

Internet-Draft

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November 1 84, 1996

Internet Printing Protocol - IPP/1.0
Version 0.9 21, November 1 84, 1996

NOTE: This document still has many rough spots which will need further editing. At this time, the reader should read it for major concepts.

~~**NOTE: This version (Ver. 0.91) contains changes (over Ver. 0.9) in the following sections: Abstract - minor wording changes; Intro. - minor wording changes; Section 2: Simplified, removed redundant paragraphs; Added Section 3: Old section 2 paragraphs about IPP objects, fixed old section 2.2.2 on Jobs and 2.2.4 on Job Templates; Added Section 4: on naming and directory schemas; Deleted Old section 3 and 4; Section 5: Fixed User Operations (including deletion of empty table rows), Section 6: Major modifications on Object Attributes; All other sections: minor changes, some fixes to security section.**~~

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62 Abstract

63 This Internet-Draft specifies an Internet Printing Protocol (IPP).
 64 This protocol is heavily influence by the semantic operations and
 65 attributes defined in ISO/IEC 10175 Document Printing Application
 66 (DPA) parts 1 and 3. It also incorporates some of the
 67 implementation and interoperability lessons learned from other
 68 printing related standards such as POSIX System Administration -
 69 Part 4 (POSIX 1378.4) and X/Open A Printing System
 70 Interoperability Specification(PSIS).

71 IPP is defined as a set of abstract data types and operations. The
 72 operations are implemented using a simple request and response
 73 mechanism built on top of HTTP. The abstract data types are
 74 encoded as simple ASCII text strings.

75 The IPP protocol initially covers only end user operations on
 76 basic print service objects. Future versions of the protocol will
 77 cover operator and administrator operations. Authentication is
 78 realized by mechanisms outside the scope of the protocol, but the
 79 protocol does introduce some access control functionality so that
 80 only authorized end users are allowed to submit print jobs to
 81 devices whose implementation and site policy support ~~with~~-access
 82 control. Also, the Cancel Job operation requires some
 83 authentication ~~and authorization~~ so that jobs can only be canceled
 84 by authorized ~~the end~~-users who submitted the job . Extended
 85 monitoring and management is possible through other protocols such
 86 as the SNMP Printer MIB [1].. In the areas where there are no
 87 existing standards, some proposed and emerging standards are being
 88 worked (management, security, etc.). As these services become
 89 more stable, this document (and hence the protocol) can be updated
 90 to reflect the integration and relationships with these other
 91 standards.

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349 1. Introduction

350 The Internet Printing Protocol (IPP) is an application level
 351 protocol that can be used for distributed printing on the
 352 Internet. The protocol is heavily influenced by the printing model
 353 introduced in the Document Printing Application (ISO/IEC 10175
 354 DPA) standard, which describes a distributed printing service. DPA
 355 identifies the end -user and administrative roles associated with
 356 a distributed printing service, and defines the set of operations
 357 supported by the service. This IPP specification deals initially
 358 only with the end user role. These ideas and concepts, when
 359 unified with other Internet protocols and services, realize a
 360 distributed print service for the Internet.

361 2. Distributed Printing

362 This document assumes a distributed computing environment where
 363 requesters of print services (clients, applications, PC drivers,
 364 etc.) cooperate and interact with print service providers.
 365 Although the underlying configuration may be a complex n-tier
 366 client/server system, an important simplifying step in this
 367 protocol is that the only object the requester of the print
 368 service ever sees is a "printer". It is important, however, to
 369 understand that in a real system, other components of a print
 370 service exist.

371 2.1 Generic Print System Components

372 Every distributed print service, including those using the
 373 Internet Printing Protocol, includes elements from the following
 374 list.

- 375 | - End-Users: End Users are humans (or agents who work on behalf
 376 of a human) who submit print jobs.
- 377 | - Print clients: Print clients are computer network nodes with
 378 which humans interact in order to manipulate the distributed
 379 print service. A print client uses some protocol to invoke
 380 print service operations on another node. Each operation has
 381 arguments and results associated with it. The print client
 382 provides arguments which add information about the operation
 383 requested, and receives results which describe the status and
 384 outcome of the operation.
- 385 | - Print servers: Printer servers may be embedded in an output
 386 device or implemented in a separate system which is associated

387 with an output device. The print server receives requests from
388 the print client and send s back results which describe the
389 status and outcome of the operation requested. A print server
390 normally provides queuing, job management, and device
391 management functions.

392 - Queues. Print jobs may be queued or stored on a spool prior to
393 printing. This allows a print service provider to accept one or
394 more print jobs while the printer (or printers) is busy
395 processing another job. Queues, if present, may be implemented
396 in the client, in the server, in the output device, or in some
397 combination of the three.

398 - Output Devices. Output devices interpret the print data and
399 generate some form of output. In the case of a laser printer,
400 for example, this normally means rasterizing the print data and
401 putting the resulting marks on paper. An output device may
402 receive print data directly from a client or through a Print
403 server.

404 A specific implementation of a print service may not include all
405 of the elements described here, and the physical packaging of
406 elements is up to the implementation. For example, an output
407 device may include a queue or a print server may include a
408 rasterizer.

409 2.2 IPP Components

410 The print model defined by the Internet Printing Protocol
411 simplifies the user's view of the system components described in
412 the previous section by encapsulating the important elements of
413 the system into three simple objects:

- 414 - End Users
- 415 - Clients
- 416 - Printers (section xxx)
- 417 - Print Jobs (section xxx)
- 418 - Job Templates (section xxx)

419 These objects are not encapsulations of both data and behavior as
420 in other object oriented models, but are simple collections of
421 attribute/value pairs. [We may try to fix this in our new design,
422 but it's not high priority.]
423

424 Clients interact with these using the following operations:

- 425 - Print (section xxx)
- 426 - Cancel Job (section xxx)
- 427 - Get Attributes(section xxx)
- 428 - Get Jobs (section xxx)

430 3. IPP Objects

431 This section describes the IPP objects.

432 3.1 Printer

433 One of the most significant objects in the IPP model is the
434 Printer. To the end ~~—~~user, the Printer object represents the
435 functionality of the actual output device along with the queuing,
436 job management, and device management functions often associated
437 with a print server. An IPP Printer object implements the
438 Internet Printing Protocol. Using the protocol, end ~~—~~users may
439 query the attributes of the Printer, submit jobs to the Printer,
440 determine subsequent states of submitted and queued jobs and state
441 of the Printer, and cancel their own print jobs. The realization
442 of a Printer object may take on different forms for any given
443 configuration of real components. However, the details of the
444 configuration of real components must be transparent to the end ~~—~~
445 user.

446 Some examples of [configurations containing an](#) IPP Printer object
447 include:

- 448 - An output device, with ~~a~~ no spooling capabilities, supporting
449 IPP
- 450 - An output device, with a built-in spooler, supporting IPP
- 451 - A print server with one or more associated output devices with
452 the print server supporting IPP.
 - 453 - The associated output devices may or may not be capable of
454 spooling jobs
 - 455 - The associated output devices may or may not support IPP
- 456 - A print server with one or more downstream print servers
457 and/or output devices where the upstream print server supports
458 IPP
- 459 - [ISSUE: Is this previous example too much?](#)

460
461 See the following figures for some examples on how to view IPP
462 Printer objects on top of other printing system models:

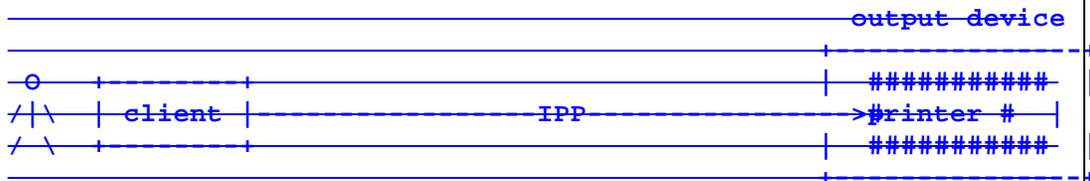
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Legend:

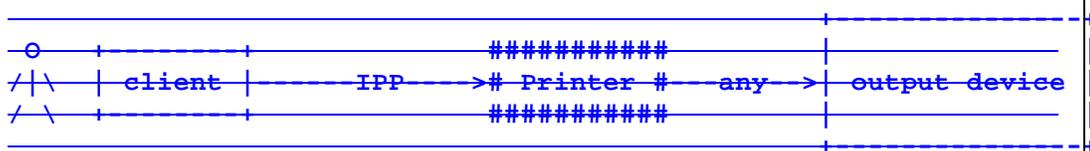
indicates an IPP printer object which is either embedded in an output device or is hosted in a server. An IPP printer object may or may not queue/spool.

any indicates any network protocol or direct connect, including IPP

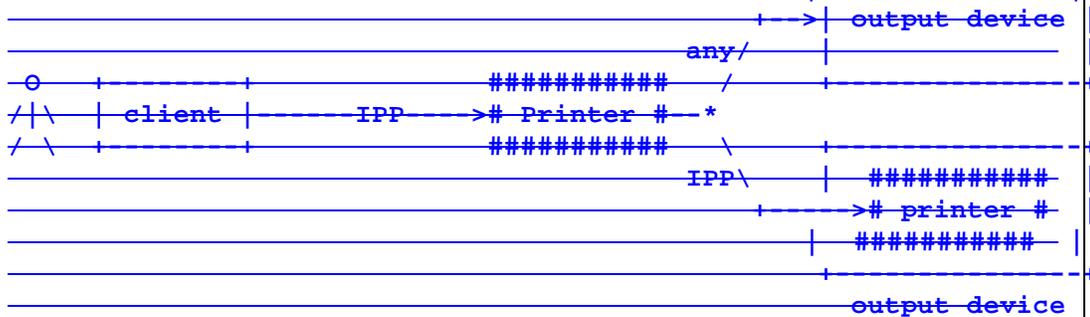
embedded printer:



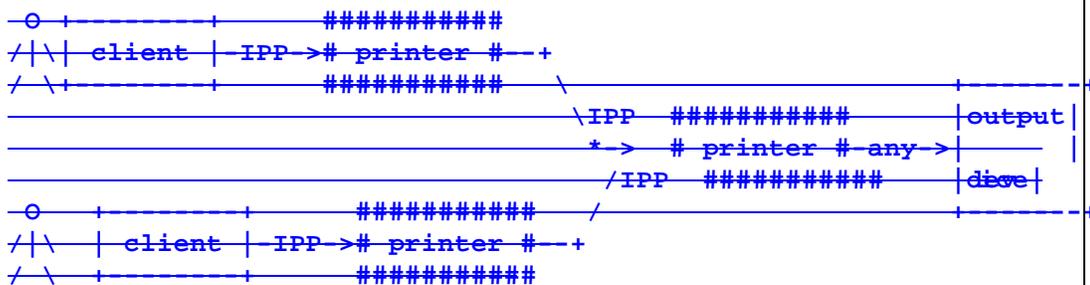
hosted printer:



fan out:



fan in:



embedded printer:



- 571 - identify the print job(section xxx)
- 572 - assist in selecting the Printer (section xxx)
- 573 - report job status (section xxx)
- 574 - assist in scheduling and processing (section xxx)
- 575 - describe the documents in the job (section xxx)
- 576 - produce the document (section xxx)

577
578 ISSUE: This list needs to b e fixed to match the final job
579 attributes sections (they don't match right now).

580 3.3 Job Template

581 A Job Template object is used to model job defaults. A Job
582 Template is essentially a set of job attributes that ~~a client~~
583 ~~references to~~ initialize a newly created job object. ~~Attributes~~
584 ~~which are sent along with the job at the time the job is submitted~~
585 ~~override the attributes in the Job Template object.~~

586 ISSUE: a job template needs more work. It is currently believed
587 that when a client needs to present a Print Dial og box to an end-
588 user, it gets potential job values and default job values from a
589 Printer. The default values are from the Job Template associated
590 with the Printer named by the end-user. If a end-user sends a job
591 to a Printer, the P rinter may set unspecified attributes to the
592 value of the associated Job Template.

593 594 3.4 Object Relationships

595 Instances of objects within the system have relationships which
596 must be maintained persistently along with the persistent storage
597 of the objects themselves. A Printer can contain zero, or more
598 Job objects. A Job object contains one or more Documents. A
599 Printer object is associated with one or more Job Template
600 objects.

601 3.5 Object Identity

602 All instances of all objects have an identifier attribute that
603 makes them unique so that they can be unambiguously referenced.
604 ~~In the object oriented model, these are the globally unique object~~
605 ~~references which are created by factories or constructors.~~

606 The following objects have the following mandatory identifier
607 attributes:

608 Object	Identifier	Containing Object
609 Printer	printer-name	None
610 Job	job-identifier	Printer
611 Job Template	job-template-name	None

614 4. Naming

616 Clients identify Printer objects by using an HTTP type URL. For
617 example, a URL for a Printer object named "printer-1" whose
618 network node's domain name is "some.domain.com", might look like:

619 http://some.domain.com/printer-1

620 In this case, the URL identifies the use of the HTTP protocol.
621 The Printer is located at the node identified by the DNS name
622 "some.domain.com" and "printer-1" is the name of the Printer.

623 Another example is the following URL:

624 http://1.2.3.4: ~~3803042~~/printer-2

625 In this case, the URL identifies the use of the HTTP protocol.
626 The Printer is located at the node identified by the IP address of
627 "1.2.3.4" using port ~~3803042~~ for the HTTP server, and "printer-2"
628 is the name of the Printer.

629 It is not necessary to expose the Job Template objects that might
630 be associated with a given printer as separate objects. They can
631 be exposed in two ways through URL naming.

632 - The Job Template can be hidden from the end user by a URL that
633 represents just Job Template name (but does not expose the
634 Printer object name) as the two URLs 1)
635 http://some.domain.com/two-sided-printer and 2)
636 http://some.domain.com/draft-printer. These look like two
637 different locations, but underneath they represent the same
638 Printer object but using two different Job Template default
639 attribute sets.

640 - The Job Template can be exposed along with the name of the
641 Printer object directly in the URL as in:
642 http://some.domain.com/hr-printer/resumes. In this case there
643 is a "resumes" Job Template associated with the "hr-printer"
644 Printer.

645 ISSUE: Should IPP propose a new standard port number (say 380)
646 for an HTTP server which has been optimized to support the IPP
647 protocol over that HTTP implmentation? IPP should work for any
648 valid HTTP server, however, there might be some specializations
649 can be performed for IPP operations.

650 4.1 Directory Services

651 IPP does not require any specific directory service. However,
652 this specification does define a generic schema that can be used
653 for any specific instance of a directory service. That is, some
654 of the attributes from the Printer object are called out as
655 attributes that may be added to a directory entry which represents
656 that Printer. This allows directory users to find and locate IPP
657 Printers by either a simple name look up or by some filtered
658 attribute search.

659

660

661 4.2 Directory Entry Schema

662 The following attributes define the generic directory entry
663 schema. All directories entries for IPP Printers in all types of
664 directories should support at least these attributes.

665

666 Name, description, owner, location, address

667 4.2.1 Status

668 [~~Such a dynamic value seem like it could be a problem in some~~
669 ~~name service entries.~~]

670 ~~The printer status field in the directory entry is really a~~
671 ~~"summary" attribute of the true printer state. The following~~
672 ~~mapping takes place between the Printer Status attribute in the~~
673 ~~directory entry and the printer state attribute in the Printer~~
674 ~~object:~~

675 ~~"Not Connected"~~
676 ~~STATE_NOT_CONNECTED~~
677 ~~STATE_PAUSED_NOT_CONNECTED~~
678 ~~"Shutdown"~~
679 ~~STATE_SHUTDOWN~~
680 ~~"Active"~~
681 ~~STATE_IDLE~~
682 ~~STATE_PAUSED~~
683 ~~STATE_PRINTING~~
684 ~~"Stopped"~~
685 ~~STATE_STOPPED~~
686 ~~STATE_PAUSED_STOPPED~~
687

688 ~~Even though the Printer may not be up and running, the directory~~
689 ~~entry still exists in the directory. In this case, the directory~~
690 ~~entry represents the fact that it may begin running at some future~~
691 ~~time.~~
692

693 4.2.1 Name

694 This is the printers name. It is a URL so it cont ains sufficient
695 information to not only name, but to address the printer using
696 IPP as well.

697 4.2.2 Description

698 This is a free form string that can contain any site specific
699 descriptive information about this printer.

700 4.2.3 Location

701 This is a free form string that can contain any site specific
702 location information.

703 In order for filtered searches to be more effective, a given site
704 may use some regular structuring within the string values such as
705 "SITE:USA-San Jose,BUILDING: A1,FLOOR:2,ROOM:555" or "department5-
706 2ndFloor-A5-Indi anHills-Chicago-IL-USA".

707 4.2.4 Print Quality

708 This indicates a somewhat subjective evaluatio n of the overall
709 printing quality: "high", "medium", or "low".

710 ISSUE: Does this subsume the need for Resolution and Speed?

711 4.2.5 Cost

712 This indicates a somewhat subjective evaluation of the overall
713 cost of printing at this printer : "high", "medium", or "low".

714 4.2.6 Resolution

715 This is the maximum resolution of the Printer in dpi. a single
716 valued, maximum resolution in either the horizontal or vertical
717 direction of the print device in dpi.

718 The syntax shall be the same as that of the printer-resolution-
719 select job attribute . That syntax allows a single integer to
720 specify the maximum resolution or a pair of integers to specify
721 the maximum resolution when the x and y dimensions differ. When
722 two integers are specified, the first is in the x direction, ie.,
723 the direction fo the shortest dimension of the medium, so that the
724 value is independent of whether the Printer feeds long edge or
725 short edge first.

726 4.2.7 Color Supported

727 This is a BOOLEAN for either yes, color printing is supported, or
728 no color printing is not supported.

729 4.2.8 Fonts Supported

730 This attribute takes on a list of fonts that are supported by the
731 printer. This is replicated from the fonts-supported attribute in
732 the Printer object.

733 4.2.9 Maximum Speed

734 This is the maximum speed of the printer ppm, ipm, lpm, or cps.
735 They syntax and values are the same as the maximum-printer-speed
736 Printer attribute. in the units defined in Maximum Speed Units

737 ISSUE: Should this be "high", "medium", and "low"??

738 ~~4.2.10 Maximum Speed Units~~

739 ~~This is the units of the maximum speed rating of the print device.~~
740 ~~This can be: pages per minute, sheets per minutes, characters per~~
741 ~~second, etc.~~

742 ISSUE: Delete ??

743

744 4.2.10 ~~Plug and Play~~ Device Id

745 This is the IEEE P1284 Device Id. This attribute can be used for
746 automatic driver download and other automatic configuration tasks.
747 It can be used to generate a platform specific id such as the
748 Windows Plug-and-Play id.

749 4.2.10 Model

750 This is a simple text string defined by the manufacturer.

751 ISSUE: Is this needed if we use the P1284 Device Id??

752 4.2.11 Manufacturer

753 This is a simple text string defined by the manufacturer. There
754 is no registration, and there is a possibility of overlap, but the
755 goal is to keep this simple, not too complex.

756 ISSUE: Is this needed if we use the P1284 Device Id??

757 ISSUE: Would the company name registered with IAN for use in
758 specifying Internet addresses be required? Recommended?

759

760 4.2.12 Type

761 This is the printing mechanism of the print device: laser, ink
762 jet, thermal, etc. The syntax and values are the same as for the
763 printer-types Printer attribute. The value of the attribute shall
764 be single-valued, while the printer-types attribute is multi-
765 valued. A Printer that is of several types may appear multiple
766 times in the directory. ISSUE: no.

767 ISSUE: Is this needed if we use the P1284 Device Id??

768

769 4.2.13 Document Formats PDLs Supported

770 This is a list of all of the document formats ~~page description~~
771 ~~languages (PDLs)~~ that the printer and/or its interpreter(s)
772 support. The syntax and values are the same as those for the
773 document-formats-supported Printer attributes.

774 4.2.14 Sides Supported

775 This attribute specifies the capabilities of the Printer for
776 marking on sides of the medium. The syntax and values shall be
777 the same as the sides-supported Printer attribute. Standard
778 values are: 1-sided (simplex), 2-sided-long-binding-edge (duplex),
779 and 2-sided-short-binding-edge (tumble). ~~is either a 1 or a 2 to~~
780 indicate the maximum number of sides on which the printer can
781 automatically print.

782 4.2.15 Finishings Supported

783 This attribute identifies the finishing operations supported by
784 the Printer. The standard finishing objects are defined in the
785 section on the finishing job attribute.

786 5. IPP Operations

787 ~~IPP defines the following end user operations:~~

788 The following symbols are used in the tables below:

789

790	P	perform the operation directly
791	PF	perform the operation; forward to Output Device sometimes
792	UA	unsupported in an Output Device unless it supports queuing
793	U	unsupported operation

794
795 IPP defines the following end user operations:

796

797

Operation	Print Server	Output Device
Print	PF	P
Cancel Job	PF	P
Get Attributes	PF	P
Get Jobs	PF	P

798

799

800 5.1 IPP Operations Using HTTP801 All IPP operations are defined using HTTP as the underlying
802 communication protocol.803 5.1.1 HTTP Overview

804 IPP is based on the existing HTTP standard. IPP is a lightweight
805 application-level protocol designed with the Internet in mind. It
806 is a generic, stateless, object-oriented protocol which can be
807 used for any task through extension of its request methods
808 (commands).

809 HTTP allows an open-ended set of methods to be used to indicate
810 the purpose of a request. It builds on the discipline of reference
811 provided by the Uniform Resource Location (URL) and message
812 formats similar to those used by Internet Mail and the
813 Multipurpose Internet Mail Extensions (MIME).

814 HTTP is based on a request-response paradigm. A requesting program
815 (a client) establishes a connection with a receiving program (a
816 server) and sends a request to the server in the form of a request
817 method, a URL, and protocol version, followed by a MIME-like
818 message containing request modifiers, client information, and
819 possibly print data. The server responds with a status line,
820 including its protocol version, and a success or failure code,
821 followed by a MIME-like message containing server information,
822 entity meta-information, and possibly some content.

823 Current practice requires that the connection be established by
824 the client prior to each request and closed by the server after
825 sending the response. Both clients and servers must be capable of
826 handling cases where either party closes the connection

827 prematurely, due to user action, auto mated time out, or program
 828 failure.

829 5.1.2 IPP Operation Encoding

830 IPP messages consist of requests from client to server and
 831 responses from server to client.

832 HTTP MESSAGE = Request | Response

833
 834 Requests and responses use the generic message format of RFC 822
 835 for transferring entities. Both messages may include optional
 836 header fields and an entity body. The entity body is separated
 837 from the headers by a null line (a line with nothing preceding the
 838 CRLF).

839
 840 Request = Request-line
 841 * (General-Header
 842 | Request-Header
 843 | Entity-Header)
 844 CRLF
 845 [Entity-Body]

846
 847 Response = Status-line
 848 * (General-Header
 849 | Request-Header
 850 | Entity-Header)
 851 CRLF
 852 [Entity-Body]

853
 854
 855 All IPP headers conform to the syntax

856 IPP Header = field name ":" [field-value] CRLF.

857
 858 IPP/1.0 defines the octet sequence CR LF as the end-of-line marker
 859 for all protocol elements except the entity-body. In this
 860 document, the sequence CR LF is shown as CRLF.

861 Note that HTTP 1.1 defines a slightly different syntax, allowing
 862 for dynamically generated messages to be transmitted. This would
 863 be required for cases such as PC driver generated Print
 864 Operations. HTTP 1.1 defines a message header which specifies a
 865 transfer encoding called "chunks".

866 5.1.2.1 HTTP Request-Header Fields

867 HTTP request header fields allow the client to pass additional
 868 information about the request, and about the client itself, to the
 869 server. All header fields are optional and when used it is
 870 assumed that IPP would use these headers in a standard way. IPP
 871 requests will be completely encapsulated within the entity body of
 872 an HTTP request.

873
 874 HTTP Entity-Header = Content-Encoding
 875 | Content-Length
 876 | Content-Type

877 | extension-header

878 |
879 | The **Content-Length** field must always be a valid length. This means
880 | that for any Print Operations based on HTTP 1.0, the entire
881 | content must be generated before this header can be built. HTTP
882 | 1.1 provides the notion of "chunks" which will allow the content
883 | to be generated dynamically as the data is sent.

884 |
885 | **Content-Type** will always be "Application/IPP".

886 | The http method token indicates the method to be performed on the
887 | resource identified by the Request-URL. The method is case-
888 | sensitive. The http methods used will be "Post" and "Get".

889 | 5.1.2.2 Print

890 | The Print operation allows a user to submit a Print Job to the
891 | print server. A Print Job contains the information needed by the
892 | Print object to print a document or set of documents. When the
893 | print operation is invoked, the Entity-Body included in the HTTP
894 | request is an IPP Print Job. The concrete syntax of the Print Job
895 | is defined in section xxx. The response to a print request
896 | includes the Job Identifier (a URL) assigned by the Printer.

897 | 5.1.2.3 Cancel Job

898 | This method allows a user to cancel one specific Print Job any
899 | time after the print job has been established on the Printer
900 | Object. Some pages may be printed before a job is terminated if
901 | printing has already started when the Cancel Job operation is
902 | received.

903 | The Cancel HTTP request will be sent to the URL identifying the
904 | job to be canceled.

905 | 5.1.2.4 Get Attributes

906 | This operation allows a user to obtain information from the Print
907 | object concerning jobs, printers, and print queues, based on ISO
908 | 10175. The entity-body of the Get Attributes operation contains
909 | the set of attributes that the requester is interested in.
910 | However, the attribute values may be null and are ignored by the
911 | server. The attribute list is returned in the response with the
912 | appropriate attribute values filled in. If no attribute list is
913 | supplied, then all attributes defined for that object are
914 | returned.

915 | 5.1.2.5 Get Jobs

916 | The Get Jobs operation allows a client to retrieve attributes of
917 | the specified job.

918 | 5.1.3 The Print-Job

919 | The entity body of a print request will contain a Print Job, as
920 | defined below. The headers defined here are IPP headers, but
921 | follow the same syntax as the basic HTTP headers.

922 Print Job = Print-Job-Object-Header section (1.2.1)
 923 [Job Attributes] section (1.2.4)
 924 *(Documents)
 925 _____
 926 Job Attribute = Attribute name : Attribute value CRLF
 927 _____
 928 Document = Document-Header section (1.2.2)
 929 [Document attributes] section (1.2.5)
 930 [Content-Header section (1.2.3)
 931 content]
 932 _____
 933

934 5.1.3.1 Print Job Object Header

935 Print-Job-Object Header = Content-Encoding
 936 Content-Length
 937 Content-Type
 938 extension-header
 939

940 Content-Type is always "IPP Print Object". Other header fields
 941 are as defined for HTTP 1.0.

942 5.1.3.2 Document Header

943 The document header allows the insertion of multiple documents
 944 within a job. At this point only a limited number of document
 945 attributes are defined. However, this structure allows the
 946 addition of other attributes which can be specified on a document
 947 boundary.

948 Document Header = Content-Encoding
 949 Content-Length
 950 Content-Type
 951 extension-header
 952

953 Content type is always "IPP Document". Other header fields area as
 954 defined in HTTP 1.0.

955 5.1.3.3 Document-Content Header

956 The document-content-header provides additional meta-information
 957 about the document. The document content header is an optional
 958 field and would not be present if the document was pointed to by a
 959 document URL attribute. It is composed of a number of document
 960 header fields as follows:

961 Document-Content-Header = Content-Encoding
 962 Content-Length
 963 Content-Type
 964 extension-header
 965 _____
 966

967 Content-Type is defined as :

968 Content-Type = Data Stream Format "/" Version
 969 _____

970 Thus, for example, if the document to be printed was a Postscript
 971 Level 2 document, the Content-Type would be specified as:

Content-Type: Postscript/2.0

Other header fields are as defined by HTTP 1.0.

5.1.3.4 Job Attributes

Job attributes are defined in section xxx. Attributes will always be sent as

Job-Attribute = attribute name ":" Attribute value CRLF

Attribute value = Value | *(Value "," Value)

5.1.3.5 Document Attributes

Document attributes are defined in section yyy. At this point a limited number of attribute may be specified on a document basis. The syntax for a document attribute is

Document-Attribute = attribute name ":" Attribute value CRLF

Attribute value = Value | *(Value "," Value)

5.2 Print Operation

~~When an end-user uses GUI to submits a job, the GUI-client client submits a Print Request according to the syntax and semantics of this standard and receives a Print Response according to this standard. The end-user or submitting application selects a Printer which implies a Job Template. gets an HTML form from the default printer. If the end-user changes the selected printer, the GUI-client gets the HTML form from that printer. The HTML form comes with the values supported by the printer and it is initialized by the values from the job template associated with the named printer.~~

[Further work needs to done to define the above concept.]

5.2.1 Print Request

The following abstract data types are part of the Print Request .

Note: The Printer name is not needed since it is a URL and it is the target of the entire operation. +

~~Printer Name Note: I don't think that this is needed~~

Job and Document Attributes A set of Job object and Document attributes as defined in section xxx

Job Return Attributes The set of Job attributes to return in the response

Printer Return Attributes The set of Printer attributes to return in the response

~~Authors deBry, Hastings, Herriot, Isaacson~~

Document Note: What if there are multiple documents and
 Contents each has a different size? How does this map on
 top of the HTTP header that has one size? Does
 it require multiple HTTP operations?

1011

1012

1013 5.2.2 Print Response

1014 The following abstract data types are part of the Print Response:

1015

Job Id Used for all other operations on this Job.
 Job Status Job state information
 Printer State Optional Printer state information
 Message Optional message Note: Is this needed?
 Errors Optional Error Information

1016

1017

1018 5.3 Cancel Job Operation

1019 5.3.1 Cancel Job Request

1020 The following abstract data types are part of the Cancel Job
 1021 Request. Note: The Job Id is not needed as data within the
 1022 operation since the Job URL is the target of the entire
 1023 operation. +

1024

~~Job Id The identifier of the job to be canceled~~
 Document Number Optional document number
 of the document to
 Issue: We don't need this i f we do not allow
 canceling of a single document in a multi-
 document job, right?
 Message Optional message to the operator.

1025

1026 5.3.2 Cancel Job Re sponse

1027 The following abstract data types are part of the Cancel Job
 1028 Response:

1029

Job Status Optional Job status information
 Errors Optional Error Information

1030

1031 5.4 Get Attributes Operations

1032 5.4.1 Get Attributes Request

1033 The following abstract data types are part of the Get Attributes
 1034 Request:

Selector	A Job Id or Printer Name URL <u>ISSUE: Is this just the target URL of the operation and it is not needed here within the operation?</u>
Requested Attributes	A set of attributes in which the requestor is interested

1035

1036

5.4.2 Get Attributes Response

1037

The following abstract data types are part of the Get Attributes Response:

1038

Result Attributes	The requested attributes of the object
Errors	Optional error information

1039

1040

5.5 Get Jobs Operation

1041

~~Get Jobs Request~~

1042

5.5.1 ~~Get~~ Get Jobs Request

1043

The following abstract data types are part of the Get Jobs Request:

1044

1045

Filtering	A lightweight filtering mechanism, such as all jobs versus a particular <u>end</u> user's jobs.
Requested Attributes	A set of job attributes in which the requestor is interested

1046

1047

1048

5.5.2 Get Jobs Response ~~Get Jobs Response~~

1049

The following abstract data types are part of the Get Jobs Response:

1050

1051

Result Attributes	Attribute set containing the returned results.
Errors	Optional Error Information

1052

1053

6. Object Attributes

1054

This section describes the attributes, syntaxes, and values that are part of IPP. The sections below show the objects and their associated attributes which are included within the scope of this protocol. The text in these sections has been heavily influenced by the ISO/IEC 10175 DPA (Final, June 1996).

1055

1056

1057

1058

1059

1060

1061

1062

6.1 Attribute Syntaxes

1063

~~NOTE: This is what Tom has submitted:~~

1064

1065 ~~Each attribute shall be in one of the following data syntaxes:~~

1066 ~~string arbitrary ASCII strings, no control characters,~~
 1067 ~~except <SPACE>.~~

1068 ~~string pair strings separated by ":"~~

1069 ~~name arbitrary ASCII strings, no control characters, and~~
 1070 ~~no <SPACE> char acters.~~

1071 ~~type 1 enum standard names, must revise the standard to add~~
 1072 ~~a new name. No private names are allowed.~~

1073 ~~type 2 enum standard names, but an implementor can add new~~
 1074 ~~by proposing them to the PWG for registration~~
 1075 ~~(or an IANA appointed registry advisor after the~~
 1076 ~~PWG is no longer certified) anytime. IANA keeps~~
 1077 ~~the registry.~~
 1078 ~~Implementors can add private (un registered)~~
 1079 ~~with a suitable distinguishing prefix, such as~~
 1080 ~~xxx where xxx is the company name~~
 1081 ~~registered with IANA.~~

1082 ~~type 3 enum standard names, but an implementor can add new~~
 1083 ~~names by submitting a registration request directly~~
 1084 ~~to IANA, no PWG or IANA appointed registry advisor~~
 1085 ~~review is required.~~
 1086 ~~Implementors can add private (un registered) names~~
 1087 ~~with a suitable distinguishing pr efix, such as~~
 1088 ~~xxx where xxx is the company name registered with~~
 1089 ~~IANA.~~

1090 ~~type 3 pair two type 3 enum names separated by ":".~~

1091 ~~cardinal 0 .. n represented as ASCII digits~~

1092 ~~ordinal 1 .. n represented as ASCII digits~~

1093 ~~ordinal pair two ordinals separated by ":"~~

1094 ~~boolean tokens: yes, y, true, or t and no, n, false, or f.~~

1095 ~~date/time date/time in ??? format~~

1096 ~~url Universal Resource Locator~~

1097 ~~octet string arbitrary binary octets~~

1098 ~~string units ordinal followed by type 2 enum units~~

1099

1100

1101 **~~NOTE: This is what Bob has~~**
 1102 **~~submitted:~~**

1103 The sections below reference the following syntax items:

<u>string</u>	<u>arbitrary ASCII strings, no control characters, except <SPACE>.TBD</u>
<u>stringPair</u>	<u>string ":" string</u>
<u>stringState</u>	<u>string state</u>
<u>name</u>	<u>arbitrary ASCII strings, no control characters, and no <SPACE> characters.TBD</u>
<u>URL</u>	<u>Universal Resource LocatorTBD</u>
<u>dateTime</u>	<u>date and time in RFC 822 formatTBD</u>
<u>deltaTime</u>	<u>[hours ":"] minutes</u>
<u>cardinal</u>	<u>0 .. n represent ed as ASCII digits</u>
<u>typeEnum</u>	<u>standard names, must revise the IPP standard to add a new name. No private names are allowed.TBD</u>

<u>type2Enum</u>	<u>standard names, but an implementor can add new TBD by proposing them to the PWG for registration (or an IANA-appointed registry advisor after the PWG is no longer certified) anytime. IANA keeps the registry. Implementors can add private (un-registered) with a suitable distinguishing prefix, such as -xxx- where xxx is the company name registered with IANA.</u>
<u>type3Enum</u>	<u>standard names, but an implementor can add new names by submitting a registration request directly to IANA, no PWG or IANA-appointed registry advisor review is required. Implementors can add private (un-registered) names with a suitable distinguishing prefix, such as -xxx- where xxx is the company name registered with IANA.TBD</u>
<u>type2EnumState</u>	<u>type2Enum state</u>
<u>type3EnumState</u>	<u>type3Enum state</u>
<u>state</u>	<u>TBD</u>
<u>Boolean</u>	<u>tokens: yes, y, true, or t and no, n, false, or f.TBD</u>
<u>positiveInteger</u>	<u>1 .. n represented as ASCII di gitsTBD</u>
<u>positiveIntegerCross</u>	<u>positiveInteger ["x" positiveInteger]</u>
<u>positiveIntegerCross State</u>	<u>positiveIntegerCross state</u>
<u>positiveIntegerRange</u>	<u>positiveInteger ":" positiveInteger</u>
<u>positiveIntegerUnits</u>	<u>positiveInteger units</u>
<u>positiveIntegerState</u>	<u>positiveInteger state</u>
<u>units</u>	<u>"ppm" "ipm" "spm" "cps" "lpm"</u>
<u>type3Locale</u>	<u>type3Country ":" type3Language ":" type3CodeSet</u>
<u>type3Country</u>	<u>type3Enum</u>
<u>type3Language</u>	<u>type3Enum</u>
<u>type3CodeSet</u>	<u>type3Enum</u>
<u>type2Format</u>	<u>name ["/" version]</u>
<u>version</u>	<u>name</u>
<u>type3LocaleSt ate</u>	<u>type3Locale state</u>

1104 ~~string: TBD~~

1105 ~~stringPair: string ":" string~~

1106 ~~stringState: string state~~

1107 ~~name: TBD~~

1108 ~~URL: TBD~~

1109 ~~dateTime: TBD~~

1110 ~~deltaTime: [hours ":"] minutes~~

1111 ~~cardinal: TBD~~

1112 ~~type1Enum: TBD~~

1113 ~~type2Enum: TBD~~

1114 ~~type3Enum: TBD~~

1115 ~~type2EnumState: type2Enum state~~

1116 ~~type3EnumState: type3Enum state~~

1117 ~~state: TBD~~

1118 ~~Boolean: TBD~~

1119 ~~positiveInteger: TBD~~

1120 ~~positiveIntegerCross: positiveInteger ["x" positiveInteger]~~

1121 ~~positiveIntegerCrossState: positiveIntegerCross state~~

1122 ~~positiveIntegerRange: positiveInteger ":" positiveInteger~~

~~positiveIntegerUnits: positiveInteger units
positiveIntegerState: positiveInteger state
units: "ppm" | "ipm" | "spm" | "cps" | "lpm"
type3Locale: type3Country ":" type3Language ":" type3CodeSet
type3Country: type3Enum
type3Language: type3Enum
type3CodeSet: type3Enum
type2Format: name ["/" version]
version: name
type3LocaleState: type3Locale state~~

1123
1124
1125
1126
1127
1128
1129
1130
1131
1132
1133
1134

6.2 Job Attributes

1135 A job object contains a set of job attributes and one or more
1136 documents. A client shall create a job and send it to a server
1137 using the Print operation. A client may use a job template
1138 associated with the selected printer in order to initialize the
1139 job.

1140 Each section heading below contains the name of an attribute and
1141 its syntax in parentheses using the rules of RFC 822.

1142
1143

6.2.1 Job Informational Attributes (Set by a Client /End User)

1144
1145

1146 The client may specify these attributes in the Print operation to
1147 provide information to identify a print -job.

1148 The client may also specify these attributes in the operations:
1149 Get-Attributes, and Get-Jobs.

6.2.1.1 job-name (string)

1151
1152
1153

This attribute supplies a human readable string for naming the
print-job.

1154 This attribute is intended for to be printed on a start sheet,
1155 returned in a Get-Jobs result, or used in notification messages.

1156 If the client does not specify this attribute, a Printer shall set
1157 it to the name of the file of the first document in the job.

6.2.2 Job Informational Attributes (Set by a Printer)

1159
1160
1161

The Print shall add all of these attributes to a job to provide
information to identify a print -job.

1162 The client may specify these attributes in the operations: Get-
1163 Attributes and Get-Jobs, but not in Print.

1164

1165 | 6.2.2.1 job-identifier (~~urlstring~~)

1166 | This attribute provides the job -identifier for this job on the
1167 | Printer. The Printer shall generate a job -identifier value as a
1168 | URL that is unique on that Printer, but need not be unique across
1169 | the distributed environment.

1170 | The value of the job -identifier attribute shall be returned by the
1171 | Printer as part of the PrintResult in the Print operation.

1172 |
1173 | 6.2.2.2 job-originator (name)

1174 | This attribute specifies the name of the person submitting the
1175 | print job. The Printer shall set this attribute to the most
1176 | authentic name that it can obtain from the client. The operation-
1177 | user-name attribute is intended to be a source of the most
1178 | authentic name.

1179 |
1180 | 6.2.2.3 job-originating-host (name)

1181 | This attribute identifies the originating host of the job. The
1182 | Printer shall set this attribute to the value of the operation-
1183 | host-name which is intended to be the most authentic host name of
1184 | the client.

1185 | 6.2.2.4 notification-address (name)

1186 | This address specifies the email address of the client. The client
1187 | specifies this attribute in the operation- notification-address
1188 | attribute which the Printer in turn uses to set this attribute.

1189 | The Printer shall use this attribute as the address for sending
1190 | messages to a job submitter when an event occurs that the end user
1191 | has registered an interest in or when certain other events occur,
1192 | such as Cancel-Job.

1193 | Note: The only type of notification is email.

1194 | ISSUE: can the email address be inferred with job-originator and
1195 | the originating-host.

1196 | 6.2.2.5 job-locale (type3Locale)

1197 | This attribute identifies the locale of the job. The Printer sets
1198 | this attribute from the value of the operation-locale.

1199 | The Printer shall use this attribute to determine the locale for
1200 | notification messages that it sends.

1201 | The type3EnumTrip consists of 3 colon separated type 3 enums. The
1202 | first shall be is the two-character country code from ISO 639. The
1203 | second shall be is the two-character language code from ISO 3166.
1204 | The third is the code-set from the IANA Code Set Registry.

1205 | ISSUE: is there a more standard syntax for locale?

1206
1207
1208
1209
1210
1211

6.2.3 Printer Selection Attributes (Set by Client/End User)

1212 The client shall specify this attribute to select a particular
1213 Printer.

1214 The client may also specify these attributes in the operations:
1215 Get-Attributes, and Get-Jobs.

1216 **Issue:** this attribute may be implicit in the specified URL in the
1217 Print operation.

1218 6.2.3.1 printer-name-requested (URL)

1219 This attribute identifies the printer that the client requests
1220 for printing the job.

1221 ISSUE: We decided to delete this attri bute!

1222 6.2.4 Job Status Attributes (Set by Printer)

1223 The Printer shall add these attributes to a job when a client
1224 submits a job, and the Printer shall assign appropriate values to
1225 each such job -status attribute.
1226

1227 The Printer uses these attributes to specify the job status
1228 before, during and after the processing of the print -job by the
1229 Printer.

1230 The client may specify job -status attributes in: Get-Attributes
1231 and Get-Jobs, but not Print.

1232 6.2.4.1 current-job-state (typeName) 1233

1234 This attribute identifies the current state of the job with the
1235 following values: unknown, pre-processing, pending, processing,
1236 printing, held, terminating, retained, completed.

<u>unknown</u>	<u>The job state is not known, or is indeterminate.</u>
<u>pre-processing</u>	<u>The job has been created on the server by the create-job sub-operation of the print-request, but a print-request with a TRUE value for the job-submission-complete component of the PrintArgument has not yet been received and no document has started processing. The job maybe in the process of being checked by the server for attributes, defaults being applied, a printer being selected, etc.</u>

<u>held</u>	<u>The job is waiting to be released for scheduling for any number of reasons as specified by the value of the job's job-state-reasons attribute.</u>
<u>pending</u>	<u>The job's job-submission-complete attribute is TRUE since the server has received a print-request with the job-submission-complete parameter TRUE and the job is waiting to start processing on a printer.</u>
<u>processing</u>	<u>The server is processing the job, or has made the job ready for printing, but the output device is not yet printing it, either because the job hasn't reached the output device or because the job is queued in the output device or some other spooler, awaiting the output device to print it.</u>
<u>printing</u>	<u>The server has completed processing the job and the output device is currently printing the job on at least one printer. That is, a print engine is either printing pages of the job, or failing in its attempt to print pages of the job because of some wait state, such as, start-wait, end-wait, needs-attention, etc. The complete job state includes the detailed status represented in the printers' printer-state attribute(s).</u>
<u>paused</u>	<u>The job has been paused as a result of a PauseJob operation.</u>
<u>interrupted</u>	<u>The job was interrupted by the InterruptJob request for an intervening job, and shall resume processing automatically once the intervening job has completed.</u>
<u>terminating</u>	<u>The job has been cancelled by a CancelJob request or aborted by the server and is in the process of terminating. The job's job-state-reasons attribute contains the reasons that the job is being terminated.</u>
<u>retained</u>	<u>The job is being retained at the server as a result of the job's job-retention-period being non-zero. The job has (1) completed successfully or with warnings or errors, (2) been aborted while printing by the server, or (3) been cancelled by the CancelJob request before or during processing. The job's job-state-reasons attribute contains the reasons that the job has been retained. While in the retained state, all of the job's document data (and resources, if any) shall be retained by the server; thus a job in the retained state could be reprinted, using some means outside the scope of ISO/IEC 10175-Part 1.</u>

completedThe job has:(1) completed successfully or with warnings or errors,(2) been aborted by the server while printing, or(3) been cancelled by the CancelJob request,AND the job's:(1) job-retention-period was zero or has expired, or(2) job-discard-time has arrived.The job's job-state-reasons attribute contains the reason(s) that the job has been completed.While in the completed state, a job's document data (and resources if any) need not beretained by the server; thus a job in the completed state could not be reprinted. Thelength of time that a job may be in this state, before transitioning to unknown, isimplementation-dependent. However, servers that implement the completed job-state shallretain, as a minimum, the following attributes for any job in the completed state: job-identifier, job-owner, job-name, current-job-state, printers-assigned, and job-state-reasons.

1237

1238 The IPP protocol supports all values for job states, but Printers
 1239 are need only support those states which are appropriate for the
 1240 particular implementation.

1241 6.2.4.2 printer-assigned (name)

1242 This attribute identifies the Output Device to which the Printer
 1243 has assigned this job.

1244 If an Output Device implements a Printer, the Printer does not set
 1245 this attribute.

1246 If a Print Server implements a Printer, the value shall be empty
 1247 until the Printer assigns an Output Device to the job..

1248 **ISSUE:** Is this attribute appropriate for a model in which we are
 1249 hiding the downstream Printer. The printers -assigned value shall
 1250 not be the same as the printer requested by the end user.

1251 The value of the job's printer -assigned attribute shall remain
 1252 after the job has completed, so that end users can determine the
 1253 Output Device on which the job was printed.

1254 6.2.4.3 submission-time (dateTime)

1255 This attribute indicates the time at which ~~the~~ this job was
 1256 accepted by the Printer. If the Printer does not support the
 1257 notion of time, the attribute is not stored as part of the job
 1258 object.

1259 6.2.4.4 job-message-from-administrator (string)

1260 This attribute provides a message from an operator, system
 1261 administrator or 'intelligent' process to indicate to the end user
 1262 the reasons for modification or other management action taken on a
 1263 job.

1264 6.2.4.5 completion-time (dateTime)

1265 This attribute indicates the time at which this job completed.
 1266 This time is useful for jobs which are retained after printing.
 1267 If the Printer does not support the notion of time, the attribute
 1268 is not stored as part of the Job object.

1269 6.2.4.6 job-state-reasons (1#type2Enum)

1270 This attribute identifies the reason or reasons that the job is in
 1271 the state that it is in (e.g., held, terminating, retained,
 1272 completed, etc.). The printer shall indicate the particular
 1273 reason(s) by setting the value of the job -state-reasons attribute.
 1274 It is valid for the printer to set the value of the
 1275 job-state-reasons attribute to the empty set.

1276 The following standard values are defined:

<u>documents-needed</u>	<u>The complete job has been accepted by the server (the value of the job-submission-complete element was TRUE in the last print-request for the job), but the server is waiting for its files to be transferred before the job can be scheduled to be printed.</u>
<u>job-hold-set</u>	<u>The value of the job's job-hold attribute is TRUE.</u>
<u>job-print-after-specified</u>	<u>The value of the job's job-print-after attribute has specified a time specification that has not yet occurred.</u>
<u>Required-resources-not-ready</u>	<u>At least one of the resources needed by the job, such as media, fonts, resource objects, etc., is not ready on any of the physical printer's for which the job is a candidate.</u>
<u>Successful completion</u>	<u>The job completed successfully.</u>
<u>Completed-with-warnings</u>	<u>The job completed with warnings.</u>
<u>Completed-with-errors</u>	<u>The job completed with errors (and possibly warnings too).</u>
<u>Cancelled-by-user</u>	<u>The job was cancelled by the user using the CancelJob request.</u>
<u>Cancelled-by-operator</u>	<u>The job was cancelled by the operator using the CancelJob request.</u>
<u>Aborted-by-system</u>	<u>The job was aborted by the system.</u>
<u>Logfile-pending</u>	<u>The job's logfile is pending file transfer.</u>
<u>Logfile-transferring</u>	<u>The job's logfile is being transferred.</u>

1277

1278 ~~documents-needed, job-hold-set, job-print-after-specified, job-~~
 1279 ~~off-peak-specified, required-resources-not-ready, successful-~~

1280 ~~completion, completed with warnings, completed with errors,~~
 1281 ~~cancelled by user, cancelled by operator, aborted by system,~~
 1282 ~~logfile pending, logfile transferring~~impressions completed
 1283 ~~(cardinal)~~

1284 6.2.4.7 impressions-completed (cardinal)

1285 This attribute contains the number of impressions that the Printer
 1286 has completed printing. If the Printer cannot report this number,
 1287 the Printer leaves this attribute unspecified.

1288 6.2.4.8 media-sheets-completed (cardinal)

1289 This attribute contains the number of media-sheets that the
 1290 Printer has completed printing. If the Printer cannot report this
 1291 number, the Printer leaves this attribute unspecified.

1292 6.2.5 Job Sheet Attributes (Set by Client/End User)

1293 The client shall specify these attributes to control the printing
 1294 of ~~of~~ job sheets.

1295 The client may also specify job sheet attributes in: Get-
 1296 Attributes and Get-Jobs.

1297 job-sheets (type3Enum) This attribute determines what type of job-
 1298 sheets the Printer shall print with the job.

1299 The standard values are: none, and default-sheet.

1300 The value 'nNone' means that the Printer shall print no job
 1301 sheets. The value 'dDefault-sheet' means that the Printer shall
 1302 print the job sheets defined by an administrator. If the
 1303 administrator's policy is not to support none, the Printer shall
 1304 use the default-sheet value if the client supplies the "none"
 1305 value.

1306 6.2.6 Notification Attributes (Set by a Client/End User)

1307 The client shall specify these attributes to indicate events that
 1308 the client is interested in.

1309 The client may also specify notification attributes in: Get-
 1310 Attributes and Get-Jobs.

1311 6.2.6.1 notification-events (#type1Enum)

1312 This attribute specifies the events about which the end user want
 1313 to be notified.

1314 This attribute will support ~~four~~three events classes: none, job-
 1315 completion, job-problems and printer-problems. ~~, If attribute~~
 1316 ~~contains no values, then the client is requesting no notification.~~

1317 If this attribute contains the event none, the Printer shall not
 1318 notify. This value is useful if an administrator has set up a
 1319 notification Printer default but the end user does not which

1320 notification. If the none value and other values are supplied,
 1321 the Printer shall ignore the none value.

1322 This attribute will support only one delivery method, namely
 1323 email. The attribute notification-address specifies the email
 1324 address.

1325 If this attribute contains the event job-completion, the Printer
 1326 shall notify the client when the job containing this attribute
 1327 completes.

1328 If this attribute contains the event job-problem, the Printer
 1329 shall notify the client when the job containing this attribute has
 1330 a problem while the job is printing. Problems include: paper jam
 1331 and out-of-paper.

1332 If this attribute contains the event printer-problem, the Printer
 1333 shall notify the client when the job containing this attribute has
 1334 a problem while the job is printing or waiting to print. Problems
 1335 include: paper jam and out-of-paper.

1336 ~~ISSUE: is there a problem with an attribute with an empty value~~
 1337 ~~being different from no attribute. Otherwise, we need a special~~
 1338 ~~value of 'none'. 'none', unlike other values should not be~~
 1339 ~~combined with other values. This particular case does not seem~~
 1340 ~~like a case where an administrator wants to prevent the use of~~
 1341 ~~'none', so empty seems like a good solution.~~

1342 **ISSUE:** Email is quite deficient for timely notification to an end-
 1343 user who receives a lot of email, but there are no other choices.
 1344 The internet community needs to solve this problem, perhaps with
 1345 an extremely-urgent email. Intranet usage may have other
 1346 solutions.

1347 6.2.7 Job Scheduling Attributes (Set by Client/End User)

1348 The client shall specify these attributes to provide the Printer
 1349 with information for the scheduling a print -job.

1350 The client may also specify these attributes in: Get-Attributes
 1351 and Get-Jobs.

1352 ~~_____~~
 1353 ~~job hold (Boolean) This attribute specifies whether the print job~~
 1354 ~~is a candidate for scheduling for printing or not, when the~~
 1355 ~~Printer would otherwise place the job in the pending or~~
 1356 ~~processing states~~

1357 ~~When the value is FALSE, the Printer shall not hold the job from~~
 1358 ~~being scheduled for printing, unless there are other reasons (see~~
 1359 ~~the current job state and the job state reasons job status~~
 1360 ~~attributes).~~

1361 ~~When the value is TRUE, the Printer shall place the job in the~~
 1362 ~~held state and add the job hold set value to the job's~~
 1363 ~~job state reasons attribute and shall not schedule the print job~~
 1364 ~~for printing. If the job enters the held state because its~~
 1365 ~~job hold attribute was TRUE, a client shall reset the job's~~

1366 ~~job hold attribute to FALSE by means of the ModifyJob operation~~
 1367 ~~before the printer can schedule the job for printing. When the~~
 1368 ~~value is set to FALSE as a result of the ModifyJob operation, the~~
 1369 ~~printer shall remove the job hold set value from the~~
 1370 ~~job state reasons attribute and, if no other reasons remain, shall~~
 1371 ~~change the job's current job state to pending so that the job~~
 1372 ~~becomes a candidate for being scheduled on printer(s).~~

1373 ~~ISSUE: the above few sentences assume a ModifyJob operation, which~~
 1374 ~~is not in version 1.0. But without this operation, the job hold~~
 1375 ~~operation is not very useful. Perhaps we should remove job hold.~~

1376 6.2.7.1 job-priority (typeName)

1377 This attribute specifies a priority for scheduling the print -job.
 1378 Printers that employ a priority -based scheduling algorithm use
 1379 this attribute.

1380 There are three standard values: high, default medium, and low.
 1381 Among those jobs that are ready to print, a Printer shall print
 1382 all such jobs with a high priority before printing those with a
 1383 default medium or low priority, and a Printer shall print all such
 1384 jobs with a default medium priority before printing those with a
 1385 low priority.

1386 If the client does not specify this attribute, the Printer assumes
 1387 that the end user places no constraints concerning priority on the
 1388 scheduling of the print -job, and it has a priority value of
 1389 default ~~the value of the Printer's maximum end user priority~~
 1390 ~~attribute. If that attribute is unspecified, the Printer uses the~~
 1391 ~~value of 'high'.~~

1392 An operator can modify a job to have any priority. An end-user is
 1393 restricted ~~by~~ the value of the maximum end user priority ~~Printer~~
 1394 ~~attribute . maximum end user priority.~~

1395 6.2.7.2 job-print-after (dateTime)

1396 This attribute specifies the calendar date and time of day after
 1397 which the print-job shall become a candidate for printing.

1398 If the value of this attribute is in the future, the Printer shall
 1399 set the value of the job's **current-job-state** to **held** and add the
 1400 **job-print-after-specified** value to the job's **job-state-reasons**
 1401 attribute and shall not schedule the print-job for printing until
 1402 the specified date and time has passed. When the specified date
 1403 and time arrives, the Printer shall remove the **job-print-after-**
 1404 **specified** value from the job's **job-state-reason** attribute and, if
 1405 no other reasons remain, shall change the job's **current-job-state**
 1406 to **pending** so that the job becomes a candidate for being scheduled
 1407 to print.

1408 If this attribute is unspecified or the value is in the past, the
 1409 job shall be a candidate for scheduling immediately.

1410

1411 6.2.7.3 job-print-off-peak (type3Enum)

1412 |
1413 | This attribute specifies the off-peak period during which the
1414 | print-job shall become a candidate for printing.

1415 | Standard values are: `evening', `night', `weekend', `second-
1416 | shift', `third-shift'.

1417 | If this attribute is specified, it contains a value with which an
1418 | administrator has associated allowable print times. An
1419 | administrator is encouraged to pick names that suggest the type of
1420 | off-peak period ~~., such as `night', `weekend', `thirdShift'.~~

1421 | If this attribute is unspecified, the job shall be a candidate for
1422 | scheduling immediately.

1423 6.2.7.4 job-retention-period (deltaTime)

1424 | The retention time is expressed in hours and minutes, e.g. 6:00 (6
1425 | hours), or 20 (20 minutes).

1426 | This attribute specifies the minimum period of time following the
1427 | completion of job processing and printing that the server shall
1428 | keep job attributes and document data. The Printer may keep these
1429 | attributes and data longer than the value of the
1430 | job-retention-period attribute.

1431 | ISSUE: Should this be deleted?

1432

1433

1434

1435

1436 6.2.8 Job Production Attributes (Set by Client/End User)

1437 | The client shall specify these attributes to affect the rendering,
1438 | production and finishing of the document s in the job-. Similar
1439 | types of instructions may also be contained in the document to be
1440 | printed.

1441 | If there is a conflict between the value of one of these
1442 | attributes, and a corresponding instruction in the document
1443 | (either implicit or explicit), the value of the attribute shall
1444 | take precedence over the document instruction.

1445 | Job Production and Resource Attributes each address a similar set
1446 | of features but they have different uses.

1447 | A job production attribute provides a client with a way to request
1448 | some feature that is not embedded within the document data. After
1449 | some program has merged the production attributes into the
1450 | document data After the information from these attributes has been
1451 | folded into the document data (possibly during a translation
1452 | process of the document data), these attributes are no longer
1453 | relevant and shall can be discarded from a job. Instead, the
1454 | resource attributes specify the resources needed to print the job
1455 | as modified by the job production attributes.

1456 Note: until companies that supply interpreters for PDL's, such as
 1457 PostScript and PCL allow a way to specify overrides for internal
 1458 job production instructions, a Printer may not be able to
 1459 implement these attributes for some PDL's.

1460 A job resource attribute tells a Printer what features the job
 1461 needs. A program that translates document data to a Printer's PDL,
 1462 and/or merges production attributes into the document data should
 1463 add job resource attributes to a job.

1464 For example, a job production attribute medium-select with the
 1465 value of 'letter' requests that a job be printed on letter paper,
 1466 but gives no information about what resources the job needs. A
 1467 resource production attribute media-used with the values of
 1468 'letter' and 'ledger' tell a Printer that the job needs letter and
 1469 ledger paper, but gives no information about which pages use each
 1470 medium.

1471 ~~After the information from these attributes has been folded into~~
 1472 ~~the document data (possibly during a translation process of the~~
 1473 ~~document data), these attributes are no longer relevant and can~~
 1474 ~~be discarded from a job. Instead, the resource attributes specify~~
 1475 ~~the resources needed to print the job as modified by the job~~
 1476 ~~production attributes.~~
 1477 ~~Note: until companies that supply~~
 1478 ~~interpreters for PDL's, such as PostScript and PCL allow a way to~~
 1479 ~~specify overrides for internal job production instructions, a~~
 1480 ~~Printer may not be able to implement these attributes for some~~
 1480 ~~PDL's.~~

1481 The client may also specify document production -instruction
 1482 attributes in: Get-Attributes and GetJobs.

1483
 1484 6.2.8.1 medium-select (type2Enum)

1485 This attribute identifies the medium that the Printer shall use
 1486 for all pages of the document regardless of what media are
 1487 specified within the document.

1488 The values for medium include medium-names, medium-sizes, input-
 1489 trays and electronic forms so that one attribute specifies the
 1490 media.

1491 Standard values are defined (taken from ISO DPA and the Printer
 1492 MIB)+

1493 ~~TBD~~

<u>default</u>	<u>The default medium for the output device</u>
<u>iso-a4-white</u>	<u>Specifies the ISO A4 white medium</u>
<u>iso-a4-coloured</u>	<u>Specifies the ISO A4 coloured medium</u>
<u>iso-a4-transparent</u>	<u>Specifies the ISO A4 transparent medium</u>
<u>iso-a3-white</u>	<u>Specifies the ISO A3 white medium</u>
<u>iso-a3-coloured</u>	<u>Specifies the ISO A3 coloured medium</u>
<u>iso-a5-white</u>	<u>Specifies the ISO A5 white medium</u>
<u>iso-a5-coloured</u>	<u>Specifies the ISO A5 coloured medium</u>

<u>iso-b4-white</u>	<u>Specifies the ISO B4 white medium</u>
<u>iso-b4-coloured</u>	<u>Specifies the ISO B4 coloured medium</u>
<u>iso-b5-white</u>	<u>Specifies the ISO B5 white medium</u>
<u>iso-b5-coloured</u>	<u>Specifies the ISO B5 coloured medium</u>
<u>jis-b4-white</u>	<u>Specifies the JIS B4 white medium</u>
<u>jis-b4-coloured</u>	<u>Specifies the JIS B4 coloured medium</u>
<u>jis-b5-white</u>	<u>Specifies the JIS B5 white medium</u>
<u>jis-b5-coloured</u>	<u>Specifies the JIS B5 coloured medium</u>

1494

1495

1496

The following stand ard values are defined for North American media:

<u>na-letter white</u>	<u>Specifies the North American letter white medium</u>
<u>na-letter coloured</u>	<u>Specifies the North American letter coloured medium</u>
<u>na-letter transparent</u>	<u>Specifies the North American letter transparent medium</u>
<u>na-legal white</u>	<u>Specifies the North American legal white medium</u>
<u>na-legal coloured</u>	<u>Specifies the North American legal coloured medium</u>

1497

1498

The following standard values are defined for envelopes:

<u>iso-b4-envelope</u>	<u>Specifies the ISO B4 envelope medium</u>
<u>iso-b5-envelope</u>	<u>Specifies the ISO B5 envelope medium</u>
<u>iso-c3-envelope</u>	<u>Specifies the ISO C3 envelope medium</u>
<u>iso-c4-envelope</u>	<u>Specifies the ISO C4 envelope medium</u>
<u>iso-c5-envelope</u>	<u>Specifies the ISO C5 envelope medium</u>
<u>iso-c6-envelope</u>	<u>Specifies the ISO C6 envelope medium</u>
<u>iso-designated-long-envelope</u>	<u>Specifies the ISO Designated Long envelope medium</u>
<u>na-10x13-envelope</u>	<u>Specifies the North American 10x13 envelope medium</u>
<u>na-9x12-envelope</u>	<u>Specifies the North American 9x12 envelope medium</u>
<u>monarch-envelope</u>	<u>Specifies the Monarch envelope</u>
<u>na-number-10-envelope</u>	<u>Specifies the North American number 10 business envelope medium</u>
<u>na-7x9-envelope</u>	<u>Specifies the North American 7x9 inch envelope</u>
<u>na-9x11-envelope</u>	<u>Specifies the North American 9x11 inch envelope</u>
<u>na-10x14-envelope</u>	<u>Specifies the North American 10x14 inch envelope</u>
<u>na-number-9-envelope</u>	<u>Specifies the North American number 9 business envelope</u>
<u>na-6x9-envelope</u>	<u>Specifies the North American 6x9 inch envelope</u>
<u>na-10x15-envelope</u>	<u>Specifies the North American 10x15 inch envelope</u>

1499

1500

1501

The following standard values are defined for the less commonly used media (white-only):

<u>executive-white</u>	<u>Specifies the white executive medium</u>
<u>folio-white</u>	<u>Specifies the folio white medium</u>
<u>invoice-white</u>	<u>Specifies the white invoice medium</u>
<u>ledger-white</u>	<u>Specifies the white ledger medium</u>
<u>quarto-white</u>	<u>Specifies the white quarto medium</u>
<u>iso-a0-white</u>	<u>Specifies the ISO A0 white medium</u>
<u>iso-a1-white</u>	<u>Specifies the ISO A1 white medium</u>
<u>iso-a2-white</u>	<u>Specifies the ISO A2 white medium</u>
<u>iso-a6-white</u>	<u>Specifies the ISO A6 white medium</u>
<u>iso-a7-white</u>	<u>Specifies the ISO A7 white medium</u>
<u>iso-a8-white</u>	<u>Specifies the ISO A8 white medium</u>
<u>iso-a9-white</u>	<u>Specifies the ISO A9 white medium</u>
<u>iso-10-white</u>	<u>Specifies the ISO A10 white medium</u>
<u>iso-b0-white</u>	<u>Specifies the ISO B0 white medium</u>
<u>iso-b1-white</u>	<u>Specifies the ISO B1 white medium</u>
<u>iso-b2-white</u>	<u>Specifies the ISO B2 white medium</u>
<u>iso-b3-white</u>	<u>Specifies the ISO B3 white medium</u>
<u>iso-b6-white</u>	<u>Specifies the ISO B6 white medium</u>
<u>iso-b7-white</u>	<u>Specifies the ISO B7 white medium</u>
<u>iso-b8-white</u>	<u>Specifies the ISO B8 white medium</u>
<u>iso-b9-white</u>	<u>Specifies the ISO B9 white medium</u>
<u>iso-b10-white</u>	<u>Specifies the ISO B10 white medium</u>
<u>jis-b0-white</u>	<u>Specifies the JIS B0 white medium</u>
<u>jis-b1-white</u>	<u>Specifies the JIS B1 white medium</u>
<u>jis-b2-white</u>	<u>Specifies the JIS B2 white medium</u>
<u>jis-b3-white</u>	<u>Specifies the JIS B3 white medium</u>
<u>jis-b6-white</u>	<u>Specifies the JIS B6 white medium</u>
<u>jis-b7-white</u>	<u>Specifies the JIS B7 white medium</u>
<u>jis-b8-white</u>	<u>Specifies the JIS B8 white medium</u>
<u>jis-b9-white</u>	<u>Specifies the JIS B9 white medium</u>
<u>jis-b10-white</u>	<u>Specifies the JIS B10 white medium</u>

1502

1503 The following standard values are defined for engineering media:

<u>a</u>	<u>Specifies the engineering A size medium</u>
<u>b</u>	<u>Specifies the engineering B size medium</u>
<u>c</u>	<u>Specifies the engineering C size medium</u>
<u>d</u>	<u>Specifies the engineering D size medium</u>
<u>e</u>	<u>Specifies the engineering E size medium</u>

1504

1505 6.2.8.2 number-up (positiveInteger)

1506 This attribute specifies the number of source page -images to
 1507 impose upon a single side of an instance of a selected medium. —

1508 In general, only certain numeric values are valid for this
 1509 attribute, depending upon the Printer implementation to which the
 1510 print-request is directed. Typical supported values are 2 and 4.
 1511 If this attribute is unspecified or has a value of 1, then the
 1512 Printer does not apply any number-up transformation to the pages.

1513 This attribute primarily controls the translation, scaling and
 1514 rotation of page images, but a site may choose to add
 1515 embellishments, such as borders to each logical page.

1516 ISSUE: should there be a separate attribute to control
 1517 embellishments, especially for the 1-up case ?-

1518 6.2.8.3 -finishing (type2Enum)

1519 This attribute identifies the finishing operation that the Printer
 1520 should apply to each copy of the printed document. Examples
 1521 include stapling, saddle -stitching, hole -drilling, binding with
 1522 tape, etc.

1523 Standard values for this attribute ~~are are: include:TBD.~~

<u>staple</u>	<u>This indicates that staples are to be used to bind the document. The exact number and placement of the staples is site-defined; other finishing object attributes may be included to provide this information.</u>
<u>staple-top-left</u>	<u>This indicates that one or more staples should be placed on the top left corner of the document</u>
<u>staple-bottom-left</u>	<u>This indicates that one or more staples should be placed on the bottom left corner of the document</u>
<u>staple-top-right</u>	<u>This indicates that one or more staples should be placed on the top right corner of the document</u>
<u>staple-bottom-right</u>	<u>This indicates that one or more staples should be placed on the bottom right corner of the document</u>
<u>saddle-stitch</u>	<u>This indicates that one or more staples (wire stitches) are to be used to bind the document along the middle fold. The exact number and placement of the stitches is site-defined.</u>
<u>edge-stitch</u>	<u>This indicates that one or more staples (wire stitches) are to be used to bind the document along one edge. The exact number and placement of the staples is site-defined.</u>
<u>punch</u>	<u>This indicates that holes are required in the finished document. The exact number and placement of the holes is site -defined. The punch specification may be satisfied (in a site- and implementation-specific manner) either by drilling/punching, or by substituting predrilled media.</u>
<u>cover</u>	<u>This value is specified when it is desired to select a non-printed (or pre-printed) cover for the document. This does not supplant the specification of a printed cover (on cover stock medium) by the document itself.</u>
<u>bind</u>	<u>This indicates that a binding is to be applied to the document; the type and placement of the binding is site-defined.</u>

- 1524 none Perform no finishing. See 9.1.2
- 1525 6.2.8.3 sides (type2Enum)
- 1526 This attribute specifies whether the document should be printed in
1527 one of three ways: 1-sided (simplex), 2-sided- ~~long~~-binding-edge
1528 (duplex), 2-sided- ~~short~~-binding-edge (tumble).
- 1529 The standard values are: 1-sided, 2-sided-long-edge, 2-sided-
1530 short-edge.
- 1531 6.2.8.4 copies (positiveInteger)
- 1532 This attribute specifies the number of copies of the job to be
1533 printed. If this attribute is unspecified, its default value is 1
1534 copy.
- 1535
- 1536 6.2.8.5 printer-resolution-select (positiveIntegerCross)
- 1537 This attribute specifies the resolution that the Printer should
1538 use.
- 1539 The syntax allows a single integer to specify the resolution or a
1540 pair of integers to specify the resolution when the x and y
1541 dimensions differ. When two integers are specified, the first is
1542 in the ~~x paper feed~~ direction, ie., in the direction fo the
1543 shortest dimension of the medium, so that the value is independent
1544 of whether the printer feeds long edge or short edge first.
- 1545 6.2.8.6 print-quality (type2Enum)
- 1546 This attribute specifies the print quality that the Printer should
1547 use.
- 1548 The standard values are :
- | | | |
|------|---------------|--|
| 1549 | <u>draft</u> | <u>Lowest quality available on the printer</u> |
| 1550 | <u>normal</u> | <u>Normal or intermediate quality on the printer</u> |
| 1551 | <u>high</u> | <u>Highest quality available on the printer</u> |
- 1552 ~~± TBD.~~
- 1553
- 1554 6.2.8.7 page-select (positiveIntegerRange)
- 1555 This attribute specifies the pages in the document that the
1556 Printer shall use. This attribute is unlikely to be useful for
1557 jobs with more than one document or in Job Templates. If this
1558 attribute is unspecified, then the Printer prints all pages in a
1559 document.
- 1560 6.2.8.8 files-are-one-document (Boolean)
- 1561 This attribute is relevant only if a job consists of two or more
1562 documents. It controls finishing operations, job-sheet placement,
1563 and the order of documents when the copies attribute exceeds 1.

1564 If the files for the job are a and b and this attribute is **true**,
1565 then files a and b are treated as a single document for finishing
1566 operations. Also, there will be no slip sheets between files a and
1567 b. If more than one copy is made, the ordering must be a, b, a,
1568 b, The attribute **files-are-interleaved** is ignored.

1569 If the files for the job are a and b and this attribute is **false**
1570 **or unspecified**, then each file is treated as a single document for
1571 finishing operations. Also, a client may specify that a slip sheet
1572 be between files a and b. If more than one copy is made, and the
1573 attribute **files-are-interleaved** false or unspecified, the ordering
1574 is a, a, b, b, If more than one copy is made, and the attribute
1575 **files-are-interleaved** true, the ordering is a, b, a, b,

1576 6.2.8.9 files-are-interleaved (Boolean)

1577 This attribute is used in conjunction with **files-are-one-document**
1578 (q.v.).

1579 ISSUE: Should the files-are-one-document and files-are-interleaved
1580 be combined into a single enum attribute?

1581 6.2.9 Attributes for Conversion of Text Files (Set by Client/End 1582 User)

1583 The client shall specify these attributes to control formatting
1584 for text documents or HTML documents. If the client does not
1585 specify any of these attributes, a Printer shall use its own
1586 defaults.

1587 A client need not specify these attributes for other types of
1588 documents, such as PostScript or PCL.

1589 6.2.9.1 width (cardinalUnits)

1590 This attribute specifies the media width for the document in
1591 characters.

1592 6.2.9.2 length (cardinalUnits)

1593 This attribute specifies the media length for the document in
1594 characters.

1595 6.2.9.3 left-margin (cardinalUnits)

1596 This attribute specifies the left-margin for the document in
1597 characters.

1598 6.2.9.4 right-margin (cardinalUnits)

1599 This attribute specifies the right-margin for the document in
1600 characters.

1601 6.2.9.5 top-margin (cardinalUnits)

1602 This attribute specifies the top-margin for the document in lines.

1603 6.2.9.6 bottom-margin (cardinalUnits)

1604 This attribute specifies the bottom-margin for the document in
1605 lines.
1606

1607 6.2.9.7 repeated-tab-stops (cardinalUnits)

1608 This attribute specifies the tab stops for the document in
1609 characters.

1610 6.2.9.8 header-text (string)

1611 This attribute specifies the header text for the document.

1612 6.2.9.9 footer-text (string)

1613 This attribute specifies the footer text for the document.

1614 6.2.9.10 font-size (cardinalUnits)

1615 This attribute specifies the font-size in points for text in the
1616 document. The value of this attribute affects the size of the
1617 other text attributes.

1618 If this attribute is omitted, the Printer shall assume a value of
1619 10. A value of 10 with a fixed pitch font, shall produce 12
1620 characters per inch in the horizontal direction and with 6 lines
1621 per inch in the vertical direction.

1622 6.2.9.11 number-pages (Boolean)

1623 This attribute specifies that the pages should be numbered in the
1624 document.

1625 default-font (string) This attribute specifies the font to use for
1626 all text in the document.

1627 6.2.9.12 default-code-set (type3Enum)

1628 This attribute specifies the code-set in which the document is
1629 encoded.

1630 6.2.9.13 content-orientation (type2Enum)

1631 This attribute specifies the orientation of the document.

1632 The standard values are ~~+ landscape or portrait.~~

portrait The page orientation such that the sides
are longer than the top when the page is
held in the intended human reading
orientation

landscape The page orientation such that the sides are shorter than the top when the page is held in the intended human readable orientation. Land scape is defined to be a rotation of the page by +90 degrees with respect to the medium (i.e. anti-clockwise) from the portrait orientation
NOTE - The +90 direction was chosen because simple finishing on the long edge is the same edge whether portrait or landscape

reverse-
portrait The page orientation defined to be a rotation of 180 degrees with respect to portrait

reverse-
landscape The page orientation defined to be a rotation of 180 degrees with respect to landscape. Landscape is defined to be a rotation of the page by -90 degrees with respect to the medium (i.e. clockwise) from the portrait orientation
NOTE - Reverse-landscape was added because some applications rotate landscape -90 degrees from portrait, rather than +90 degrees.

1633

1634 | 6.2.10 Job Resource Attributes (Set by the program that produces or
 1635 | senses the PDL)

1636 | A program described below shall add these attributes, which
 1637 | describe the resources needed to print the job.

1638 | A Printer may use these attributes to validate and schedule the
 1639 | print-job without inter preting the contents of the document. This
 1640 | provides the opportunity for a Printer to support a broad set of
 1641 | document formats yet still support fast efficient scheduling and
 1642 | validation of each job.

1643 | The client /end user shall not specify these attributes. Instead,
 1644 | it is the duty of the program that translates the document to the
 1645 | printer's PDL (or analyzes it) to add these attributes and their
 1646 | values to the job. Such a program may execute at a number of
 1647 | different points in time:

1648 | 1. The program produces a final form document and stores it in
 1649 | a file before the end-user submits the print job.

1650 | 2. The program produces a final form document data stream when
 1651 | the end-user specifies "Print" to the application program
 1652 | (Windows GDI driver).

1653 | 3. The program translates a revisable or final form document
 1654 | into a PDL that the printer understands.

1655 | If any of these attributes is unspecified, the Printer shall
 1656 | assume that the all resources required by the document of the type
 1657 | specified by the missing attributes are ready , ie., are available
 1658 | to the Printer and/or output device without human intervention .
 1659 | These attributes may be unspecified if the translation program
 1660 |

1661 fails to provides such values, or if no translation occurs (e.g.
1662 the document is a PostScript document.

1663 Note: The Printer does not use these attributes during the actual
1664 printing of a document.

1665 Note: these attributes allow more than one value wherever it is
1666 possible for a job to specify more than one value of the
1667 corresponding job attribute, possibly by embedded instructions.

1668 The client may specify these attributes in: Get-Attributes and
1669 Get-Jobs.

1670 [See the section on job production attributes for an explanation of](#)
1671 [how the job resource attributes differ from the job production](#)
1672 [attributes.](#)

1673

1674

1675 6.2.10.1 document-format-used (1#type2Format)

1676 This attribute identifies the document format [s](#) needed to print [the](#)
1677 [document\(s\) in](#) this job.

1678

1679 A format consists of two elements, a name and a version. The
1680 latter element is optional.

1681 The syntax is for type2Format:

1682 name ["/" version]

1683 Examples include: PostScript, PostScript/2.0 and PCL/5e

1684 ISSUE: do we want the version to be optional?

1685 ~~*~~

1686

1687 6.2.10.2 fonts-used (1#string)

1688 This attribute identifies the font resources used ~~in~~ the
1689 [document\(s\) in the](#) job.

1690 6.2.10.3 code-sets-used (1#type3Enum)

1691 This attribute identifies the code-sets used in the document [\(s\) in](#)
1692 [the Job](#). This attribute is relevant only for files that are not in
1693 ASCII, such as text files and possibly PCL files. PostScript files
1694 are always ASCII. Normally there is at most 1 code-set.

1695 Standard values are defined in the section [specifying the default-](#)
1696 [code-set attribute.](#) ~~on default fonts.~~

1697 6.2.10.4 media-used (1#type2Enum)

1698 This attribute identifies the media, media-sizes, input-trays or
1699 electronic forms needed to print the [document\(s\) in the](#) job.

1700 Standard values for this attribute are defined in the section
1701 [specifying the ~~on~~-medium-select attribute](#).

1702
1703 6.2.10.5 sides-used (type2Enum)

1704 This attribute specifies whether a job needs ~~one~~-sided, ~~two~~-
1705 sided-long [-binding-](#)edge, or ~~two~~-sided-short [-binding-](#)edge
1706 printing.

1707 Standard values for this attribute are defined in the section
1708 [specifying ~~on~~ the sides attribute](#).

1709
1710 6.2.10.6 print-quality-used (type2Enum)

1711 This attribute specifies what print quality the job needs.

1712
1713 Standard values for this attribute are defined in the section
1714 [specifying the ~~on~~-print-quality attribute](#).

1715 6.2.10.7 finishing-used (type2Enum)

1716 This attribute specifies what finishing the job needs.

1717 Standard values for this attribute are defined in the section
1718 [specifying the ~~on~~-finishing attribute](#).

1719 6.2.10.8 printer-resolution-used (positiveIntegerCrossState)

1720 This attribute specifies what resolution the job needs.

1721 6.2.10.9 total-job-octets (positiveInteger)

1722 This attribute specifies the total size of the job in octets. This
1723 attribute is the first of three that a translation program can use
1724 to specify the size of a job.

1725 6.2.10.10 job-impression-count (positiveInteger)

1726 This attribute specifies the total size of the job in impressions.

1727 6.2.10.11 job-media-sheet-count (positiveInteger)

1728 This attribute specifies the total size of the job in media-
1729 sheets.

1730 6.2.11 Number of Documents [\(Set by Client\)](#)

1731 This group contains a single attribute which specifies the number
1732 of documents in the job.

1733
1734 The client shall specify this attribute in Print and may specify
1735 this attribute in: Get-Attributes and Get-Jobs.

1736 6.2.11.1 number-of-documents (positiveInteger)

1737 This attribute specifies the number of documents in the job. Each
1738 document shall contain its own set of document content attributes
1739 described below.

1740 6.2.12 Document Data (Set by a Client/End User)

1741 This group of attributes describes the document data for the job.
1742 These attributes also include the document data or reference it.

1743 All job attributes in other sections of this document occur only
1744 once per job and apply to all documents in a job.

1745 The client may specify document -data attributes in Print. The
1746 client must specify either the document-URL or document-
1747 content path in Print.

1748 Except for document-content, the client may specify document -data
1749 attributes in: Get-Attributes, and Get-Jobs.

1750

1751

1752

1753

1754 6.2.12.1 document-format (type2Format)

1755 This attribute identifies the document format of this document.

1756 If the client does not specify this attribute, then the Printer
1757 shall attempt to determine the format in order to decide if the
1758 document data needs to be translated.

1759 ISSUE: do we want the version to be optional?

1760 6.2.12.2 document-name (name)

1761 This attribute contains the name of the document used by the
1762 client to initially identify the document.

1763

1764 6.2.12.3 document-URL (name)

1765 This attribute contains the URL of the document if the client
1766 specified the document with a URL.

1767 If this attribute is specified, then document-content and
1768 document path shall be unspecified.

1769 6.2.12.4 document-content (octetString)

1770 This attribute contains the actual contents of the document.

1771 If this attribute is specified, then document path and document-
1772 URL shall be unspecified.

1773 This attribute shall be used during the transmission of the Print
1774 operation over a network. A Printer shall save the document data
1775 to a file and reference it with the document-URL or document-path
1776 attribute. A Get-Attribute or Get-Jobs operation shall always find
1777 that this attribute is unspecified.

1778 ~~6.2.12.5 document path (name)~~

1779 ~~This attribute contains a path which references a file containing~~
1780 ~~the document.~~

1781 ~~If this attribute is specified, then document content and~~
1782 ~~document URL shall be unspecified.~~

1783 ~~This attribute shall not be used during the transmission of the~~
1784 ~~Print operation over a network. It is intended to reference the~~
1785 ~~file when document data is on the printer.~~

1787 ~~ISSUE: is this attribute necessary or is document URL sufficient?~~

1788 6.3 Operation Attributes (Set by Client)

1790 NOTE: These attributes have just been introduced and they are not
1791 as stable as the attributes in the other sections. Some work is
1792 still needed to show the relationship between these attributes,
1793 job attributes, printer attributes, and authentication and
1794 authorization.
1795

1796 The client shall set these attributes and associate them with an
1797 operation rather than an object.

1798 It is intended that a client program rather than an end-user has
1799 control over the setting of these values so that they cannot be
1800 easily forged.

1801 6.3.1 operation-locale (type3Locale)

1802 This attribute identifies the locale of the client. The Printer
1803 uses this attribute to determine the locale of messages in the
1804 result of the operation or in errors returned by the operation.

1805 The standard values are defined in the section on the job-locale
1806 attribute. The type3EnumTrip consists of 3 colon separated type 3
1807 enums. The first is the country. The second is the language. The
1808 third is the code set.

1809 If an operation does not specify this attribute, the Printer shall
1810 assume that the operation has the same locale as the Printer.

1811 6.3.2 operation-notification-address (name)

1812 This attribute identifies the email-address of the client. The
1813 Printer uses this attribute to determine the email address for any
1814 notifications that occur in the Printer.

1815 ISSUE: can this address be determined from the next two
1816 attributes: operation-user-name and operation-host-name?

1817 6.3.3 operation-user-name (name)

1818 This attribute identifies the most authenticated end user name
1819 that the client can supply. This name identifies the end user
1820 performing the operation.

1821 This value shall be set by the system rather than the end-user in
1822 order to minimize the chance of forgery.

1823 6.3.4 operation-host-name (name)

1824 This attribute identifies the most authenticated host name that
1825 the client can supply. This name identifies the host from which
1826 the operation comes.

1827 This value shall be set by the system rather than the end-user in
1828 order to minimize the chance of forgery.

1829 6.4 Printer Attributes (Set by the Administrator)

1830 A printer object may be realized in ~~either~~ a Print Server or
1831 Output Device ~~.~~ Note: How these attribute are set by an
1832 Administrator is outside the scope of this specification.

1833 A Printer Object in an Output Device contains a set of printer
1834 object attributes that represent an Output Device capable of
1835 rendering a document in visible form. Examples include electronic
1836 and electro-mechanical printers such as laser printers, ink-jet
1837 printers, and various kinds of impact printers, but may include
1838 other types of output devices such as microfiche imagers and
1839 plotters as well.

1840 A Printer Object in a Print Server that supplies queuing,
1841 spooling, and scheduling for an Output device that does not queue
1842 or spool.

1843

1844 A Printer Object in a Print Server contains a set of printer
1845 object attributes that are the union of the Printer objects in the
1846 downstream Output Devices. This object extends the capabilities
1847 of an Output Device. For example, an administrator might define a
1848 single Print Server to represent all of the Output Devices of the
1849 same type and capability in a single location, associated with a
1850 particular server. A end user/~~client~~ would normally send a
1851 print-job to a Print Server, and allow the Print Server to assign
1852 the job to a particular Output Device based on the relative load
1853 and availability of the printers under its control, thus providing
1854 a load balancing service. However, nothing precludes an
1855 administrator from configuring a print system so that a end
1856 user/~~client~~ can send a print-job directly to an Output Device .

1857 A Print Server, in the most common case, controls exactly one
1858 downstream Output Device. The Print Server's Printer object has

1859 attributes whose values are the same as those of the Printer
1860 object in the downstream Output Device.

1861 The attributes defined in this section provide information about
1862 a particular Printer.

1863 6.4.1 printer-name (name)

1864 This attribute uniquely identifies the printer on its host.

1865 6.4.2 printer-location ~~text~~(string)

1866 This attribute identifies the location of this printer.

1867 6.4.3 printer-model (string)

1868 This attribute identifies the make and model of the printer.

1869 6.4.4 printer-types (type2Enum)

1870 This attribute identifies the marking technology of the printer.

1871 The standard value for this attribute are the descriptive names
1872 specified by ISO DPA which have corresponding enum symbolic and
1873 numeric values assigned by the Printer MIB (RFC 1759). These
1874 standard values are:

<u>other</u>	<u>Other than the standard values</u>
<u>unknown</u>	<u>Unknown printer type</u>
<u>electrophotographic-LED</u>	<u>electrophotographic LED</u>
<u>electrophotographic-</u>	<u>electrophotographic laser</u>
<u>laser</u>	
<u>electrophotographic-</u>	<u>other electrophotographic</u>
<u>other</u>	
<u>impact-moving-head-dot-</u>	<u>9-pin impact moving head dot</u>
<u>matrix-9-pin</u>	<u>matrix</u>
<u>impact-moving-head-dot-</u>	<u>24-pin impact moving head dot</u>
<u>matrix-24-pin</u>	<u>matrix</u>
<u>impact-moving-head-dot-</u>	<u>neither 9-pin nor 24-pin moving</u>
<u>matrix-other</u>	<u>head dot matrix</u>
<u>impact-moving-head-</u>	<u>fully formed impact moving head</u>
<u>fully-formed</u>	
<u>impact-band</u>	<u>impact band</u>
<u>impact-other</u>	<u>impact other</u>
<u>inkjet-aqueous</u>	<u>aqueous inkjet</u>
<u>inkjet-solid</u>	<u>solid inkjet</u>
<u>inkjet-other</u>	<u>other inkjet</u>
<u>pen</u>	<u>pen</u>
<u>thermal-transfe r</u>	<u>thermal transfer</u>
<u>thermal-sensitive</u>	<u>thermal sensitive</u>
<u>thermal-diffusion</u>	<u>thermal diffusion</u>
<u>thermal-other</u>	<u>other thermal</u>
<u>electro-erosion</u>	<u>electro-erosion</u>
<u>electro-static</u>	<u>electro-static</u>
<u>photographic-microfiche</u>	<u>photographic microfiche</u>
<u>photographic-</u>	<u>photographic imagesetter</u>
<u>imagesetter</u>	
<u>photographic-other</u>	<u>other photographic</u>

	<u>ion-deposition</u>	<u>ion deposition</u>
	<u>E-beam</u>	<u>E-beam</u>
	<u>typesetter</u>	<u>typesetter</u>
1875	other, unknown, electrophotographic LED, electrophotographic	
1876	laser, electrophotographic other, impact moving head dot matrix 9	
1877	pin, impact moving head dot matrix 24 pin, impact moving head,	
1878	dot matrix other, impact moving head fully formed, impact band,	
1879	impact other, inkjet aqueous, inkjet solid, inkjet other, pen,	
1880	thermal transfer, thermal sensitive, thermal diffusion, thermal	
1881	other, electro, erosion, electro static, photographic microfiche,	
1882	photographic imagesetter, photographic other, ion deposition, E	
1883	beam, typesetter.	

1884 **ISSUE:** Should they be from the printer MIB instead. In the printer
 1885 MIB hyphens do not exist. Instead the first letter after a hyphen
 1886 is upper case. THIS ISSUE IS CLOSED: We will use the xxx-yyy-zzz
 1887 format rather than the xxxYyyZzz format.

1888 6.4.5 printer-state (typeName)

1889 This attribute identifies the current state of the printer. The
 1890 protocol support all values for printer states, however a Printer
 1891 shall only generate the printer states which are appropriate for
 1892 the particular implementation.

1893 The following standard values are defined:

<u>unknown</u>	<u>The printer state is not known, or is indeterminate, or is not returned by the operation</u>
<u>idle</u>	<u>The printer is ready to accept jobs, but none have been scheduled on it.</u>
<u>printing</u>	<u>The printer is currently printing a job</u>
<u>needs-attention</u>	<u>The printer needs human attention (no special skills required). This state typically includes adding paper, clearing a jam, changing the medium, etc.</u>
<u>paused</u>	<u>The operator has (temporarily) paused the printer, by means outside the scope of this part of ISO/IEC 10175.</u>
<u>shutdown</u>	<u>The printer has been taken out of service, (for a long time), wh ether for repairs or others reasons. The printer's message generic attribute may be used to record a reason and estimated time for return to service</u>
<u>job-start-wait</u>	<u>The currently processing job was started with the job-start-wait attribute set, and is awaiting operator intervention or time-out.</u>
<u>job-end-wait</u>	<u>The currently processing job was started with the job-end-wait attribute set, and is awaiting operator intervention or time-out.</u>
<u>job-password-wait</u>	<u>The currently processing job was started with the job -password attribute set, and is awaiting the operator or user to enter the password supplied by the job-password attribute.</u>

needs-key-operator The printer needs the attention of a key operator. Key operator functions are printer-specific, but typically include adding toner or developer, or attending to a hardware fault.

connecting-to-printer The server has scheduled a job on the printer and is in the process of connecting to a shared network printer (and may not be able to actually start printing the job for an arbitrarily long time depending on the usage of the printer by other servers).

timed-out The server was able to connect to the printer (or is always connected), but was unable to get a response from the printer in the time specified by the printer's printer-timeout-period attribute.

1894 ~~unknown, idle, printing, needs attention, paused, shutdown,~~
 1895 ~~job start wait, job end wait, job password wait,~~
 1896 ~~needs key operator, connecting to printer, state timed out~~

1897 6.4.6 printer-state-message (string)

1898 This attribute specifies a message that gives further information
 1899 about the current printer state. .

1900 6.4.7 message (string)

1901 This attribute provides a message from an operator, system
 1902 administrator or 'intelligent' process to indicate to the end
 1903 user information or status of the printer, such as why it is
 1904 unavailable or when it is expected to be available. ~~the reasons~~
 1905 ~~for modification or other management action taken on a job~~.

1906 6.4.8 locale (type3Locale)

1907 This attribute specifies the locale that the Printer operates in.

1908 The standard values are defined in the section on the job-locale
 1909 attribute.

1910 6.4.9 notification-events (#type2Enum)

1911 This attribute specifies the events on whose occurrence the
 1912 Printer should notify those addresses specified by the
 1913 notification-addresses attribute.

1914 If the attribute is unspecified or empty, the Printer does not
 1915 perform notification, though the Printer still checks the jobs'
 1916 notification-events attribute.

1917 In this attribute, job-problem and printer-problem have the same
 1918 meaning.

1919 The standard values are defined in the section on the job's
 1920 notification-events attribute.

1921 6.4.10 notification-addresses (#name)

1922 This attribute specifies the email addresses to which the Printer
1923 should send messages when events specified by the notification-
1924 events attribute occur.

1925 If the attribute is unspecified or empty, the Printer does not
1926 perform notification, though the Printer still checks the jobs'
1927 notification-events attribute.

1928 6.4.11 end-user-acl (#name)

1929 This attribute specifies the [end](#) users who are allowed to print on
1930 the Printer.

1931 If the attribute is unspecified or empty, the Printer allows
1932 anyone to print.

1933 ISSUE: this does not fully solve the internet authorization
1934 problem because of authentication issues.

1935 6.4.12 maximum-printer-speed (positiveIntegerUnits)

1936 This attribute indicates the maximum printer speed of the Printer.
1937 A job cannot control a Printer's speed, but a Printer Browser can
1938 use printer speed as a criteria.

1939 The standard units are a type2Enum and are: ppm, ipm, spm, lpm,
1940 cps.

1941 6.4.13 fonts-substitutions (#stringPair)

1942 This attribute specifies an appropriate substitute for a font that
1943 is advertised as supported in the fonts-supported attribute, even
1944 though the Printer doesn't actually have the font available.

1945 This attribute consists of a set of font pairs: a font name and
1946 the font to use instead.

1947 6.4.14 fonts-supported (1#stringState)

1948 This attribute identifies the font resources supported by this
1949 printer and indicates the state of readiness for each font.

1950 The standard names are defined in the section on default-font.

1951 Each item in the list contains the pair consisting of a font name
1952 and a state indicating the font's readiness state.

1953 6.4.15 media-supported (1#nameState)
1954

1955 This attribute identifies the media, media-sizes, input trays, and
1956 electronic forms supported by this printer, and indicates the
1957 state of readiness for each medium resource.
1958

1959 There may be just two states: ready and needs-installing, or there
1960 may be a third state: needs-purchasing.

1961 The standard names are defined in the section on the section on
1962 the medium-select.

1963 6.4.16 document-formats-supported (1#type2FormatState)

1964 |
1965 | This attribute identifies the document -formats, including the
1966 | document-format-versions, supported by the Printer. This set
1967 | includes both the formats that are native to the Printer and
1968 | those formats that the Printer can translate to one that is
1969 | native to the Printer. From the client's point of view, this set
1970 | contains all formats in which documents can be submitted to this
1971 | Printer.

1972 | Proprietary document format identifiers, and versions are assigned
1973 | by the owners of those formats.

1974 | The state of readiness for each format is also included, though
1975 | all formats should normally always be ready.

1976 6.4.17 numbers-up-supported (1#positiveIntegerState)

1977 | This attribute identifies the number -up values supported by this
1978 | printer..

1979 | The state of readiness for each number-up value is also included,
1980 | though all number-up conversions should always be ready.

1981 6.4.18 finishings-supported (#type2EnumState)

1982 | This attribute identifies the ~~per document~~ finishing operations
1983 | supported by this Printer and states of readiness for each
1984 | finishing.

1985 | The standard finishing objects are defined in the section on the
1986 | finishing [Job](#) attribute.

1987 | 1988 | 6.4.19 sides-supported (1#type2EnumState)

1989 | This attribute indicates the values of the sides attribute
1990 | supported by this printer and the states of readiness of each
1991 | value.

1992 | The standard values are defined in the section on the sides
1993 | attribute.

1994 6.4.20 print-qualities-supported (1#type2EnumState)

1995 | This attribute indicates the values of the printer-quality
1996 | attribute supported by this printer and the states of readiness
1997 | for each print-quality value.

1998 | The standard values are defined in the printer-quality attribute.

- 1999 6.4.21 printer-resolutions-supported (1#positiveIntegerCrossState)
- 2000 This attribute indicates the values of the printer-resolution-
2001 select attribute supported by this printer and their states of
2002 readiness.
- 2003 The state of readiness for each printer resolution is also
2004 included, though normally all printer-resolutions should always be
2005 ready.
- 2006 The syntax is discussed in the section on the printer-resolution-
2007 select attribute.
- 2008 6.4.22 code-sets-supported (1#type3EnumState)
- 2009 This attribute indicates the values of the default-code-set
2010 attribute supported by this printer and the states of readiness
2011 for each code-set.
- 2012 The standard values are defined in the default-code-set attribute.
- 2013 6.4.23 off-peak-times-supported (#type3EnumState)
- 2014 This attribute indicates the values of the job-print-off-peak
2015 attribute supported by this printer and the states of readiness
2016 for each value.
- 2017 If this attribute is unspecified, then the Printer has no off-peak
2018 periods.
- 2019 The standard values are defined in the section on the job-print-
2020 off-peak attribute.
- 2021 Note: this document does not define how an administrator
2022 associates the off-peak names with actual time periods.
- 2023 6.4.24 events-supported (#type2EnumState)
- 2024 This attribute indicates the values of the job and printer
2025 notification-events attribute supported by this Printer and the
2026 states of readiness for each value.
- 2027 If this attribute is unspecified, then the Printer does not
2028 support notification.
- 2029 The standard values are defined in the section on the
2030 notification-events attribute.
- 2031 6.4.25 locales-supported (1#type3LocaleState)
- 2032 This attribute indicates the values of the job-locale attribute
2033 supported by this Printer and the states of readiness for each
2034 value.
- 2035 The standard values are defined in the section on the job-locale
2036 attribute.

2037 6.4.26 job-sheets-supported (#type3EnumState)

2038 This attribute identifies the job-sheet values supported by this
2039 printer, and the state of readiness for each job-sheet.

2040 To allow no job sheets, the system administrator shall include the
2041 value none as a value for this attribute. The client specifies
2042 that there are no job sheets by using the value none as the value
2043 of the job-sheets attribute.

2044 If the job-sheets attribute is not specified or contains a value
2045 which the Printer does not support, then the server shall select
2046 from among the values of this attribute. The server shall not
2047 select the value none unless it is the only value specified for
2048 the job-sheets-supported attribute.

2049 NOTE - It is preferable for the server to produce some job
2050 jobsheet, even if not the desired one, rather than produce none at
2051 all or reject the job.

2052
2053 6.4.27 maximum-copies (positiveInteger)

2054 | This attribute indicates the maximum number of copies of a
2055 document that can be rendered by this printer in a single
2056 print-job.
2057

2058 | If the attribute is unspecified or has a value of 0, there is no
2059 limit on the maximum number of copies for this Printer.
2060

2061 6.4.28 maximum-job-octets (positiveInteger)

2062 This attribute indicates that the Printer shall accept a job only
2063 if its size in octets is less than the value specified by this
2064 attribute.

2065 If the attribute is unspecified or has a value of 0, there is no
2066 limit on the size of a job in octets.

2067 6.4.29 maximum-impressions (positiveInteger)

2068 This attribute indicates that the Printer shall accept a job only
2069 if its size in impression is less than the value specified by this
2070 attribute.

2071 If the attribute is unspecified or has a value of 0, there is no
2072 limit on the size of a job in impressions.

2073 6.4.30 maximum-media-sheets (positiveInteger)

2074 This attribute indicates that the Printer shall accept a job only
2075 if its size in media-sheets is less than the value specified by
2076 this attribute.

2077 If the attribute is unspecified or has a value of 0, there is no
2078 limit on the size of a job in media-sheets.

2079 6.4.31 maximum-job-retention-period (deltaTime)

2080 This attribute indicates that when the Printer accepts a job, the
2081 retention period must not exceed the value of this attribute.
2082 Otherwise, the Printer sets the job's retention-period to the
2083 value of this attribute.

2084 If this attribute is unspecified, then the Printer places no limit
2085 on the retention time.

2086 [ISSUE: Should this be deleted?](#)

2087 6.4.32 maximum-end-user-priority (typeName)

2088 This attribute indicates that when the Printer accepts a job, the
2089 job-priority must not exceed the value of this attribute.
2090 Otherwise, the Printer sets the job's job-priority to the value of
2091 this attribute.

2092 If this attribute is unspecified, then the Printer places no limit
2093 on the job-priority time.

2094 The standard values are defined in the section on the job-priority
2095 attribute.

2096

2097

2098

2099 6.5 Job Templates

2100 The attributes for a Job Template can be any of the Job object
2101 attributes defined in the sections:

2102 Job Sheet Attributes
2103 Notification Attributes
2104 Job Scheduling Attributes
2105 (except job-print-after)
2106 Job Production Attributes
2107 (except page-select)
2108 Attributes for Conversion of Text Files
2109

2110

2111 6.6 Conformance

2112

2113

2114 A conforming implementation shall implement all operations,
2115 objects and attributes defined in this document. IPP is explicitly
2116 designed to be extensible. This means that in addition to the
2117 attributes defined in this specification, specific implementation
2118 instances may support not only the basic protocol as defined in
2119 this specification, but might add vendor specific extensions.

2120 Also, for the core set of attributes listed in this specification,
2121 it is not required that a conforming server support all (standard)
2122 values of all supported attributes. For example, it is not
2123 required that a printer implement all finishing methods indicated
2124 by the standard values.

2125 The explicit requirement of the term "supported", with respect to
 2126 one of the attributes that deal with printer functions or
 2127 resources, is that the server shall recognize the attribute and
 2128 those values that are supported, and shall be able to respond to a
 2129 query about which values that printer does, in fact, support.

2130 Additional attributes can be proposed to be registered by going
 2131 through the type 2 enum process which will register their
 2132 specification after approval with IANA.

2133

2134

2135 7. Security Considerations

2136 This protocol does not identify any new authentication mechanisms.
 2137 The authentication mechanisms built into HTTP (such as SSL and
 2138 SHTTPS) are recommended.

2139 This protocol does define a simple authorization mechanism by
 2140 introducing the "end-user-acl" attribute as part of the Printer
 2141 object. This ACL attribute is a multi-valued list of all of the
 2142 authenticated names of end-users. This protocol does not specify
 2143 specifiy what the domain is for names in this ACL attribute .

2144 ISSUE: Will it always be possible for a Printer to obtain a
 2145 meaningful authenticated name t hat the Printer can match against
 2146 the end-user-acl, or will some other mechanism be necessary, such
 2147 as a password?

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<add the list of IPP attendees and participants>

2263

2264

2265 10. Appendix A: Extended Operations

2266 The following symbols are used in the tables below:

- 2267 P perform the operation directly
- 2268 PF perform the operation; forward to Output Device sometimes
- 2269 UA unsupported in an Output Device unless it supports queuing
- 2270 U unsupported operation

2271 Lower priority end user operations are:

Operation	Print Server	Output Device
- Modify Job	P	UA
- Resubmit Job	P	UA

2273

2274 Management operations are:

Operation	Print Server	Output Device
- Clean Queue	PF	UA
- Disallow Queuing	P	UA
- Allow Queuing	P	UA
- Pause Printing	P	P
- Resume Printing	P	P
- Promote Job	PF	UA
- Shutdown Printer	P	P
- Startup Printer	P	P
- Create Printer	P	U
- Delete Printer	P	U
- Set Attribute	P	P

2275

2276

2277 10.1 Modify Job Operation

2278 10.1.1 Modify Job Argument

2279 The following abstract data types are part of the Modify Job
 2280 Argument (the attributes that can be modified may be severely
 2281 restricted):

Job Id	Which job to modify. [There are no document attributes to modify.]
Job Attributes	Attribute set for Job attributes. Only replacement is possible; the GUI fetches the value and then sets a new one.
Message	Optional Message.
Common Arguments	

2282

2283 10.1.2 Modify Job Result

2284 The following abstract data types are part of the Modify Job
 2285 Result:

Modify Status	Modify result attributes.
Errors	Optional Error Information

2286
2287
2288
2289
2290
2291

NOTE: job-hold can be added as a Job attribute when Modify Job is supported as an IPP operation.

10.2 Resubmit Job Operation

2292
2293

10.2.1 Resubmit Job Argument ~~Error! Bookmark not defined~~
~~Bookmark not defined.~~

2294
2295

The following abstract data types are part of the Resubmit Argument:

	.
Destination Printer Name	Optional name of the destination printer.
Operation	MOVE or COPY
Job Set	A set of jobs to move or copy. Each entry in the set has: Job Id, Document Number, Job attributes, and Document attributes.
Message	Optional Message
Common Arguments	

2296
2297
2298

10.2.2 Resubmit Job Result

2299
2300

The following abstract data types are part of the Resubmit Job Result:

Resubmit Job Set	A set of jobs that were resubmitted. Each element in the set has: Old Job Id, New Job Id, and an attribute set with info about the results of the move or copy.
Errors	Optional Error Information

2301
2302