error" (most severe). See reference for semantics of defined keywords. (Keywords: Other, None, AttentionRequired, ConnectingToDevice, CoverOpen, Deactivated, DeveloperEmpty, DeveloperLow, DoorOpen, FuserOverTemp, FuserUnderTemp, HoldNewJobs, InputTrayMissing, InterlockOpen, InterpreterResourceUnavailable, MarkerSupplyEmpty, MarkerSupplyLow, MarkerWasteAlmostFull, MarkerWasteFull, MediaEmpty, MediaJam, MediaLow, MediaNeeded, MovingToPaused, OpcLifeOver, OpcNearEol, OutputAreaAlmostFull, OutputAreaFull, OutputTrayMissing, Paused, Shutdown, SpoolAreaFull, StoppedPartly, Stopping, TimedOut, TonerEmpty, TonerLow)				
PrinterUpTime		integer	1:MAX	S	[rfc2911] §4.4.29
	The amount of time (in seconds) that this Printer has been up and running				
PrinterUriSupported	Yes	String	uri	D	[rfc2911] §4.4.1
	Contains at least one URI for this Printer object. The PrinterUriSupported, UriAuthenticationSupported and the UriSecuritySupported are parallel elements. Each of these elements must have the same cardinality. The "i"th value of each of these elements describes the URI for the printer, the authentication mechanism used and the security method used. (Example: <i>ipp://www.company.com/printer</i>)				
QueuedJobCount		integer	0:MAX	S	[rfc2911] §4.4.24
	The number of jobs that this Printer has accepted but has not yet completed.				
ReferenceUriSchemesSupported	Yes	String	UriScheme	D	[rfc2911] §4.4.27
	Which URI schemes are supported by this Printer to retrieve Document This element must be supported if the Printer is capable of print by reference. (Example: <i>ftp, http</i>)				
RepertoiresSupported	Yes	String	Repertoire	D	[Repertoire] §3.1
	Indicates the subsets of characters that are actually present in the Printer. (Example: <i>IANA: iso-8859-1, Unicode: Latin 1, Vendor: Oak Floral</i>)				
SubordinatePrintersSupported	Yes	String	Uri	D	[admin-ops] §7.1
	Contains the URI of the immediate subordinate Printers associated with this Printer.				

Printer Element Name	Multivalued	Syntax	Constraint	Group*	reference
Description (values)					
UriAuthenticationSupported	Yes	String	type2 keyword	D	[rfc2911] §4.4.2
The Client authentication mechanism that this Printer object uses to identify the user. (See PrinterUriSupported for additional information) (<i>Keywords: None, Requesting-UserName, Basic, Digest, Certificate</i>)					
UriSecuritySupported	Yes	String	type2 keyword	D	[rfc2911] §4.4.3
Identifies the security mechanisms used for accessing this Printer object. (See PrinterUriSupported for additional information) (<i>Keywords: None, Ssl3, Tls</i>)					
VersionsSupported	Yes	String	type2 keyword	D	[rfc2911] §4.4.14
The versions of the semantics that this Printer supports. (<i>Keywords: 1.0, 1.1, etc. </i>).					
WhichJobsSupported	Yes	String	type2 keyword	D	[prod-print2] §7.8
Contains the set of values that this Printer supports for the WhichJobs operation element that the client may supply in the Get-Jobs operation as a job filter. (<i>Keywords: Aborted, All, Canceled, Completed, NotCompleted, Pending, PendingHeld, Processing, ProcessingStopped </i>)					

710

8 Status Strings

711

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

713

Table 7 Status strings indicating some degree of success

Status String	Actions where status may occur
Reference	Description of status
SuccessfulOk	Any
Rfc2911	Action succeeded and no requested element were substituted or ignored.
SuccessfulOkConflictingElements	CreateJob, PrintJob, PrintUri, SendDocument, SendUri, ValidateDocument, ValidateJob
	Action succeeded but some elements were conflicting and have been substituted or ignored.
SuccessfulOkIgnoredOrSubstitutedElements	CreateJob, PrintJob, PrintUri, SendDocument, SendUri, ValidateDocument, ValidateJob
	Action succeeded but some unsupported elements were ignored or substituted.

714

715

Table 8 Status strings indicating error on the part of the Client

Status String	Actions where status may occur
	Description of status
ClientErrorBadRequest	Any
	Malformed syntax or constraint exceeded.

Status String	Actions where status may occur
Description of status	
ClientErrorCharsetNotSupported	Any
	The charset is not supported.
ClientErrorCompressionError	PrintJob, PrintUri, SendDocument, SendUri
	An error occurred when uncompressing the Document Content.
ClientErrorCompressionNotSupported	PrintJob, PrintUri, SendDocument, SendUri
	The compression of the Document Content is not supported.
ClientErrorConflictingElements	CreateJob, PrintJob, PrintUri, SendDocument, SendUri, SetDocumentElements, SetJobElements, SetPrinterElements, ValidateDocument, ValidateJob
	Some supplied elements are conflicting. The Printer must return them in the Unsupported Elements group.
ClientErrorDocumentAccessError	PrintUri, SendUri
	An error occurred when the Printer attempted to access the Document Content through the URI supplied.
ClientErrorDocumentFormatError	PrintJob, PrintUri, SendDocument, SendUri
	An error occurred when interpreting the Document Content.
ClientErrorDocumentFormatNotSupported	CreateJob, PrintJob, SendDocument, SendUri, ValidateDocument, ValidateJob
	The document format is not supported.
ClientErrorElementsNotSettable	SetDocumentElements, SetJobElements, SetPrinterElements
	The supplied element(s) are not settable
ClientErrorElementsOrValuesNotSupported	CreateJob, PrintJob, PrintUri, SendDocument, SendUri, SetDocumentElements, SetJobElements, SetPrinterElements, ValidateDocument, ValidateJob
	The supplied element(s) or Values are not supported
ClientErrorForbidden	Any
	The Printer understood the request, but is refusing to fulfill it for authentication and/or authorization reasons. The client should not try again even with credentials.
ClientErrorGone	Any
	The target object is no longer available.
ClientErrorJobNotAcceptingAdditionalDocuments	SendDocument, SendUri
	Client attempted to add a Document to a Job after indicating the last document was sent
ClientErrorNotAuthenticated	Any
	The request requires user authentication. The client may try again with suitable authentication.
ClientErrorNotAuthorized	Any

Status String	Actions where status may occur
	Description of status
	The requester is not authorized to perform the request. The Client should not try again.
ClientErrorNotFound	ActivatePrinter, CancelDocument, CancelJob, DeactivatePrinter, DeleteDocument, DisablePrinter, EnablePrinter, GetDocumentElements, GetDocuments, GetJobElements, GetJobs, GetPrinterElements, GetPrinterSettableElementValues, HoldJob, PromoteJob, ReleaseJob, ReprocessJob, RestartJob, ResumeJob, SendDocument, SendUri, SetDocumentElements, SetJobElements
	The target object was not found.
ClientErrorNotPossible	
	The action cannot be performed, because of the state of the target object.
ClientErrorRequestEntityTooLarge	Any
	The request and/or the Document Content is too large.
ClientErrorRequestValueTooLong	Any
	An element value in the request is longer than the Printer supports.
ClientErrorTimeout	SendDocument, SendUri
	The client did not produce a subsequent request within the time that the Printer was prepared to wait.
ClientErrorUnsupportedInterface	
	PSI specific error indicating a request for information for a non-existent interface
ClientErrorUriNotResolvable	
	PSI specific error indicating inability of PSI Server to communicate with a Target Device
ClientErrorUriSchemeNotSupported	PrintUri, SendUri
	The URI scheme is not supported.
ClientInvalidUri	
	PSI specific error indicating the URI provided is not well formed

716

717

Table 9 Status strings indicating error on the part of the Printer

Status String	Actions where status may occur
Reference	Description of status
ServerErrorBusy	Any
	A temporary error indicating that the Printer is too busy processing jobs and/or other requests. A Client should try again later.
ServerErrorDeviceError	CreateJob, PrintJob, PrintUri, SendDocument, SendUri

Status String	Actions where status may occur
Reference	Description of status
	The Printer encountered a device error that causes it to be unable to accept a new request. For example, a paper jam for a Printer that doesn't spool and so cannot accept a new job submission until the jam is fixed.
ServerErrorInternalError	Any
	An unexpected internal error occurred.
ServerErrorJobCanceled	CancelDocument, CancelJob, DeleteDocument, SendDocument, SendUri, SetDocumentElements, SetJobElements
	The job has been canceled by an operator or aborted by the system. For example, while the Client is transmitting the Document Content to the Printer.
ServerErrorMultipleDocumentJobsNotSupported	SendDocument, SendUri
	The Printer doesn't support multiple document jobs and the client attempted to supply a second SendDocument or SendUri request. The Printer's "MultipleDocumentJobsSupported" Printer Description element is 'false'.
ServerErrorNotAcceptingJobs	CreateJob, PrintJob, PrintUri
	The Printer is not currently accepting jobs. Its "PrinterIsAcceptingJobs" Printer Description element is 'false'.
ServerErrorNotCancelableAtTargetDevice	CancelJob, CancelJob
	PSI specific error indicating the Print Service is unable to direct the Target Device to cancel the Job.
ServerErrorOperationNotSupported	Any unsupported action
	The Printer does not support the requested action.
ServerErrorPrinterIsDeactivated	Any except Activate-Printer
	The Printer has been deactivated using the Deactivate-Printer operation and is only accepting the Activate-Printer
ServerErrorServiceUnavailable	Any
	The Printer is unable to service the request at this time due to overloading or maintenance. The client should try again later as per the "message" Operation element.
ServerErrorTargetDeviceNotReachable	CreateJob
	PSI specific error indicating the Print Service is unable to communicate with the specified Target Device.
ServerErrorTargetDeviceUrlNotSupported	CreateJob
	PSI specific error indicating the Print Service does not support the specified Target Device.
ServerErrorTemporaryError	Any
	A temporary error such as a buffer full write error, a memory overflow, or a disk full condition.
ServerErrorTooManyDocuments	SendDocument, SendUri
	An attempt to create a Document in a Job failed because it exceeded the Printer's capacity for this Job at this time..
ServerErrorTooManyJobs	PrintJob, PrintUri, CreateJob
	An attempt to create a Job in a Job failed because it exceeded the Printer's

Status String	Actions where status may occur
Reference	Description of status
	capacity at this time..
ServerErrorVersionNotSupported	Any
	The Printer doesn't support the requested major version of the protocol and returns the closest version that it does support.

718

719

720 9 Semantic Elements to be added

721 ? Color and Imaging (awaiting reference from CIP4/PWG)

722 10 Change Log

723 10/31/03 PJZ Clarified MediaKey

724 10/24/03 PJZ Clarified MediaSize units, added PrinterStateReason. Updated boiler plate

725 8/20/03 PJZ cross checked tables and figures

726 8/15/03 PJZ Synched specification with [jobx], [override] and [doc-obj],

727 6/30/03 PJZ Added Overrides

728 4/21/03 PJZ Removed Tumble value from Sides

729 3/31/03 PJZ Cleaned up Naming of Classes, Elements and Values (§ 4.1) and IPP
730 Mapping (§14). Fixed case of element values in tables

731 3/26/03 PJZ Updated with changes from Document Object Specification

732 3/21/03 PJZ Added Character Repertoire

733 3/17/03 PJZ Removed PSI specific actions, corrected list of excluded elements in
734 appendix B

735 3/16/03 TNH/PJZ Updated with the Document Object specifications. Added CloseJob
736 that PSI is using. Renamed SendData to SendDocumentData to indicate what data.
737 Prefixed JobId, JobPrinterUri, and JobUri Document Description elements with Document,
738 so no Document attributes have a Job prefix. Added the following Document Description
739 elements: DocumentContainerSummary, DocumentCreatorApplicationName,
740 DocumentCreatorApplicationVersion, DocumentCreatorOsName,
741 DocumentCreatorOsVersion, DocumentFormatDetected, DocumentFormatDeviceId,
742 DocumentFormatVersion, DocumentIdUri, DocumentMessage, ElementNaturalLanguage.

- 743 1/29/03 PJZ Incorporated comments from Face to Face preparing document for Last Call.
744 Updated abstract, introduction and terminology sections. Added section to capture known
745 semantic elements “waiting in the wings”. Sorted status strings alphabetically. Added PSI
746 specific actions and status strings. Corrected Job & Doc state transition diagrams.
- 747 1/13/03 PJZ Expanded on Processing Actual Element, Incorporated comments from
748 teleconference
- 749 11/1/02 PJZ Fixed up status code tables. The DocumentProcessing subgroups were
750 merged into the DocumentProcessing element. Moved fidelity elements to JobDescription.
751 Finished incorporating Prod-Print2 and rfc3381 elements. Cross checked figures tables and
752 associated schema. Added –Actual extension.
- 753 10/28/02 PJZ “XML”ified attributes and object & added IPP mapping information
754 describing change. Completed adding [admin-ops], [PWG5100.1]. Rationalized “Pages”
755 and “PageRanges”. Changed “State” groups to “Status” to avoid name collision with
756 “State” elements (e.g. “JobState”)
- 757 10/14/01 TNH Fixed some Figure caption problems. Instead of deprecating
758 AttributeFidelity, made it work with JobMandatoryAttributes. Added way to specify the
759 member attribute in a collection attribute (Attr.Member). Clarified PagesPerSubset as
760 combining all Input Documents into a single contiguous Input-Pages stream and then
761 subsetting it into Output Documents. Added GeneratedNaturalLanguageSupported from
762 RFC 2911.
- 763 10/07/02 PJZ Updated references. Added JobCoverFront, JobCoverBack, and natural
764 language elements. Reworked section 5.3.5 GetPrinterSettableAttributeValues. Corrected
765 Action table and section.
- 766 9/30/02 PJZ Began conversion of status string section to table. Corrected and updated
767 figures. Removed detailed IPP encoding section. Added globalization section
- 768 9/27/02 TNH Version 0.11: Spell checked, corrected some misspelled attribute names.,
769 Finished moving Compression and DocumentFormat from the Processing to the Document
770 Description tables. Improved the attributes descriptions, especially those that are related to
771 other attributes. Added the attributes and values from [prod-print2]. Added several
772 attributes from IPP documents that were missing for some reason. Corrected a number of
773 Maxlength values. Sorted the values of JobStateReasons, DocumentStateReasons, and
774 PrinterStateReasons, so easier to keep track of. Add References: [adm-ops], [prod-print2].
- 775 9/16/02 PJZ Added more definitions and document actions. Incorporated the comments
776 from teleconference and TH mail note. Updated references.
- 777 9/9/02 PJZ Final edits to ready document for review. Updated all figures and added
778 highlighting of sections to review.
- 779 9/1/02 PJZ Changes from email input and PWG meeting. Printer/Job/Document
780 Attribute groups broken out into State and Description groups

- 781 8/16/02 PJZ Changed Content back to document, Added PWG5100.1, PWG5100.2,
 782 PWG5100.3, PWG5100.4, job-progress to model. Filled out document object, added “Job
 783 Level” subcategory to Processing attributes
- 784 6/17/02 PJZ Added high level description of PWG Action semantics and Printer state
 785 transitions. Returned VersionsSupported and OperationsSupported.
- 786 6/4/02 SAA Modified to split the Job Attributes into 3 categories:
 787 1) Processing Attributes
 788 2) Content Attributes
 789 3) Job Attributes
 790
- 791 The Processing Attributes were further split into 3 subcategories:
 792 1) Rendering attributes
 793 2) Imposition Attributes
 794 3) Finishing Attributes
- 795 Added attributes from UPnP Print Basic service template: MediaSize, MediaType,
 796 DeviceId attributes.
- 797 Removed references to Mandatory vs. Optional since a semantic model should not
 798 dictate what is used or not used by the future solutions targeted at specific markets.
 799 For example, UPnP picked specific attributes for the SOHO market and did not need
 800 all of the Mandatory IPP attributes.
- 801 Modified Printer Description Attributes with the following:
 802 1) Added in DeviceId.
 803 2) Changed Document* to Content*.
 804 3) Removed VersionsSupported and OperationsSupported since these are
 805 dependent on the interface used in specific solutions.
- 806 5/29/02 PJZ Incorporated comments prior to initial release
- 807 5/26/02 TH detailed review of the draft
- 808 5/23/02 TH re-organize draft with comments from Melinda Grant
- 809 5/16/02 PJZ original draft

810

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867 13 Appendix A – UPnP Definitions

868 13.1 DeviceId

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

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

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

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

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

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

887

888 MANUFACTURER:ACME Manufacturing;

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

890 MODEL:LaserBeam 9;

891 COMMENT:Anything you like;

892 ACTIVE COMMAND SET:PCL;

893

894 (See IEEE 1284-2000 clause 7.6)

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

898 **14 Appendix B – IPP Mapping**

899 ***14.1 Changes to remove some IPP specific aspects***

900 This section lists some changes to remove some IPP specific aspects from the PWG Semantic
901 Model.

902 1. IPP enumerations use their well-known string name instead of the integer enumeration.

903 This applies not only to IPP attributes but also to IPP Operations.

904 2. Any IPP attribute name containing “ipp” has had the “ipp” removed.

905 3. All IPP attribute and operation keywords have the substring “attribute” replaced with
906 “element”.

907 4. All IPP operation, status codes, attribute, and attribute value keyword names have had the
908 first letter capitalized and the ‘-’ character removed and the character following the ‘-’ has
909 been capitalized. (All mixed case PWG Semantic Model keywords can be interpreted
910 without regard to case.)

- 911 5. The IPP attribute value keywords defined in other registries remain unchanged. Note that
912 the PWG defined media keyword values for the Semantic Elements MediaType,
913 MediaColor, MediaSizeName and Media use the values as specified in PWG 5101.1.
- 914 6. The types of the attributes have been simplified. All keyword, text, name, DateTime, uri,
915 UriScheme, enum and mimeType types are represented by the simple string type.
916 The “Constraint” column in section 7 clarifies the mapping of the string types in the
917 Semantic Model to their original types (e.g. JobState type:string constraint: Type 1
918 keyword). Note that IPP Attributes of type Keyword or Name are represented as strings
919 with a Type 2 or 3 keyword constraint
- 920 7. The “1setOf X” types are represented as the base type and the “Multivalued” field in the
921 tables set to “Yes”.
- 922 8. Integers and Boolean types remain the same.
- 923 9. Any applicable constraints placed on the attribute values has been noted in the tables.
- 924 The term “keyword” continues to be used for string values enumerated as part of the PWG Model.
925 The term “object” is sometimes changed to “data class”. The term “operation” has been changed to
926 “action” to use the term more frequently used with XML.
- 927 The following IPP attributes are not included: operation-id, attributes-charset, request-id.

928 **14.2 Attribute Group Mapping**

929 IPP Actions may contain a number of parameters. The first parameter is always the Operation
930 Attributes for the Action. The IPP Operation Attributes have been mapped to the Printer and Job
931 Description Element Groups.

932 The IPP Printer Description Attributes map to the PWG Printer Status Elements and Printer
933 Description Elements. The IPP Job Description Attributes map to the PWG Job Status Elements
934 and Job Description Elements.

935 The IPP Job Template Attributes map to the PWG Job Processing Elements and Document
936 Processing Elements. IPP does not differentiate between the PWG Processing Elements subgroups
937 of Rendering, Imposition and Finishing Elements.

938