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Printer Working Group (PWG)

Overview of the PWG Semantic Model

June 14, 2002

Version 0.11

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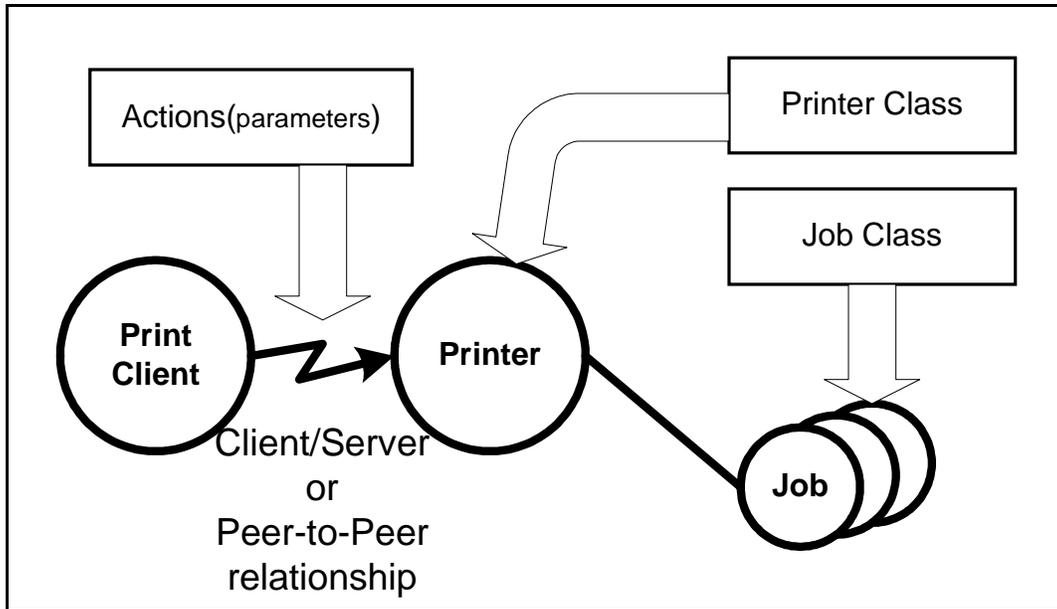
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78 **1 Model Overview**

79 The Printer Working Group (PWG) has defined a simplified printing model. It represents printing
 80 in either a client/server print paradigm or a peer-to-peer print paradigm. The PWG model describes
 81 the device as a Printer object. A Printer object may represent one or more physical Printers. The
 82 other main object is the Job. A Printer can contain zero or more Jobs and a Job is contained in only
 83 one Printer. The PWG model contains methods that act upon these objects.



84

85 **Figure 1 Model Overview**

86 The objects are represented in the semantic model as data classes. The methods are represented as a
 87 set of actions that act upon those data classes. The actions permit the creation and control of Jobs
 88 as well as the submission of a Job’s document content or URL reference to the document content.
 89 Other actions allow the control of the Job or Printer. There are also actions to query a Printer or
 90 Job to access their attributes or to obtain a list of jobs.

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

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

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

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

97

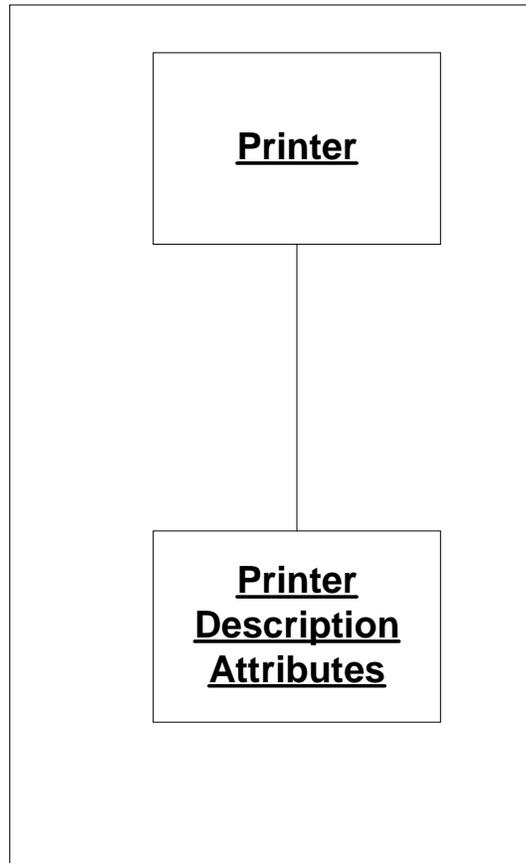
98 **2 Data Classes**

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

101 **2.1 Printer Object Class**

102 The Printer class is represented by a collection of attributes as shown in Figure 2 Printer Class.

103 The Printer Description Attributes are presented in detail in Table 4 - Printer Description Attributes



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105

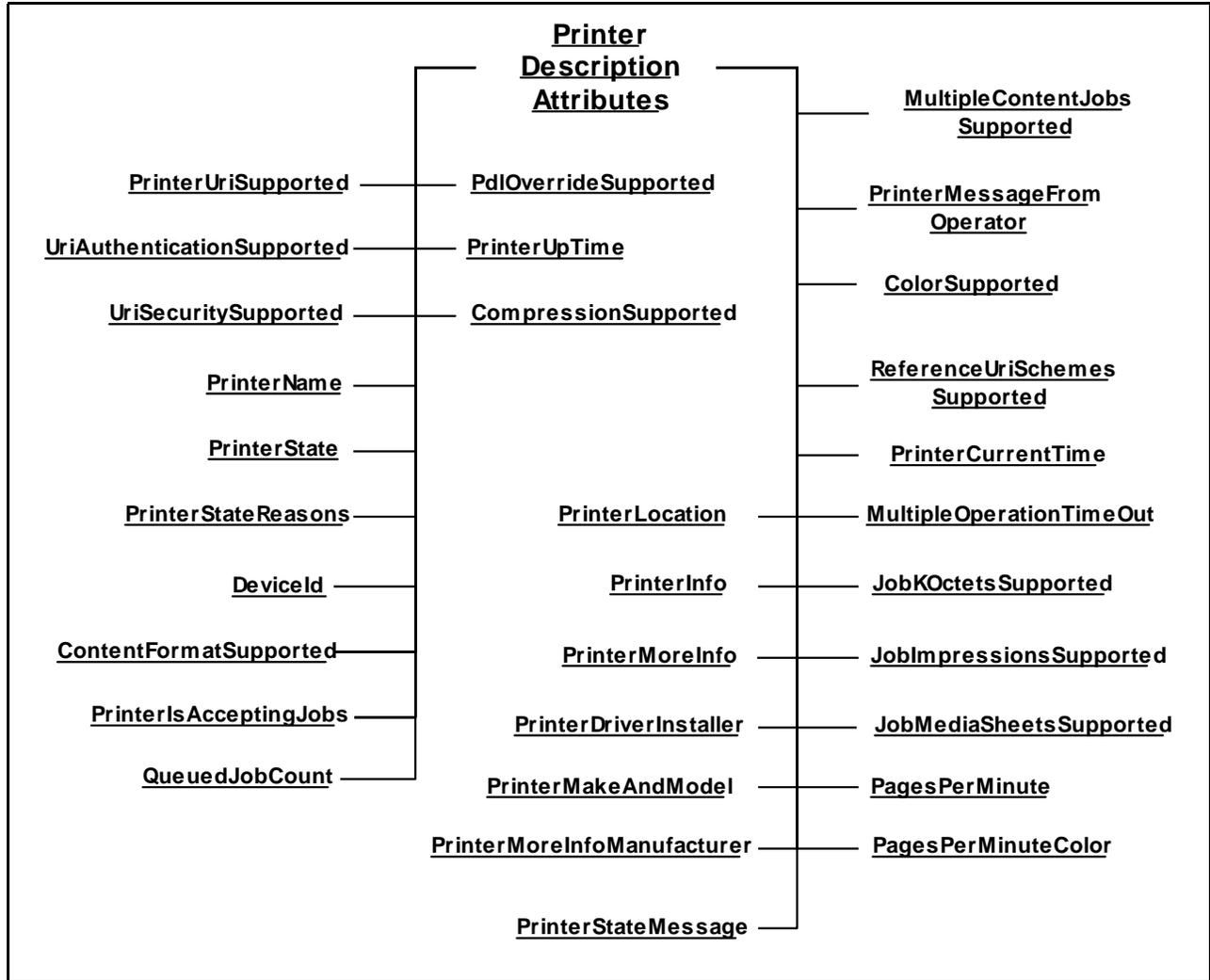
Figure 2 Printer Class

106 **2.1.1 Printer Description Attributes**

107 Figure 3 shows the Printer Description Attributes. These attributes represent the processing state of
108 the printer and information that describes the printer such as its make, where it's located and its
109 speed. It also contains the Printer attributes that describe attribute values the client can supply in
110 action requests. The semantics of the attributes are summarized in Table 4 - Printer Description
111 Attributes

112

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Figure 3 Printer Description Attributes

116 **2.2 Job Object Class**

117 The Job object class is represented by a collection of attributes divided into three groups as shown
118 in Figure 4 Job data Class:

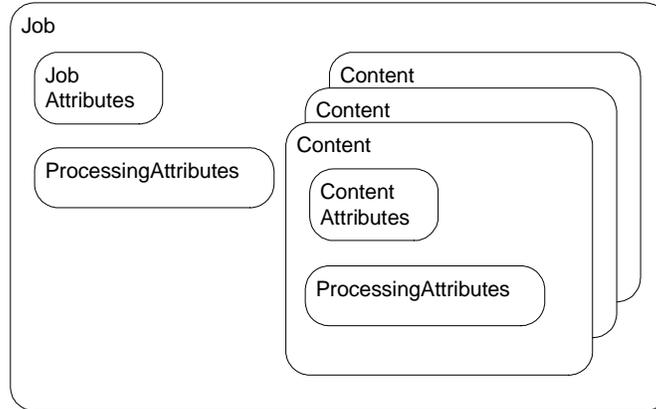
119 Processing Attributes - shown in Table 4 Processing Attributes.

120 Job Attributes - shown in Table 2- Job Attributes.

121 Content Attributes – shown in Table 3 – Content Attributes

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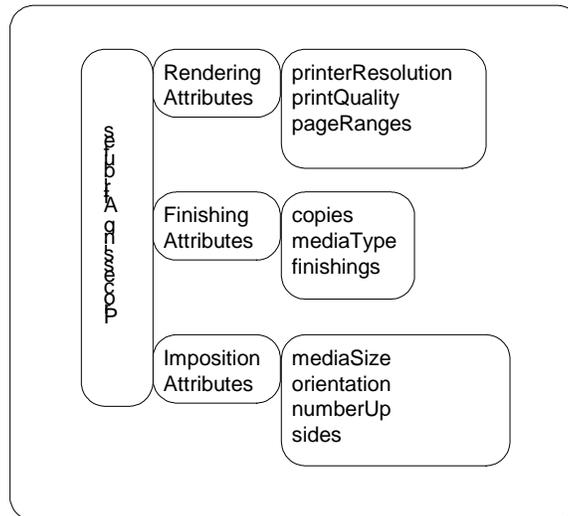
Figure 4 Job data Class

125 2.2.1 Processing Attributes

126 Figure 6 Processing Attributes shows the Processing Attributes. The Processing attributes are split
127 into three groups:

- 128 1) Rendering Attributes identify the different rendering attributes that determine the quality
129 and resolution of how marks are made on the page.
- 130 2) Finishing Attributes define how multiple physical sheets are manipulated to create final
131 output products. The output could be a job, document or page depending on the defined
132 solution interface.
- 133 3) Imposition Attributes identify how the logical pages look on the MediaSheet.

134



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Figure 5 - Processing Categories

137 An interface will support the processing attributes that are required for its application. The
138 semantics of the attributes are summarized in along with a brief description of each attribute.

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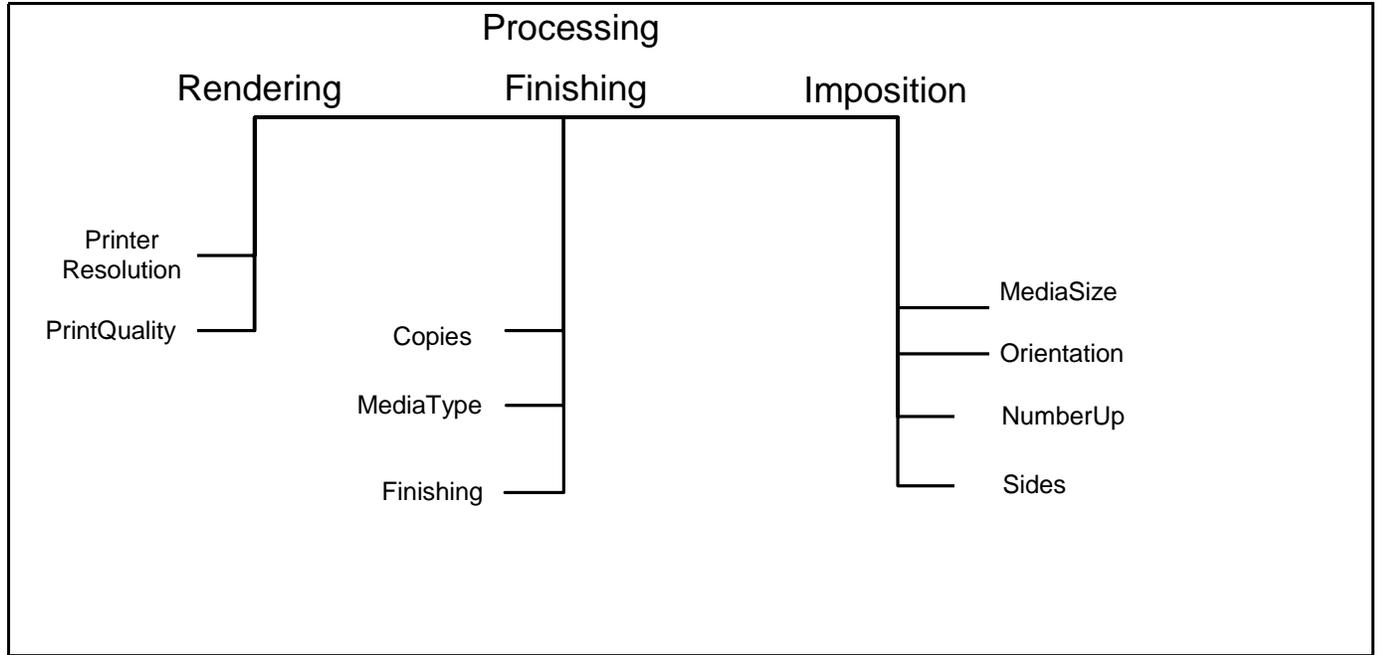
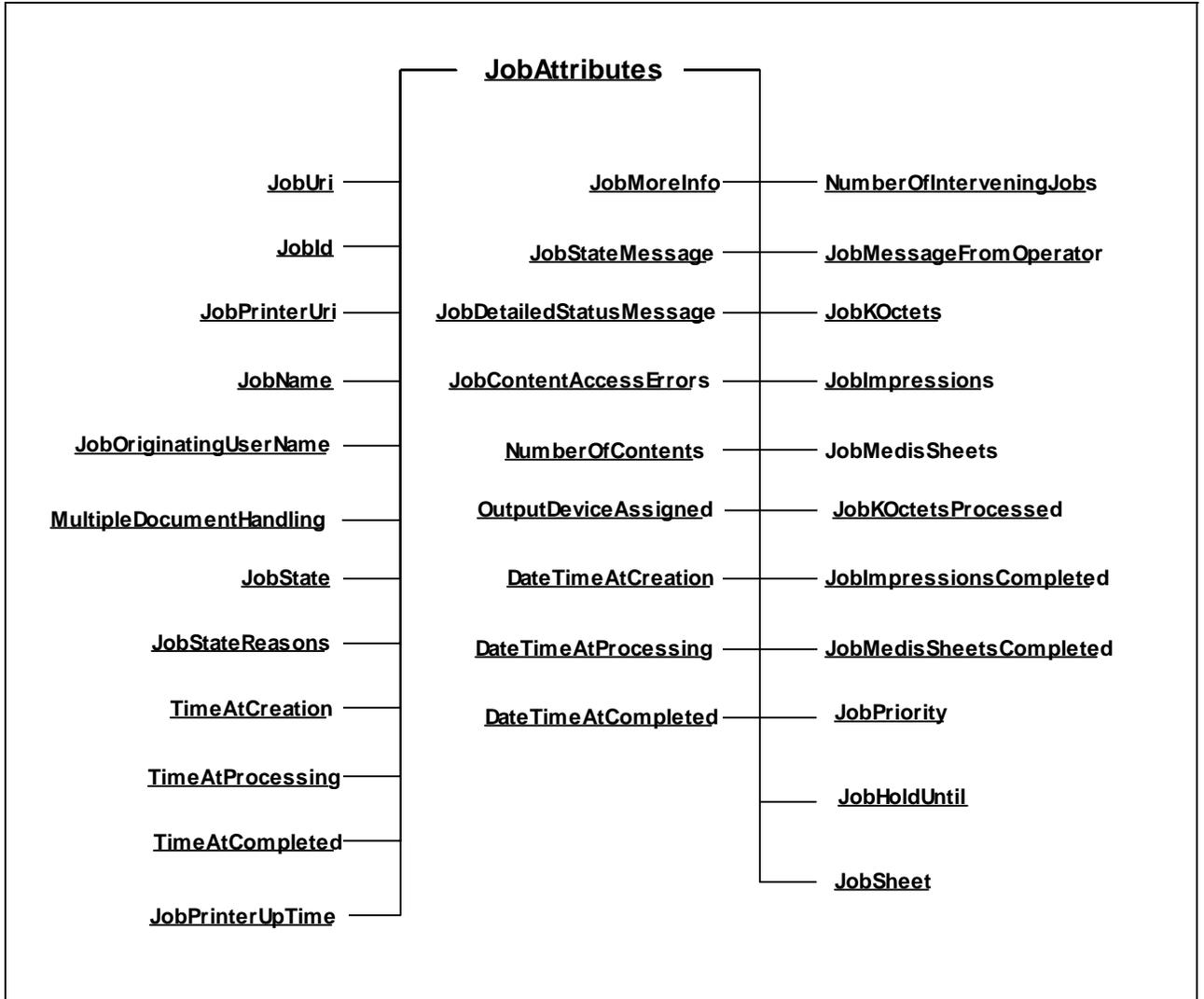


Figure 6 Processing Attributes

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141 **2.2.2 Job Attributes**

142 **Figure 7** shows the Job Attributes. The semantics of the attributes are summarized in **Table 2- Job**
 143 **Attributes.**



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145

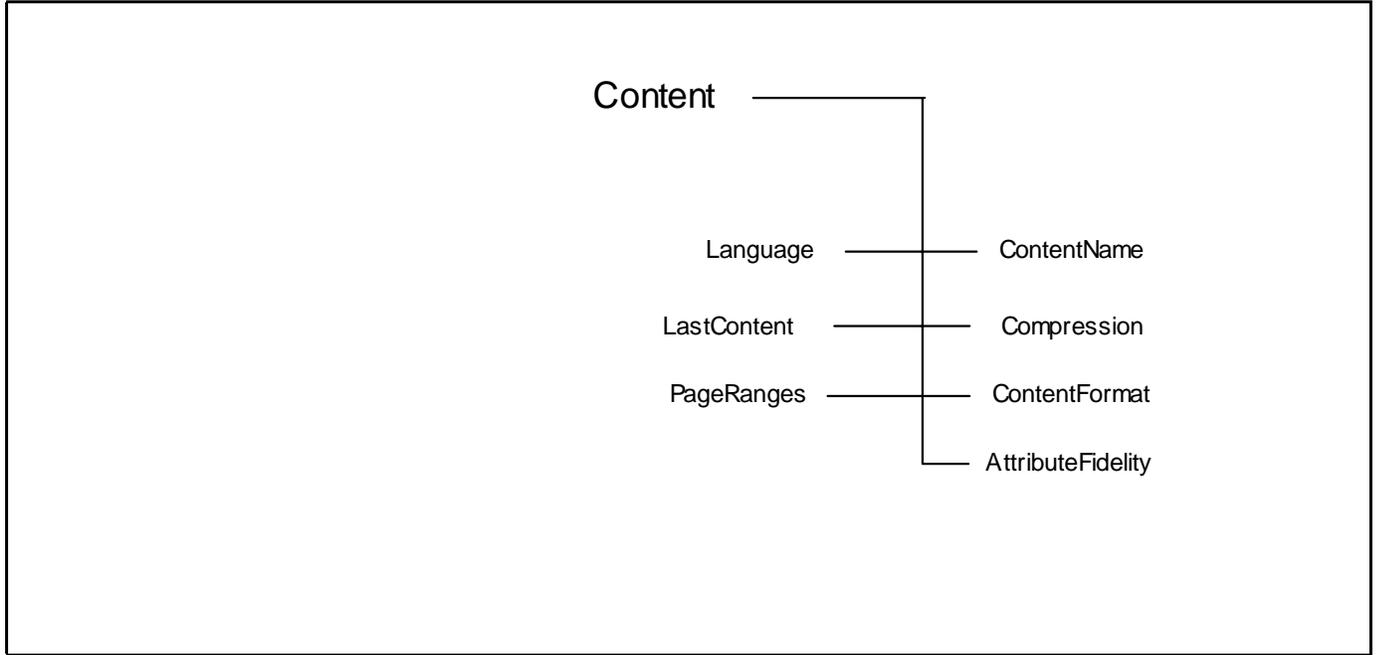
146
147

Figure 7 Job Attributes

148

149 **2.2.3 Content Attributes**

150 Figure 8 shows the Content Attributes. A Printer should support each Content Attribute that
151 represents a feature of the Printer. The semantics of the attributes are summarized in Table 3 –
152 Content Attributes



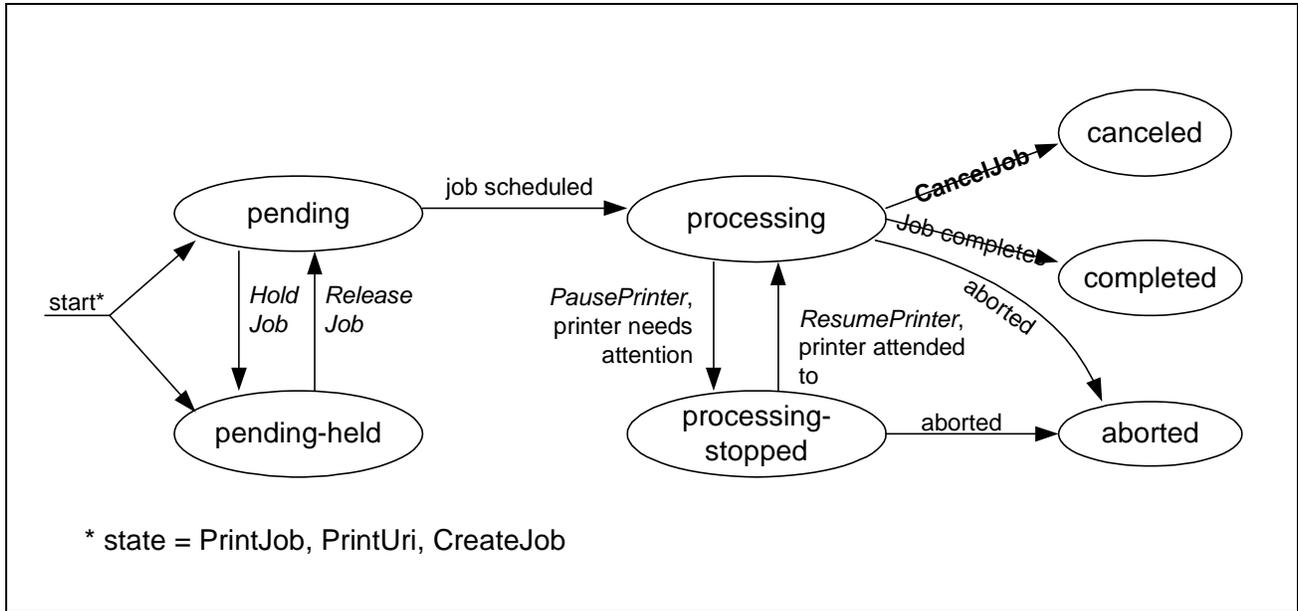
153
154

155

Figure 8 Content Attributes

156 **2.2.4 The "JobState" attribute and the Job Life Cycle**

157 The "JobState" attribute is one of the most important Job attributes. Figure 9 shows the values of
 158 the "JobState" attribute and the Job life cycle as affected by actions on the Job, Printer, and job
 159 processing.



160

161 **Figure 9 The "JobState" Job Attribute and the Job object life Cycle**

162 **2.3 Summary of Job and Printer object attributes**

163 This appendix summarizes the attributes for the Job and Printer objects. For each attribute, the
 164 tables contain the attribute name, whether the attribute is multi-valued, its syntax, constraints
 165 (MAX = 2**31-1, MIN = -2**31, and Maxlength = number of octets for strings), and a reference
 166 to the Content where the semantics of the attribute is completely specified:

- 167 •

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167 Table 1 - Processing Attributes (see section 2.2.1)

168 • Table 2- Job Attributes (see section 2.2.2)

169 • Table 3 – Content Attributes

170 • (see section Content Attributes2.2.3)

171 • Table 4 - Printer Description Attributes

172

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Table 1 - Processing Attributes

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
Copies		Integer	1:MAX	[rfc2911] §4.2.5
	The number of copies of the Output Content(s) to be printed.			
Sides		String	type2 keyword	[rfc2911] §4.2.8
	Indicates how an impression is to be placed upon the side(s) of the media (keyword: one-sided, two-sided-long-edge, two-sided-short-edge, two-sided-long-edge, tumble)			
NumberUp		Integer	1:MAX	[rfc2911] §4.2.9
	Indicates the number of pages in an impression.			
Orientation		String	type2 keyword	[rfc2911] §4.2.10
	The desired orientation for printed pages. (keywords: portrait, landscape, reverse-landscape, reverse-portrait)			
MediaSize		String	Type3 keyword	
	<p><i>Identifies the medium size name and dimensions that the Printer Service uses for all sheets of the job. Each value MUST include the name of the size followed by the dimensions in inches or millimeters followed by the “in” or “mm” suffix to indicate the units. Both the Inch and Millimeter dimension MAY include a non-zero decimal fraction set off by a period (.). The name of the size consists of a class part and a name part separated by an underscore (_). The class part MUST be “na”, “asme”, or “oe” for inch units and “iso”, “jis”, “jpn”, “prc”, “roc”, or “om” for metric units (see [PWG5101.1] for additional class names). The name part is set off by a second underscore (_) and the dimensions are separated by the lower case letter x. The shorter dimension MUST come first. See the Allowed Values for examples.</i></p> <p><i>For sizes that do not have standard names, a UCP or a Print Service can create a customized name using the 'custom_xxx' class and name, where xxx indicates the custom name of the medium, followed by the dimensions in inches or millimeters as for standard names. For example, a custom 3.5 by 5.0 inch medium that, say, represents an index card, could be indicated by the string value:</i></p> <p style="text-align: center;"><i>custom_index-card_3.5x5in</i></p> <p><i>The Printer specified allowed values indicate the minimum and maximum custom sizes that the Printer will allow the client to supply.</i></p> <p><i>(See [PWG5101.1] for suggested media size names and their dimensions. These names SHOULD NOT use the “custom” class name.)</i></p>			
MediaType		String		

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Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
	<p><i>Identifies the medium type that the Printer uses for all impressions of the job. Example values:</i></p> <p>stationery Separately cut sheets of an opaque material</p> <p>transparency Separately cut sheets of a transparent material</p> <p>envelope Envelopes that can be used for conventional mailing purposes</p> <p>labels Label stock [For example, a sheet of peel-off labels].</p> <p>photographic Separately cut sheets of an opaque material to produce photographic quality images</p> <p>cardstock Separately cut sheets of an opaque material that is heavier and stiffer than stationery.</p> <p>device-setting Indicates that the control point wants the Printer to use its <defaultValue> value for MediaType.</p> <p><i>The values are a subset of and the descriptions are a taken verbatim from the Media Type Names in [PWG5101.1].</i></p>			
PrinterResolution		resolution		
	The resolution that Printer uses for the Job in cross-feed and feed direction in units of dpi or dpc.			
PrintQuality		String		
	The print quality that the Printer uses for the Job. (keyword: draft, normal, high)			
Finishing	Yes	String	Type2 keyword	[rfc2911] §4.2.6
	Identifies the finishing that the Printer uses for each copy of each printed Output Content in the Job (example: none, staple, punch, cover, bind, saddle-stitch, edge-stitch, staple-top-left, staple-bottom-left, staple-top-right, staple-bottom-right, edge-stitch-left, edge-stitch-top, edge-stitch-right, edge-stitch-bottom, staple-dual-left, staple-dual-top, staple-dual-right, staple-dual-bottom)			

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Table 2- Job Attributes

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
JobUri		String	uri	[rfc2911] §4.3.1
	The Printer sets this to the URI for the job. (example: ipp://www.company.com/printer/jobs/22)			
JobId		Integer	1:MAX	[rfc2911] §4.3.2
	The Printer sets this to the ID of the job that is unique for the Printer.			
JobPrinterUri		String	uri	[rfc2911] §4.3.3

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Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
				The Printer set this to the URI of Printer that created this Job. (example: ipp://www.company.com/printer)
JobName		String	Maxlength=127	[rfc2911] §4.3.5
				The Printer sets this to the client-supplied end-user friendly name for the Job, else the Printer must generate a name from other information. (example: "license agreement memo")
JobOriginatingUserName		String	Maxlength=1023	[rfc2911] §4.3.6
				The Printer sets this attribute to the most authenticated printable name that it can obtain (example: "John Doe", \authDomain\John Doe")
JobState		String	Type1 keyword	[rfc2911] §4.3.7
				The current state of the job (see section 2.2.4). See also JobStateReasons attribute below. (keywords: pending, pending-held, processing, processing-stopped, canceled, aborted, completed)
JobStateReasons	Yes	String	type2 keyword	[rfc2911] §4.3.8
				Provides additional information about the job's current state. (keywords: none, job-incoming, job-data-insufficient, Content-access-error, submission-interrupted, job-outgoing, job-hold-until-specified, resources-are-not-ready, printer-stopped-partly, printer-stopped, job-interpreting, job-queued, job-transforming, job-queued-for-marker, job-printing, job-canceled-by-user, job-canceled-by-operator, job-canceled-at-device, aborted-by-system, unsupported-compression, compression-error, unsupported-Content-format, Content-format-error, processing-to-stop-point, service-off-line, job-completed-successfully, job-completed-with-warnings, job-completed-with-errors, job-restartable, queued-in-device))
TimeAtCreation		Integer	MIN:MAX	[rfc2911] §4.3.14.1
				The time at which the Job was created in "PrinterUpTime" seconds.
TimeAtProcessing		Integer	MIN:MAX	[rfc2911] §4.3.14.2
				The time at which the Job first began processing.
TimeAtCompleted		Integer	MIN:MAX	[rfc2911] §4.3.14.3
				The time at which the Job completed.
JobPrinterUpTime		Integer	1:MAX	[rfc2911] §4.3.14.4
				The amount of time (in seconds) that the Printer has been up and running. See Printer attribute "PrinterUpTime"
JobMoreInfo		String	uri	[rfc2911] §4.3.4
				URI used to obtain information intended for end user consumption about this specific Job. (example: " http://www.company.com/printer/embeddedjobpage ")
JobStateMessage		String	Maxlength=127	[rfc2911] §4.3.6

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Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
	Specifies information about the "JobState" and "jobStateReasons" attributes in human readable text. (example: "Job completed successfully with warnings")			
JobDetailedStatusMessage	Yes	String	Maxlength=1023	[rfc2911] §4.3.10
	Specifies additional detailed and technical information about the job. Intended for use by the system administrator or other experienced technical persons. (example: "PostScript error: stack overflow")			
JobContentAccessErrors	Yes	String	Maxlength=1023	[rfc2911] §4.3.11
	Information about each Content access error for this job encountered by the Printer. (example: "(404) http://www.company.com/pub/fileToPrint.pdf ")			
NumberOfContents		Integer	0:MAX	[rfc2911] §4.3.12
	The number of Contents in the job.			
OutputDeviceAssigned		String	Maxlength=127	[rfc2911] §4.3.13
	Identifies the output device to which the Printer has assigned this job (example: "Pete's Printer")			
DateTimeAtCreation		String	DateTime [rfc1123]	[rfc2911] §4.3.14.5
	Indicates the date and time at which the Job was created . (example: Fri, 03 May 2002 08:49:37 GMT)			
DateTimeAtProcessing		String	DateTime [rfc1123]	[rfc2911] §4.3.14.6
	Indicates the date and time at which the Job first began processing. (example: Fri, 03 May 2002 08:49:37 GMT)			
DateTimeAtCompleted		String	DateTime [rfc1123]	[rfc2911] §4.3.14.7
	Indicates the date and time at which the Job completed. (example: Fri, 03 May 2002 08:49:37 GMT)			
NumberOfInterveningJobs		Integer	0:MAX	[rfc2911] §4.3.15
	The number of jobs that are "ahead" of this job assuming the current scheduled order.			
JobMessageFromOperator		String	Maxlength=127	[rfc2911] §4.3.16
	Message to the end user indicating the reasons for any management action taken on a job. (example: "Job canceled due to length", "Pick job up in mailbox")			
JobKOctets		Integer	0:MAX	[rfc2911] §4.3.17.1
	The total size of the Job's Content(s) in integral units of 1024 octets.			
jobImpressions		Integer	0:MAX	[rfc2911] §4.3.17.2
	The total size in number of impressions in all the Job's Content(s).			
JobMediaSheets		Integer	0:MAX	[rfc2911] §4.3.17.3

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Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
				The total number of media sheets to be produced for this job.
JobKOctetsProcessed		Integer	0:MAX	[rfc2911] §4.3.18.1
				the total number of octets processed in integral units of 1024 octets so far.
jobImpressionsCompleted		Integer	0:MAX	[rfc2911] §4.3.18.2
				The number of impressions completed for the job so far.
MultipleContentHandling		String	type2 keyword	[rfc2911] §4.2.4
				Controls whether Input Content in multi-Content jobs are combined into a single Output Content or are kept as separate Output Content (see section 6.1.5.1). Useful for application of Finishings and the placement of one or more print-stream pages into impressions and onto media sheets for multi-Content Jobs. (keywords: single-Content, separate-Content-uncollated-Copies, separate-Content-collated-Copies, single-Content-new-sheet)
JobMediaSheetsCompleted		Integer	0:MAX	[rfc2911] §4.3.18.3
				The media-sheets completed marking and stacking for the entire job so far.
JobPriority		Integer	1:100	[rfc2911] §4.2.1
				Priority for scheduling the Job. A higher value specifies a higher priority.
JobHoldUntil		String	Type3 keyword	[rfc2911] §4.2.2
				Specifies the named time period during which the Job must become a candidate for printing. (keywords: no-hold, indefinite, day-time, evening, night, weekend, second-shift, third-shift)
JobSheets		String	type3 keyword	[rfc2911] §4.2.3
				Specifies which job start/end sheet(s), will be printed with a job.. (example: none, standard)

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Table 3 – Content Attributes

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
ContentName		String	Maxlength=127	[rfc2911] §4.?.?
				Name for the Content to be used in an implementation specific manner.
Compression		String		
				Compression algorithm used on the Content Data, if any.
ContentFormat		String	MimeMediaType [rfc2046], [rfc2048]	[rfc2911] §4.?.?

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Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
	The Content format (i.e. PDL) for the Content. 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 Content. (examples: “application/octet-stream”, “application/postscript”, “application/vnd.hp-PCL”, “text/plain; charset=utf-8”)			
LastContent		Boolean		[rfc2911] §4.??
	‘true’ if this is the last Input Content for the job. Default = ‘false’.			
PageRanges		String		
	Identifies the range(s) of pages that are to be printed by the Printer for each copy of each Output Content.			
Language		String		
	Identifies the Natural Language of the Content			
AttributeFidelity		Boolean		
	Allows a user to control the Printer’s acceptance of the job submission based on whether or not the Printer supports all the supplied Job Processing attributes and values. Default = ‘false’			

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Table 4 - Printer Description Attributes

Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
PrinterUriSupported	Yes	String	uri	[rfc2911] §4.4.1
	Contains at least one URI for the Printer object. The PrinterUriSupported, UriAuthenticationSupported and the UriSecuritySupported are parallel attributes. Each of these attributes must have the same cardinality. The “i”th value of each of these attributes describes the URI for the printer, the authentication mechanism used and the security method used. (example: ipp://www.company.com/printer)			
UriAuthenticationSupported	Yes	String	type2 keyword	[rfc2911] §4.4.2
	The Client authentication mechanism that the Printer object uses to identify the user. See PrinterUriSupported for additiona information. (keywords: none, requesting-user-name, basic, digest and certificate)			
UriSecuritySupported	Yes	String	type2 keyword	[rfc2911] §4.4.3
	Identifies the security mechanisms used for accessing the Printer object. See PrinterUriSupported for additiona information. (keywords: none, ssl3, tls)			
PrinterName		String	Maxlength=127	[rfc2911] §4.4.4

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Attribute Name	Multivalued	Syntax	constraint	reference
	Description (values)			
	The end-user friendly name of the Printer object. (example: "Pete's Printer")			
PrinterState		String	type1 keyword	[rfc2911] §4.4.11
	Identifies the current state of the device (see section 6.1.1). See "PrinterStateReasons" below. (keywords: idle, processing, stopped)			
PrinterStateReasons	Yes	String	type2 keyword	[rfc2911] §4.4.12
	Augments the "printer-state" attribute to give more detailed information about the Printer state. Each keyword value may have a suffix to indicate its level of severity. The three suffixes (levels) are: "Report" (least severe), "Warning", and "Error" (most severe). Keywords without suffixes are assumed to be "Error" (most severe). See reference for semantics of defined keywords. (keywords: other, none, media-needed, media-jam, moving-to-paused, paused, shutdown, connecting-to-device, timed-out, stopping, stopped-partly, toner-low, toner-empty, spool-area-full, cover-open, interlock-open, door-open, input-tray-missing, media-low, media-empty, output-tray-missing, output-area-almost-full, output-area-full, marker-supply-low, marker-supply-empty, marker-waste-almost-full, marker-waste-full, fuser-over-temp, fuser-under-temp, opc-near-eol, opc-life-over, developer-low, developer-empty, interpreter-resource-unavailable)			
DeviceId		String		

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Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
<p><i>The value of this variable MUST exactly match the IEEE 1284-2000 Device ID string, except the length field MUST not be specified.. The value is assigned by the Printer vendor and MUST NOT be localized by the Print Service.</i></p> <p><i>The IEEE 1284-2000 Device ID is a length field followed by a case-sensitive string of ASCII characters defining peripheral characteristics and/or capabilities. For the purposes of this specification, the length bytes MUST NOT be included. The Device ID sequence is composed of a series of keys and values of the form:</i></p> <p>key: value { ,value} repeated for each key</p> <p><i>As indicated, each key will have one value, and MAY have more than one value. The minimum necessary keys (case-sensitive) are MANUFACTURER, COMMAND SET, and MODEL. (These keys MAY be abbreviated as MFG, CMD, and MDL respectively.) Each implementation MUST supply these three keys and possibly additional ones as well. Each key (and each value) is a string of characters. Any characters except colon (:), comma (,), and semi-colon (;) MAY be included as part of the key (or value) string. Any leading or trailing white space (SPACE[x'20'], TAB[x'09'], VTAB[x'0B'], CR[x'0D'], NL[x'0A'], or FF[x'0C']) in the string is ignored by the parsing program (but is still counted as part of the overall length of the sequence).</i></p> <p><i>An example ID String, showing optional comment and active command set keys and their associated values (the text is actually all on one line):</i></p> <pre> MANUFACTURER:ACME Manufacturing; COMMAND SET:PCL,PJL,PS,XHTML-Print+xml; MODEL:LaserBeam 9; COMMENT:Anything you like; ACTIVE COMMAND SET:PCL; </pre> <p><i>(See IEEE 1284-2000 clause 7.6)</i></p> <p><i>Note: One of the purposes of the DeviceId variable is to select a printer driver for those clients that need a printer driver. The values of the COMMAND SET key are interpreted by the printer driver provided by the vendor and so are vendor-defined, rather than being standardized.</i></p>				
ContentFormatSupported	YES	String	MimeMediaType	
<p>Identifies both the Content and Image formats supported by the Printer. Specifies the set of Content 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.</p>				
PrinterIsAcceptingJobs				[rfc2911] §4.4.23
Boolean				
Indicates whether the printer is currently able to accept jobs.				

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Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
QueuedJobCount		integer	0:MAX	[rfc2911] §4.4.24
The number of jobs that the Printer has accepted but has not yet completed.				
PdloverrideSupported		String	type2 keyword	[rfc2911] §4.4.28
Expresses the ability of a Printer to either attempt to override a Content's production instructions with Job Processing Attributes or not. (keywords: attempted, not-attempted)				
PrinterUpTime		integer	1:MAX	[rfc2911] §4.4.29
The amount of time (in seconds) that a Printer has been up and running				
CompressionSupported	Yes	String	Type3 keyword	[rfc2911] §4.4.32
Identifies the set of supported Compression algorithms for Content content. (keywords: none, deflate, gzip, compress)				
PrinterLocation		String	Maxlength=127	[rfc2911] §4.4.5
Identifies the location of the device. (example: Pete's Office)				
PrinterInfo		String	Maxlength=127	[rfc2911] §4.4.6
Descriptive information about this Printer object.(example: "Out of courtesy for others, please print only small (1-5 page) jobs at this printer")				
PrinterMoreInfo		String	uri	[rfc2911] §4.4.7
URI used to obtain information intended for end user consumption about this specific Printer. (example: " http://www.company.com/printer/embeddedwebpage ")				
PrinterDriverInstaller		String	Uri	[rfc2911] §4.4.8
Intended for consumption by automata to locate the driver installer for this Printer object. Note: This attribute has not been used by any known implementation. (example: " http://www.company.com/printer/installerProgram ")				
PrinterMakeAndModel		String	Maxlength=127	[rfc2911] §4.4.9
Identifies the make and model of the device. (example: "Xerox Phaser 7700", "HP LaserJet 1000", "Lexmark Optra Color 45")				
PrinterMoreInfoManufacturer		String	uri	[rfc2911] §4.4.10
URI used to obtain more information for end user consumption about this type of device. (example: " http://www.xerox.com/go/xrx/template/012.jsp?Xcntry=USA&Xlang=en_US&prodID=7700 ", " http://www.lexmark.com/US/products/overview/0,1224,MjQ5fDE=,00.html ")				
PrinterStateMessage		String	Maxlength=1023	[rfc2911] §4.4.13
Information about the "printer- state" and "printer-state-reasons" attributes in human readable text. (example: "Printer stopped due to paper jam")				

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Attribute Name	Multivalued	Syntax	constraint	reference
Description (values)				
MultipleContentJobsSupported		boolean		[rfc2911] §4.4.16
	Indicates whether the Printer supports more than one Content per job, i.e., more than one SendContent and/or SendUri request per job. A multi-Content per job Printer must implement this attribute and have a value of 'true'. A single Content per job Printer may either not support this attribute or support it with a value of 'false'.			
PrinterMessageFromOperator		String	Maxlength=127	[rfc2911] §4.4.25
	End user information for the printer. (example: "printer unavailable until 1pm due to preventive mainanance")			
ColorSupported		boolean		[rfc2911] §4.4.26
	Indicates if the device is capable of any type of color printing at all, including highlight color.			
ReferenceUriSchemesSupported	Yes	String	UriScheme	[rfc2911] §4.4.27
	Which URI schemes are supported by the printer to retrieve Content This attribute must be supported if the Printer is capable of print by reference. (example: ftp, http)			
PrinterCurrentTime		String	DateTime [rfc1123]	[rfc2911] §4.4.30
	Indicates the current date and time. (example: Fri, 03 May 2002 08:49:37 GMT)			
MultipleOperationTimeOut		Integer	1:MAX	[rfc2911] §4.4.31
	Identifies the minimum time (in seconds) that a multi-Content per job Printer must wait between actions on an open job. The actions can add Content to the open Job or close the Job. Timeouts are handled in an implementation specific manner. Multi-Content per job PrinterS must implement this attribute. The recommended value is greater than 60 and less than 240.			
JobKOctetsSupported		RangOfInteger	0:MAX	[rfc2911] §4.4.33
	Specifies the allowable upper and lower bounds of the total size per job in integral units of 1024 octets.			
JobImpressionsSupported		RangOfInteger	0:MAX	[rfc2911] §4.4.34
	Specifies the upper and lower bounds for the number of impressions allowed per job.			
JobMediaSheetsSupported		RangOfInteger	0:MAX	[rfc2911] §4.4.35
	Specifies the upper and lower bounds for the number of media sheets allowed per job.			
PagesPerMinute		Integer	0:MAX	[rfc2911] §4.4.36
	Specifies the nominal number of pages per minute which may be generated by this printer.			
PagesPerMinuteColor		Integer	0:MAX	[rfc2911] §4.4.37
	Specifies the nominal number of pages per minute which may be generated by this printer when printing color.			

180 **3 Status Codes**

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

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

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

185 successful-ok-ignored-or-substituted-attributes - Action succeeded but some unsupported attributes
186 were ignored or substituted.

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

189

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

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

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

196 client-error-not-authenticated - The request requires user authentication. The client may try again
197 with suitable authentication.

198 client-error-not-authorized - The requester is not authorized to perform the request. The Client
199 should not try again.

200 client-error-not-possible - The action cannot be performed, because of the state of the target object.

201 client-error-timeout - The client did not produce a subsequent request within the time that the
202 Printer was prepared to wait.

203 client-error-not-found - The target object was not found.

204 client-error-gone - The target object is no longer available.

205 client-error-request-entity-too-large - The request and/or the Document Content is too large.

206 client-error-request-value-too-long - A attribute value in the request is longer than the Printer
207 supports.

208 client-error-document-format-not-supported - The document format is not supported.

209 client-error-attributes-or-values-not-supported - An attribute and/or value is not supported and must
210 be in order to carry out the request. The Printer must return the unsupported attributes or
211 values in the Unsupported Attributes group.

212 client-error-uri-scheme-not-supported - The URI scheme is not supported.

213 client-error-charset-not-supported - The charset is not supported.

214 client-error-conflicting-attributes - Some supplied attributes are conflicting. The Printer must
215 return them in the Unsupported Attributes group.

216 client-error-compression-not-supported - The compression of the Document Content is not
217 supported.

218 client-error-compression-error - An error occurred when uncompressing the Document Content.

219 client-error-document-format-error - An error occurred when interpreting the Document Content.

220 client-error-document-access-error - An error occurred when the Printer attempted to access the
221 Document Content through the URI supplied.

222

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223 The following status codes are returned when the Printer rejects the action indicating some error on
224 the part of the Printer:

225 server-error-internal-error - An unexpected internal error occurred.

226 server-error-operation-not-supported - The Printer does not support the requested action.

227 server-error-service-unavailable - The Printer is unable to service the request at this time due to
228 overloading or maintenance. The client should try again later as per the “message”
229 Operation attribute.

230 server-error-version-not-supported - The Printer doesn’t support the requested major version of the
231 protocol and returns the closest version that it does support.

232 server-error-device-error - The Printer encountered a device error that causes it to be unable to
233 accept a new request. For example, a paper jam for a Printer that doesn’t spool and so
234 cannot accept a new job submission until the jam is fixed.

235 server-error-temporary-error - A temporary error such as a buffer full write error, a memory
236 overflow, or a disk full condition.

237 server-error-not-accepting-jobs - The Printer is not currently accepting jobs. Its
238 “PrinterIsAcceptingJobs” Printer Description attribute is ‘false’.

239 server-error-busy - A temporary error indicating that the Printer is too busy processing jobs and/or
240 other requests. A Client should try again later.

241 server-error-job-canceled - The job has been canceled by an operator or aborted by the system. For
242 example, while the Client is transmitting the Document Content to the Printer.

243 server-error-multiple-document-jobs-not-supported - The Printer doesn’t support multiple
244 document jobs and the client attempted to supply a second SendDocument or SendUri
245 request. The Printer’s “MultipleDocumentJobsSupported” Printer Description attribute is
246 ‘false’.

247

248 4 Change Log

249 5/16/02 PJZ original draft

250 5/23/02 TH re-organize draft with comments from Melinda Grant

251 5/26/02 TH detailed review of the draft

252 5/29/02 PJZ Incorporated comments prior to initial release

253 6/4/02 SAA Version .4 to version .9 was modified to split the Job Attributes into 3
254 categories:

255 1) Processing Attributes

256 2) Content Attributes

257 3) Job Attributes

258

259 The Processing Attributes were further split into 3 subcategories:

260 1) Rendering attributes

261 2) Imposition Attributes

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262 3) Finishing Attributes

263 Also added in some attributes from UPnP Print Basic service template: MediaSize, MediaType,
264 DeviceId attributes.

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

268 Modified Printer Description Attributes with the following:

269 1) Added in DeviceId.

270 2) Changed Document* to Content*.

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

273

274 5 References

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276 2911 "Internet Printing Protocol/1.1 Model and Semantics", September 2000, T. Hastings,
277 R. Herriot, R. Debry, S. Isaacson, P. Powell

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

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

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

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286

286 **Appendix – IPP Operation Model**

287 **5.1 Action Summary**

288 Table 5 - Summary of Actions

289 summarizes the actions defined for the Job and Printer. See section 6 for more details.

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

290 **Table 5 - Summary of Actions**

291 **6 Actions**

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

298 **6.1 Job Creation and document submission Actions**

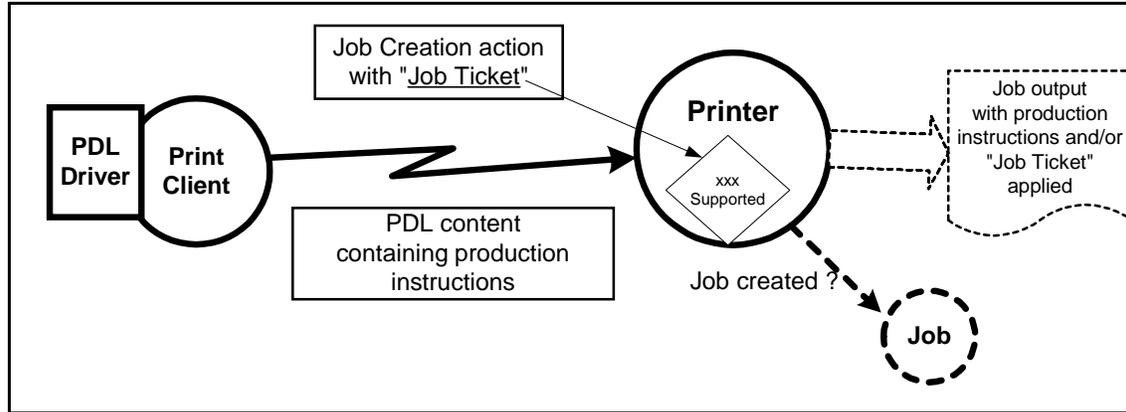
299 This section describes the Job Creation actions that create a Job and the ones that create Document
 300 Content. The Job Creation actions are: PrintJob, PrintUri, and CreateJob. The PrintJob action also
 301 submits the Document content. The PrintUri action submits a URI reference to the Document
 302 content which the Printer then retrieves when needed at a later time. The CreateJob action only
 303 creates the job and the Client must issue subsequent SendDocument and SendUri actions in order
 304 to submit document content or a URI reference, respectively, for a job.

305 Production instructions contained in the arguments of the Job Creation action (i.e., Operation and
 306 Job Processing attributes) is combined with Printer supplied information to create a Job instance.

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

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312 A concept that is important in the PWG model is a set of production instructions that can be applied
313 to a print job. Examples of these instructions include the number of Copies and the media to use.
314 These instructions are often referred to as a Job Ticket. The Job Ticket is made up of the Operation
315 Attributes (see section 2.2.2), the “Processing” attributes (see section 2.2.1), and Document
316 Attributes in a Job Creation operation.



317

318

Figure 10 Production Instruction Processing

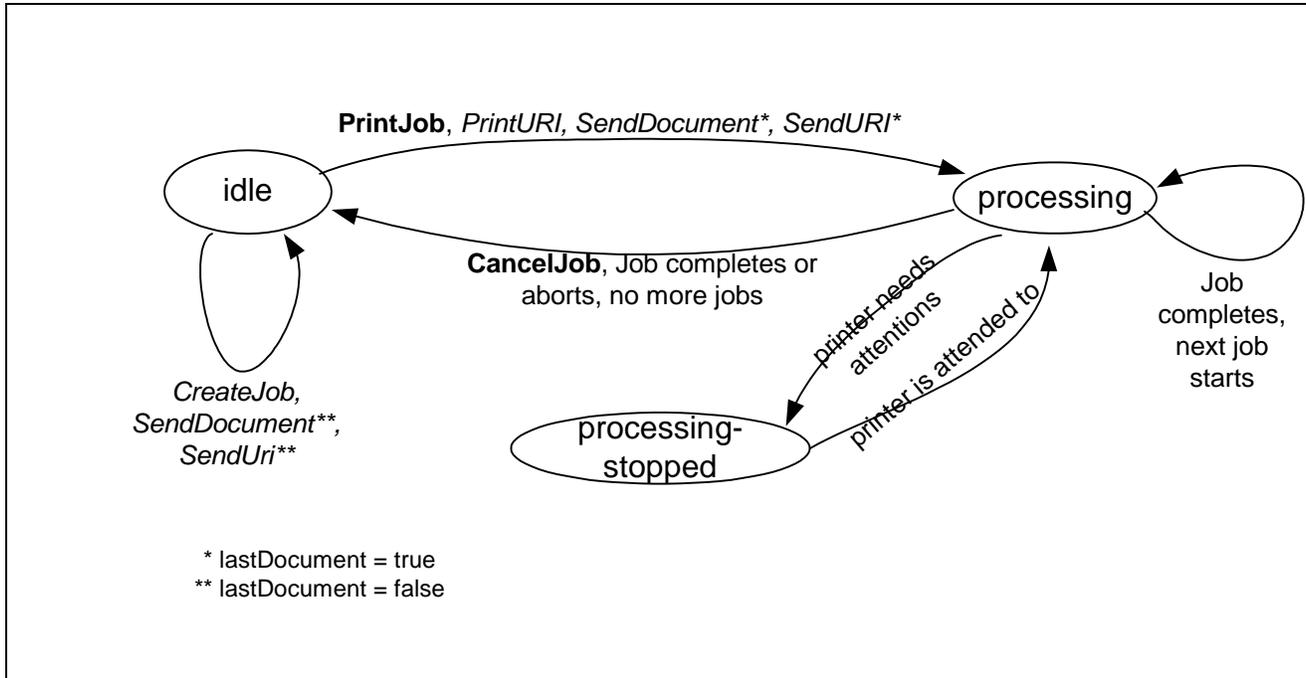
319 In the real world, production instructions are also contained in the document content for a job.
320 Page Description Languages (PDL) such as PostScript® and PCL® often contain production
321 instructions. Some environments use a printer specific driver to generate the PDL stream based on
322 feature selections made through a user interface. Given that productions instructions can occur in
323 both the PDL and in an associated Job, the PWG model allows a Printer to declare its capability to
324 resolve this conflict. The Printer’s attribute “PdIOverride” declares if an attempt will be made to
325 override the instructions in the PDL with the instructions in the Job.

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

333 The PWG model allows a client to control the Printer’s acceptance of a job submission based on
334 the job request and the Printer’s current configured capabilities as follows. When the client
335 supplies a ‘true’ value for the “AttributeFidelity” Job Processing attribute, the Printer must reject
336 the job unless the Printer supports *all* of the supplied Job Processing attributes and values. When
337 the client supplies a ‘false’ value or omits the attribute, the Printer must accept the job submission
338 and ignore or substitute attributes and values, respectively, that it does not support. Note that the
339 “AttributeFidelity” Job Processing attribute covers only the creation of the Job. It is
340 implementation specific how a Printer handles processing a job when the Printer encounters
341 unsupported production instructions in the document content.

342 **6.1.1 The “PrinterState” attribute and the Printer Life Cycle**

343 The “PrinterState” attribute is one of the most important Printer Description attributes Figure 11
 344 shows the values of the “PrinterState” attribute and the Printer life cycle as affected by actions on
 345 the Printer and job processing.



346
 347

348 **Figure 11 - The "PrinterState" attribute and the Printer Life Cycle**

349 **6.1.2 "Job Processing" Printer Attributes**

350 See section 2.2.1 below for the attributes that may comprise this group. If a Job Processing
 351 attribute (e.g. Media) is supported, the Printer must have an associated xxxSupported (e.g.
 352 MediaSupported) and xxxDefault (e.g. MediaDefault) “Job Processing” Printer attribute. There
 353 may be an associated xxxReady (e.g. MediaReady) “Job Processing” Printer attribute. By
 354 retrieving the “Job Processing” Printer attributes, a Client can determine all the attributes and their
 355 values that may be used in constructing a Job Creation action.

356 **6.1.2.1 xxxSupported Attributes**

357 These attributes list all the currently configured valid values for the “xxx” Job Processing
 358 Attributes. Though the Printer is configured to support the feature, human intervention may be
 359 required to process the job (e.g. selected paper may have to be loaded into a tray). The syntax for
 360 xxxSupported is multi-valued when an “xxx” attribute is a string. When “xxx” is an integer, the
 361 syntax of the corresponding “xxxSupported” attribute is usually RangeOfInteger which indicates
 362 the minimum and maximum values supported by the Printer. However, there are some exceptions
 363 as indicated in Table 6-Integer syntaxes whose “xxxSupported” syntax isn’t RangeOfInteger

364 .

365 **Table 6-Integer syntaxes whose “xxxSupported” syntax isn’t RangeOfInteger**

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

366

367 **6.1.2.2 xxxDefault Attributes**

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

373 **6.1.2.3 xxxReady Attributes**

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

376 **6.1.3 PrintJob**

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

381 **PrintJobRequest(**Operation Attributes, [Job Processing Attributes], [Job Finishing
 382 Attributes], [Document Attributes], Document Data)

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383 **Operation Attributes:**
384 **PrinterUri(uri):** The target printer for the job
385 **[Document Attributes]:** **[requestingUserName], [JobName],**
386 **[DocumentFormat], [JobKOctets], [jobImpressions], [JobMediaSheets]:**
387 see section 2.2.2.
388 **[Job Processing Attributes]:**
389 Any Job Processing Attribute (see section 2.2.1) or vendor/site specific extension.
390 **[Job Description Attributes]:**
391 Any Job Description Attribute (see section 3.2.2) or vendor/site specific extension.
392
393 **[Job Finishing Attributes]:**
394 Any Job Finishing Attribute (see section 2.2.1) or vendor/site specific extension.
395 **[Document Attributes]:**
396 Any Document Attributes for the single document sent (see section 2.2.1) or
397 vendor/site specific extension.
398
399 **Document data:** The document to print.
400

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

402 **Operation Attributes :**
403 **statusCode:** Results of the action (see Appendix section 6.5).
404 *[statusMessage]: Localized text description of the status code.*
405 *[detailedStatusMessage]: Text for detailed and technical information about the job.*
406 **[Unsupported Attributes]:** any unsupported or conflicting attributes and or attribute
407 values. May be returned on success or failure.
408 **Job Attributes:**
409 **JobUri, JobId, JobState, JobStateReasons, [JobStateMessage],**
410 **[NumberOfInterveningJobs]** See section 2.2.2.

411 **6.1.4 PrintUri**

412 ([rfc2911] §3.2.2) Identical to the PrintJob operation (see section 6.1.1) except that a client
413 supplies a URI reference to the document data. The calling sequence is the same as PrintJob ()
414 except that the Operation Attributes in the request contains the “documentUri” attribute and the
415 Document Data is omitted.

416 **6.1.5 CreateJob**

417 ([rfc2911] §3.2.4) Similar to the PrintJob operation (see section 6.1.1), except that in the CreateJob
418 request the Client does not supply Document Data. The client supplies a single set of Job
419 Processing attributes that the Printer applies to the Output Document(s) of the job. The
420 “MultipleDocumentHandling” Job Processing attribute controls whether the Printer produces
421 separate Output Documents or combines the Input Documents into a single Output Document (see
422 section 6.1.5.1).

423 **6.1.5.1 The “MultipleDocumentHandling” Job Processing attribute**

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

436 **6.1.6 SendDocument**

437 ([rfc2911] §3.3.1) Submits the entire Document Content for the next Input Document of a job
 438 created by a previous CreateJob action (see section 6.1.5).

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

440 **Operation Attributes:**

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

442 **[requestingUserName]**: see section 2.2.2.

443 **[Document Attributes]:**

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

445

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

447 **Operation Attributes :**

448 **statusCode**: Results of the action (see Appendix section 6.5).

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

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

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

453 **Job Attributes:**

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

455 **[NumberOfInterveningJobs]** See section .

456 **6.1.7 SendUri**

457 ([rfc2911] §3.3.2) Identical to the SendDocument operation (see section 6.1.6) except that a client
 458 supplies a URI reference to the Document Content data, instead of supplying the document content.
 459 The calling sequence is the same as SendDocument () except that the Operation Attributes in the
 460 request contains the “documentUri” attribute and the Document Data is omitted.

461 **6.1.8 ValidateJob**

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

465 The calling sequence is similar to PrintJob (see section 6.1.1) except the request does not contain
 466 the Document Data and the response does not contain the Job Attributes.

467 **6.2 Job Control Actions**

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

470 **6.2.1 CancelJob**

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

473 **CancelJobRequest(Operation Attributes)**

474 **Operation Attributes:**

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

476 **[requestingUserName]**: see section 2.2.2.

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

479

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

481 **Operation Attributes :**

482 **statusCode**: Results of the action (see Appendix section 6.5).

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

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

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

487 **6.2.2 HoldJob**

488 ([rfc2911] §3.3.5) Allows a client to hold a pending Job in the Printer so that it is not eligible for
 489 scheduling. The request calling sequence is similar to CancelJob (see section 6.2.1) except that the
 490 “jobHoldUntil” attribute may be in the “Operation Attributes”. The response sequence is the same
 491 as CancelJob.

492 **6.2.3 ReleaseJob**

493 ([rfc2911] §3.3.6) Release a previously held Job so that it is again eligible for scheduling. The
 494 calling sequence is the same as CancelJob (see section 6.2.1).

495 **6.2.4 RestartJob**

496 ([rfc2911] §3.3.7) Restart a job that is retained in the Printer after processing has completed. The
 497 request calling sequence is similar to CancelJob except that the “jobHoldUntil” attribute may be in
 498 the “Operation Attributes”. The response sequence is the same as CancelJob (see section 6.2.1).

499 **6.3 Status and information Actions**

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

502 **6.3.1 GetJobs**

503 ([rfc2911] §3.3.4) Retrieve the list of Jobs belonging to the Printer. The Client may supply a list of
 504 Job attribute and/or attribute group names. A group of Job attributes will be returned for each
 505 returned Job.

506 **GetJobsRequest(Operation Attributes)**

507 **Operation Attributes:**

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

509 **[requestingUserName]:** see section 2.2.2.

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

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

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

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

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

518 **Operation Attributes :**

519 **statusCode:** Results of the action (see Appendix section 6.5).

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

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

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

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

526 **6.3.2 GetPrinterAttributes**

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

529 **GetPrinterAttributesRequest(Operation Attributes)**

530 **Operation Attributes:**
531 **PrinterUri(uri):** The target printer
532 **[requestingUserName]:** see section 2.2.2.
533 **[requestedAttributes (string(multivalued))]:** set of Printer Attribute and/or
534 Attribute Group names to be returned. Default = ‘all’.
535 **[DocumentFormat(string)]:** Since some capabilities can be PDL specific, this
536 optional attributes allows the Printer to return capabilities based on PDL if
537 known to the Printer.
538 **GetPrinterAttributesResponse(Operation Attributes, [Unsupported Attributes], Printer**
539 **Attributes)**

540 **Operation Attributes :**
541 **statusCode:** Results of the action (see Appendix section 6.5).
542 *[statusMessage]: Localized text description of the status code.*
543 *[detailedstatusMessage]: Text for detailed and technical information about the*
544 *Printer.*
545 **[Unsupported Attributes]:** any unsupported or conflicting attributes and or attribute
546 values. May be returned on success or failure.
547 **Printer Attributes(requested attributes/values (multivalued)):** The requested attributes

548 **6.3.3 GetJobAttributes**

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

550 **GetJobAttributesRequest(Operation Attributes)**

551 **Operation Attributes:**
552 **JobUri(uri) or (PrinterUri(uri) and JobId(integer)):** The target job
553 **[requestingUserName]:** see section 2.2.2.
554 **[requested-attributes (string(multivalued))]:** set of Job Attribute and/or Attribute
555 Group names to be returned for each Job. Default = ‘all’.
556 **GetJobAttributesResponse(Operation Attributes, [Unsupported Attributes], Job Attributes)**

557 **Operation Attributes :**
558 **statusCode:** Results of the action (see Appendix section 6.5).
559 *[statusMessage]: Localized text description of the status code.*
560 *[detailedstatusMessage]: Text for detailed and technical information about the job.*
561 **[Unsupported Attributes]:** any unsupported or conflicting attributes and or attribute
562 values. May be returned on success or failure.
563 **Job Attributes(requested attribute/values(multivalued)):** The requested attributes and
564 their values)

565 **6.4 Printer Control Actions**

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

568 **6.4.1 PausePrinter**

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

570 **PausePrinterRequest(Operation Attributes)**

571 **Operation Attributes:**

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

573 **[requestingUserName]:** see section 2.2.2.

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

575 **Operational Attributes :**

576 **statusCode:** Results of the action (see Appendix section 6.5).

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

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

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

581 **6.4.2 ResumePrinter**

582 ([rfc2911] §3.2.8) Resume the scheduling of Jobs in the Printer. The calling sequence is the same
583 as PausePrinter (see section 6.4.1).

584 **6.4.3 PurgeJobs**

585 ([rfc2911] §3.2.9) Removes all jobs from the Printer, regardless of their state. . The calling
586 sequence is the same as PausePrinter (see section 6.4.1).

587 **6.5 Changes to remove some IPP specific aspects**

588 This section lists some changes to remove some IPP specific aspects from the PWG Semantic
589 Model. Any attribute name containing “ipp” has had the “ipp” removed. The IPP operation names
590 have the hyphens removed to be the PWG action names and the operations supported are mixed
591 keywords, not integer enum values. All attributes names have had the first letter capitalized and
592 the ‘-’ character removed and the character following the ‘-’ has been capitalized. The keyword
593 attribute values defined remain unchanged and are all lower case, except for the ones that specify
594 other attributes names (which are changed to be the mixed case without hyphens). **ISSUE 03:**
595 **What about the case and hyphens in status code names (and removing the integer values)?** The
596 term “object” is sometimes changed to “data class”. **ISSUE 04: Why? and Why not done**
597 **consistently?** The term “operation” has been changed to “action” to use the term more frequently
598 used with XML.

599 The aspects of the model that deal with globalization (i.e. character set & language) have been
600 removed. Globalization will be addressed in a protocol specific binding of this semantic model.
601 The Printer globalization attributes are charsetConfigured, charsetSupported,
602 naturalLanguageConfigured, naturalLanguageSupported and generatedNaturalLanguageSupported.

603 The types of the attributes have been simplified. All keyword, text, name, DateTime, uri,
604 UriScheme, enum and mimeType are represented by the simple string type. The term
605 “keyword” continues to be used for string values enumerated as part of the PWG Model. The
606 integer enums values are replaced by their associated keyword. The “1setOf X” types are

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607 represented as the base type and the “Multivalued” field in the tables below set to “Yes”. Integers
608 and Boolean types remain the same. Any applicable constraints placed on the attribute values has
609 been noted in the tables below.