~~Proposed Internet Draft S. Isaacson~~
Internet-Draft   S. Isaacson
                                                                  Novell, Inc.
                                                                     D. Taylor
                                                                  Novell, Inc.
                                                                     M. MacKay
                                                                  Novell, Inc.
                                                                     P. Zehler
                                                             Xerox Corporation
                                                                   T. Hastings
                                                             Xerox Corporation
                                                                     C. Manros
                                                             Xerox Corporation
                                                                     R. Herriot
                                                             Sun Microsystems
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Internet Printing Protocol - IPP/1.0
Version 0.9 ~~, November 11~~ 1, November 14 , 1996

NOTE: ~~Because this document has been extensively changed from its original form, it~~ 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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Abstract

This Internet-Draft specifies an Internet Printing Protocol (IPP)
~~based on HTTP [still to be ratified by the IPP group].~~ protocol
~~for the Internet~~ . This protocol is heavily influence by the
semantic operations and attributes defined in ISO/IEC 10175
Document Printing Application (DPA) parts 1 and 3. It also
incorporates some of the implementation and interoperability
lessons learned from other printing related standards such as
POSIX System Administration - Part 4 (POSIX 1378.4) and X/Open A
Printing System Interoperability Specification(PSIS).

IPP is defined as a set of abstract data types and operations. The
operations are implemented using a ~~protocol that is HTTP based
[still to be ratified by the IPP group].~~ simple request and
response mechanism built on top of HTTP. The abstract data types
are encoded as simple ASCII text strings.

~~The IPP protocol initially covers only user operations on basic
print service objects, but will cover management operation as soon
as possible. Authentication and some access control will be
required for the CancelJob operation. Additional access
Control,~~ The IPP protocol initially covers only end user operations
on basic print service objects. Future versions of the protocol
will cover operator and administrator operations. Authentication
is relized by mechanisms outside the scope of the protocol, but
the protocol does introduce some access control functionality so

97   that only authorized end users are allowed to submit print jobs to
98   devices with access control. Also, the Cancel Job operation
99   requires some authentication and authorization so that jobs can
100 only be ~~Device Management, and Service Management will be added to~~
101 ~~the protocol as soon as possible. Some~~ canceled by authorized end-
102 users. Extended monitoring and management is possible through
103 other protocols ~~. The SNMP Printer MIB [1] is an example of one of~~
104 ~~these~~ such as the SNMP Printer MIB [1]. . In the areas where there
105 are no existing standards, ~~many are being worked in other~~
106 ~~distributed service forums~~ some proposed and emerging standards are
107 being worked (management, security, etc.). As these services
108 become more sta ~~ndardized~~ ble, this document (and hence the
109 protocol) can be updated to reflect the integration and
110 relationships with these other standards.

111

483

484 1. Introduction

485   Th~~is document is a Proposed Internet Draft. It is a specification~~
486   ~~for a~~e Internet Printing Protocol (IPP) is an application level
487   protocol that can be used for distributed printing on the
488   Internet. Th~~is protocol, Internet Printing Protocol (IPP) is~~
489   ~~heavily influence~~e protocol is heavily influenced by the printing
490   model introduced in the Document Printing Application (ISO/IEC
491   10175 DPA) standard ~~. The DPA model~~, which describes a distributed
492   printing service ~~made up of cooperating networked entities. DPA~~
493   ~~also identifies~~. DPA identifies the end- user and administrative
494   roles associated with a distributed printing service, and defines
495   the set of operations supported by the service. Thi s IPP
496   specification deals initially ~~and operations.~~only with the end
497   user role. These ideas and concepts, when unified with other
498   Internet protocols and services, realize ~~s~~ a distributed print
499   service for the Internet.

500
501 2. Distributed Printing

502   This document assumes a distributed computing environment where
503   ~~print service user~~requesters of print service s (clients,
504   applications, PC drivers, etc.) cooperate and interact with print
505   service providers ~~(servers, printers, gateways, etc.) to realize~~
506   ~~the print service.~~
507   . Although the underlying configuration may be a complex n-tier
508   ~~The actual protocol is yet HTTP based [still to be ratified by the~~
509   ~~IPP group].~~
510
511
512
513
514 ~~2. Distributed Printing~~
515
516   ~~The distributed printing service is defined as a collection of~~
517   ~~coordinating and cooperating entities in a distributed computing~~
518   ~~environment. The model assumed by this protocol is potentially an~~
519   ~~n-tier client/server model, but the model will be optimized for~~
520   ~~the normal cases of a 1 tier model(client to pri nter) and a 2 tier~~
521   ~~(client to server to printer). Users of the 1 tier and 2 tier~~
522   ~~models should not be aware of any extra complexity to support 3 or~~
523   ~~more tiers A client is able to access the services offered by a~~
524   ~~server by invoking one or more operations associated with the~~
525   ~~server. Each operation has associated arguments and results. The~~

526 ~~arguments provide additional data which is passed from the client~~
527 ~~to the server. The results return the status and outcome of the~~
528 ~~desired operation back to the client from the server.~~
529
530 ~~2.1 Components~~
531
532 ~~In the distributed printing service the entities or components~~
533 ~~are:~~
534
535 ~~One or more humans or agents acting on behalf of humans.~~
536 ~~Humans (or their agents) act in the role of Users, Operators,~~
537 ~~Managers, or Administrators.~~
538 client/server system, an important simplifying step in this
539 protocol is that the only object the requester of the print
540 service ever sees is a "printer". It is important, however, to
541 understand that in a real system, other components   of a print
542 service exist.
543 2.1 Generic Print System Components
544 Every distributed print service, including those using the
545 Internet Printing Protocol, includes elements from the following
546 list.
547 –   End-Users: End Users are humans (or agents who work on behalf
548   of a human) who submit print jobs.
549 ~~One or more clients. Clients are computer network nodes with~~
550 ~~which end user~~ Print clients: Print clients are computer
551 network nodes with which human s interact in order to manipulate
552 the distributed print service. A ~~client implements the IPP~~
553 ~~protocol.~~
554 print client uses some protocol to invoke print service operations on
555 another node. Each operation has arguments and
556 ~~One or more print service providers (servers). An instance of~~
557 ~~a print service provider implements the IPP protocol by~~
558 ~~receiving and responding to IPP operations. A print service~~
559 ~~provider is also a "client" of yet another instance of a print~~
560 ~~service provider. Some of these clients use the IPP protocol;~~
561 ~~others use some other protocol. The last print service pro   vider~~
562 ~~in the n tier chain is a "client" to a print engine. There are~~
563 ~~several different types of print service providers which are~~
564 ~~defined later in this document.~~
565
566 ~~This LDPA specification only defines the operation used by Users.~~
567 ~~The operations used by Operators, Managers, and Administrators may~~
568 ~~be added if there is time.~~
569
570 ~~2.2 Objects~~
571
572 –   ~~To accomplish the action(s) requested via an operation, the~~
573   ~~print service provider manages and manipulates data objects.~~
574   ~~These are simply convenient collections of data that may~~
575   ~~represent other objects (real life or computer system)~~
576   ~~elsewhere. A client~~ results associated with it. The print
577   client provides arguments which add information about the
578   operation requested, and receives results which describe the
579   status and outcome of the operation.

580   – Print servers: Printer servers may be embedded in an output
581   device or implemented in a separate system which is associated
582   with an output device. The print server receives requests from
583   the print client and send back results which describe the
584   status and outcome of the operation requested. A print server
585   normally provides queuing, job management, and device
586   management functions.

587   – Queues. Print jobs may be queued or stored on a spool prior to
588   printing. This allows a print service provider to accept one or
589   more print jobs while the printer (or printers) is busy
590   processing another job. Queues, if present, may be implemented
591   in the client, in the server, in the output device, or in some
592   combination of the three.

593   – Output Devices. Output devices interpret the print data and
594   generate some form of output. In the case of a laser printer,
595   for example, this normally means rasterizing the print data and
596   putting the resulting marks on paper. An output device may
597   receive print data directly from a client or through a Print
598   server.

599   A specific implementation of a print service may not include all
600   of the elements described here, and the physical packaging of
601   elements is up to the implementation. For example, an output
602   device may include a queue or a print server may include a
603   rasterizer.

604   2.2 IPP Components

605   The print model defined by the Internet Printing Protocol
606   simplifies the user's view of the system components described in
607   the previous section by encapsulating the important elements of
608   the system into three simple objects:

609   – Printers (section xxx)
610   – Print Jobs (section xxx)
611   – Job Templates (section xxx)
612
613   ~~supplies arguments in the form of attribute values for some of~~
614   ~~these objects. A server informs the client of the status or~~
615   ~~outcome of an operation by also providing attribute values for the~~
616   ~~objects involved in the operations.~~ These objects are not
617   encapsulations of both data and behavior as in other object
618   oriented models, but are simple collections of attribute/value
619   pairs. [We may try to fix this in our new design, but it's not
620   high priority.]

621
622   ~~The objects which are relevant to this protocol are:~~
623
624   ~~– Printer (contains server, queue and printer concepts)~~
625   ~~– Job (contains job and document concepts, a document object may~~
626   ~~be added in the future)~~
627
628   ~~– Job Template (contains Initial Value Job and Initial Value~~
629   ~~Document)~~
630

631 ~~IPP defines the operations that interact with and affect the real~~
632 ~~life objects represented by the protocol's object definition.~~

633

634 ~~2.2.1 Printer~~

635

636 ~~[Note: it is not clear when 'Printer' refers to the hardware and~~
637 ~~when it refers to a software printer object.]~~

638

639 ~~This document shall use the following terms:~~

640

641 ~~**Output Device:** printer hardware,~~
642 ~~**Print Server:** a program that augments one or more Output~~
643 ~~Devices.~~
644 ~~**Printer:** the software realization of a printer implemented~~
645 ~~in an Output Device or a Printer Server.~~

646

647 ~~One of the most significant components within the distributed~~
648 ~~printing service is a Printer. A Printer object is a composition~~
649 ~~of some of the functionality that has traditionally been tied to~~
650 ~~other components within the printing system. A Printer can support~~
651 ~~the functionality of spooling, job management, device management,~~
652 ~~server, as well as more traditional device components.~~

653

654 ~~A Printer can be in on e of two authorization modes:~~

655

656 ~~Public Access: The Printer is not restricted with any access~~
657 ~~control checks. The authorization allows anyone. The Printer~~
658 ~~uses a simple, name only (no password or credential) form of~~
659 ~~binding. [What does this last sentence mean?]~~

660

661 ~~**ISSUE:** does Public access really mean no authentication. I~~
662 ~~would expect not. Otherwise, a person can cancel anyone's jobs.~~

663

664 ~~Controlled Access: The Printer may have some restrictions based~~
665 ~~on some authentication and authorization scheme. The Prin ter~~
666 ~~uses some form of credential based binding. . [What does this~~
667 ~~last sentence mean?]~~

668

669 ~~A Printer object represents an instance of a print service~~
670 ~~provider which implements the IPP protocol. This allows the~~
671 ~~Printer to provide a common interface for all types of disparate~~
672 ~~and diverse physical devices or as well as a gateway interface for~~
673 ~~other non Internet based printing systems.~~

674

675 ~~To a print service user, a Printer has the "looks and feel" of a~~
676 ~~any typical physical printer. Jobs are submitted to and manag ed~~
677 ~~at the Printer. The Printer can accept or reject submitted jobs~~
678 ~~based on job attributes which are sent along with the print job.~~
679 ~~The Printer tracks all jobs that have been submitted to it. The~~
680 ~~Printer can be modified to indicated a corresponding behavior~~
681 ~~change at the device level (either manually or automatically). In~~
682 ~~the Controlled Access mode, the Printer has an identity with a~~
683 ~~security or credential service.~~

684

685

686 ~~An object that an end user views as a Printer can be implemented~~
687 ~~with either of the fol lowing configurations.~~

688

689 ~~an Output Device which supports the IPP protocol. This Output~~
690 ~~Device may or may not have a job queue, and if it has a job~~
691 ~~queue it may be of very limited size. An administrator~~
692 ~~configures this Printer to receive jobs directly from a client.~~
693
694 ~~a Print Server and one or more downstream Output Devices. The~~
695 ~~Print Server supports incoming IPP protocol and uses either IPP~~
696 ~~or some other protocol to communicate with downstream Output~~
697 ~~Devices. A Print Server augments downstream Output De vices by~~
698 ~~supporting a large job queue. An administrator configures the~~
699 ~~downstream Output Devices to receive jobs from the Print~~
700 ~~Server. When there is only one downstream Output Device, the~~
701 ~~Printer object in the Print Server has the same values as those~~
702 ~~in the downstream Output Device. Note that if the downstream~~
703 ~~Output Device supports the IPP protocol, then its Printer~~
704 ~~Object and the Print Server's Printer Object are identical,~~
705 ~~attribute for attribute. When there are two or more downstream~~
706 ~~Output Devices, t he Printer object in the Print Server has the~~
707 ~~union of values in the downstream Output Devices.~~
708
709 ~~The print system shall also support gateways. Such gateways shall~~
710 ~~translate incoming IPP protocol to some other protocol and shall~~
711 ~~translate some other protocol to IPP protocol. Gateways shall pass~~
712 ~~operations through with minimal delay. Further description of them~~
713 ~~is beyond the scope of this document.~~
714
715 ~~ISSUE: where does file conversion occur when there is no~~
716 ~~associated application, e.g. text or HTML to PostScri pt. To keep~~
717 ~~the model simple, the Printer defined above should only queue and~~
718 ~~print jobs. Conversion of text, HTML should occur within some~~
719 ~~other server which forwards the job to a Printer.~~
720
721
722 ~~The following describes the allowed chains of printer types~~
723 ~~using RFC 822 syntax:~~
724
725 ~~normal usage:~~
726 ~~ipp end user [PrintServer] OutputDevice~~
727
728 ~~outbound gateway:~~
729 ~~ipp end user Gateway AnotherPrintSystem~~
730
731 ~~inbound gateway:~~
732 ~~AnotherPrintSystem Gateway [PrintServer] OutputDevice~~
733
734
735 ~~Although other arrangements of these printer types is possible,~~
736 ~~they are not useful.~~
737
738
739
740 ~~2. How can I achieve both "fan out" and "fan in" of client to~~
741 ~~Printers and from Printers to physical print devices?~~
742
743 ~~For "fan in", an administrator or a user creates a name space~~
744 ~~entry which maps a name to a printer object and a job template.~~
745 ~~This job template provides the default values to a client when a~~
746 ~~client creates a job object. In this model, the client does the~~
747 ~~work of defaulting, or alternatively, the server (possibly the~~
748 ~~Printer receivi ng a URL request) returns a HTML form with~~

749 ~~potential values and default values all filled in. The print~~
750 ~~service adds no additional default values for unspecified~~
751 ~~attributes, but an Output Device takes its own default action for~~
752 ~~unspecified attributes.~~

754 ~~This model currently contains a mechanism for defaulting in two~~
755 ~~places: during GUI initialization in the client and during~~
756 ~~printing of the job in the Output Device. There may be a need to~~
757 ~~associated defaulting (i.e. a job template) with a Printer Object~~
758 ~~so that an administrator can enforce value that are left~~
759 ~~undefined. This is currently an open issue that will not be~~
760 ~~resolved for version 1.0.~~

762 ~~For "fan out", an administrator sets up a Print Server to fan out to~~
763 ~~one or more downstream Output Devices for load balancing and~~
764 ~~reliability.~~

767 ~~3. How can a Printer be configured to service multiple spooling~~
768 ~~Printers?~~

770 ~~The system administrator establishes whether an end user has~~
771 ~~direct access to an Output Device or indirect access via a Print~~
772 ~~Server. If multiple Pr int Servers are used to feed the same~~
773 ~~Output Device , their schedulers are not coordinated. Although~~
774 ~~this configuration is possible, it is not recommended.~~

777 ~~2.2.2 Job~~
778 Clients interact with these using the following operations:

779 – Print (section xxx)
780 – Cancel Job (section xxx)
781 – Get Attributes(section xxx)
782 – Get Jobs (section xxx)

784 3. IPP Objects

785 This section describes the IPP objects.

786 3.1 Printer

787 One of the most significant objects in the IPP model is the
788 Printer. To the end-user, the Printer object   represents the
789 functionality of the actual output device along with the queuing,
790 job management, and device management functions often associated
791 with a print server. An IPP Printer object implements the
792 Internet Printing Protocol. Using the protocol, end-users may
793 query the attributes of the Printer, submit jobs to the Printer,
794 determine subsequent states of submitted and queued jobs and state
795 of the Printer, and cancel their own print jobs. The realization
796 of a Printer object may take on different for ms for any given
797 configuration of real components. However, the details of the
798 configuration of real components must be transparent to the end-
799 user.

800 Some examples of an IPP Printer object include:

801   – An output device, with a no spooling capabilities, supporting
802   IPP
803   – An output device, with a built-in spooler, supporting IPP
804   – A print server with one or more associated output devices with
805   the print server supporting IPP.
806   – The associated output devices may or may not be capable of
807   spooling jobs
808   – The associated output devices may or may not support IPP
809   – A print server with one or more downstream print servers
810   and/or output devices where the upstream print server supports
811   IPP
812
813   See the following figures for some examples on how to view IPP
814   Printer objects on top of other printing system models:

```
815     Legend:
816
817     ##### indicates an IPP printer object which is either embedded
818           in an output device or is hosted in a server.  An IPP
819           printer object may or may not queue/spool.
820
821     any   indicates any network protocol or direct connect, including
822           IPP
823
824
825     embedded printer:
826                                                     output device
827                                             +--------------+
828      O    +--------+                        | ##########   |
829     /|\   | client |----------------IPP---------------># printer # |
830     / \   +--------+                        | ##########   |
831                                             +--------------+
832
833
834     hosted printer:
835                                             +--------------+
836      O    +--------+       ##########       |              |
837     /|\   | client |------IPP---># printer #---any-->| output device |
838     / \   +--------+       ##########       |              |
839                                             +--------------+
840
841
842                                             +--------------+
843     fan out:                                |              |
844                                     +-->| output device |
845                              any/       |              |
846      O    +--------+       ##########   /   +--------------+
847     /|\   | client |------IPP---># printer #--*
848     / \   +--------+       ##########   \   +--------------+
849                                   IPP\   | ##########   |
850                               +-----># printer # |
851                                     | ##########   |
852                                     +--------------+
853                                        output device
854
855     fan in:
856      O +--------+       ##########
857     /|\| client |-IPP># printer #--+
858     / \+--------+       ##########   \           +-------+
859                             \IPP   ##########  |output|
860                             *->  # printer #-any->|       |
861                             /IPP   ##########  |device|
862      O    +--------+       ##########   /           +-------+
863     /|\   | client |-IPP># printer #--+
864     / \   +--------+       ##########
865
866
867
868
```

869   3.2 Job

870   A Job object is used to model a job. A job can consist of one
871   ~~document. There are certain job attributes that pertain to the~~
872   ~~running and scheduling of the entire job (all documents). There~~
873   ~~are other job attributes that define global behavior or defaults~~
874   ~~for all contained documents.~~
875
876   ~~Still other job attributes pertain to each document within a job.~~
877   ~~There are no separate document objects,~~ or more documents.
878   However, there are no separate document objects. The impact of
879   this is that th ere are no attributes that pertain to one document
880   in a job but not to others, except for ~~the attribute that~~
881   ~~specifies the location of the documents.~~
882   a single
883   ~~In future versions, jobs will be able to contain more than one~~
884   ~~document, and documents will become separate object with~~
885   ~~attributes that override corresponding job attributes.~~
886
887
888   ~~2.2.4 Job Template~~
889   attribute that specifies the document data, its location, and its
890   format. Note: In future versions, documents may become   separate
891   objects with attributes whose scope and application are different
892   from the corresponding job attributes.
893
894   Job attributes provide information to

895   –   identify the print job(section xxx)
896   –   assist in selecting the Printer (section xxx)
897   –   report job status (section xxx)
898   –   assist in scheduling and processing (section xxx)
899   –   describe the documents in the job (section xxx)
900   –   produce the document   (section xxx)
901
902   3.3 Job Template

903   A~~n~~ Job Template object is used to model job defaults.   ~~These are~~ A
904   Job Template is essentially a set of job attributes that a client
905   ~~us~~referenc~~e~~s to initialize a newly created job object.
906   Attributes which are sent along with the job at the time the job
907   is submitted override
908
909   ~~2.3 Object Relationships~~
910   the attributes in the Job Template object.
911
912   3.4 Object Relationships

913   Instances of objects within the system have relationships which
914   must be maintained persistently along with the persistent storage
915   of the objects ~~themselves.~~
916
917   ~~An instance of a print service provider is a   Printer. The~~
918   ~~Printer is represented via a Printer object~~ themselves . A Printer
919   can contain zero, ~~one,~~ or more Job objects. A Job object contains
920   one or more Documents. ~~The following relationships are examples:~~
921   A
922
923   ~~• "Document object D1 belongs to Job object J1", or~~

924   ~~• "Job object J1 belongs to Printer object P1".~~

925

926   ~~2.4 Use of Naming and Directory Services~~

927

928   ~~[There is more work that need to be done to define the name~~
929   ~~service in an HTTP context. A name is   a URL and is probably~~
930   ~~resolved at Print Servers and Output Devices.]~~

931

932   ~~Any distributed service uses some sort of naming and/or directory~~
933   ~~service for (X.500, NDS, DCE naming, DNS). It is outside the~~
934   ~~scope of this protocol to define which name service to use or what~~
935   ~~the protocol is for using that name service, but the following~~
936   ~~discussion helps to clarify how the name service is intended to be~~
937   ~~used.~~

938

939   ~~To distributed printing system, the instances of print service~~
940   ~~providers are represented by objects of type Pr   inter. These same~~
941   ~~instances are also registered to the name/directory service.~~
942   ~~There is one entry in the name service for each Printer.~~

943

944   ~~That is, instances of print service providers are represented to~~
945   ~~IPP as Printer objects. These objects represent their real life~~
946   ~~counterparts, the print service provider (software, hardware, or~~
947   ~~firmware). However, for directory lookup, there is an entry in the~~
948   ~~naming service that also represents the Printer.~~

949

950   ~~It is important to remember that a Printer object represents   the~~
951   ~~current status and configuration information of a certain print~~
952   ~~service provider. The Printer object contains attributes and~~
953   ~~values that describe the characteristics and capabilities of the~~
954   ~~print device. However, a few of the most important attributes~~
955   ~~from the Printer object are duplicated in the entry in the~~
956   ~~directory. These attributes are used for filtered directory~~
957   ~~lookups. The results of these searches enable a user to select an~~
958   ~~appropriate printer. It is the responsibility of the Printer~~
959   ~~itself to keep these attributes consistent and accurate. This~~
960   ~~requirement frees the directory or some directory agent from~~
961   ~~continually polling registered entities for configuration changes.~~

962

963   ~~The following attributes are in the directory entry:~~

964

965   ~~Fully Distinguished Name (the name within the directory's~~
966   ~~name space)~~
967   ~~Description~~
968   ~~Location~~
969   ~~Owner~~
970   ~~Address~~
971   ~~Status~~
972   ~~Resolution~~
973   ~~Color Supported~~
974   ~~Maximum Speed~~
975   ~~Maximum Speed Units~~
976   ~~Device Id~~
977   ~~Model~~
978   ~~Manufacturer~~
979   ~~Type~~
980   ~~PDLs Supported~~
981   ~~Sides Supported~~

982

983   ~~The final set of name service entry attributes needs to be~~
984   ~~finalized and rationalized with the PSIS name service~~
985   ~~recommendations [6] as well as implementation experience.~~
986
987
988   ~~2.4.1 Status~~
989
990   ~~[Such a dynamic value seem like it could be a problem in some~~
991   ~~name service entries.]~~
992   ~~The printer status field in the directory entry is really a~~
993   ~~"summary" attribute of the true printer state. The following~~
994   ~~mapping takes place between the Printer Status attribute in the~~
995   ~~directory entry and the printer state attribute in the Pri nter~~
996   ~~object:~~
997
998   ~~"Not Connected"~~
999   ~~- STATE_NOT_CONNECTED~~
1000 ~~- STATE_PAUSED_NOT_CONNECTED~~
1001 ~~"Shutdown"~~
1002 ~~- STATE_SHUTDOWN~~
1003 ~~"Active"~~
1004 ~~- STATE_IDLE~~
1005 ~~- STATE_PAUSED~~
1006 ~~- STATE_PRINTING~~
1007 ~~"Stopped"~~
1008 ~~- STATE_STOPPED~~
1009 ~~- STATE_PAUSED_STOPPED~~
1010
1011 ~~Even though the Printer may not be up and running, the directory~~
1012 ~~entry still exists in the directory. In this case, the directory~~
1013 ~~entry represents the fact that it may begin running at some future~~
1014 ~~time.~~
1015
1016 ~~2.4.2 Resolution~~
1017
1018 ~~This is a single valued, maximum resolution in either the~~
1019 ~~horizontal or vertical direction of the print device in dpi.~~
1020
1021 ~~2.4.4 Color Supported~~
1022
1023 ~~This is a BOOLEAN for either yes, color printing is supported, or~~
1024 ~~no color printing is not supported.~~
1025
1026 ~~2.4.5 Maximum Speed~~
1027
1028 ~~This is the maximum speed of the printer in the units defined in~~
1029 ~~Maximum Speed Units~~
1030
1031 ~~2.4.6 Maximum Speed Units~~
1032
1033 ~~This is the units of the maximum speed rating of the print device.~~
1034 ~~This can be: page s per minute, sheets per minutes, characters per~~
1035 ~~second, etc.~~
1036
1037 ~~2.4.7 Plug and Play Device Id~~
1038
1039 ~~This attribute can be used for automatic driver download and other~~
1040 ~~automatic configuration tasks.~~
1041
1042 ~~2.4.8 Model~~

1043
1044 ~~This is a simple text string defined by the manufacturer.~~
1045
1046 ~~2.4.9 Manufacturer~~
1047
1048 ~~This is a simple text string defined by the manufacturer. There~~
1049 ~~is no registration, and there is a possibility of overlap, but the~~
1050 ~~goal is to keep this simple, not too complex.~~
1051
1052 ~~2.4.10 Type~~
1053
1054 ~~This is the printing mechanism of the print device: laser, ink~~
1055 ~~jet, thermal, etc.~~
1056
1057 ~~2.4.11 PDLs Supported~~
1058
1059 ~~This is a list of all of the page description languages (PDLs)~~
1060 ~~that the printer and/or its interpreter(s) support.~~
1061
1062 ~~2.4.12 Sides Supported~~
1063
1064 ~~This is either a 1 or a 2 to indicate the maximum number of sides~~
1065 ~~on which the printer can automatically print.~~
1066
1067 ~~2.5 OIDs~~
1068 ~~[OIDs do not belong in this model until we establish the protocol]~~
1069
1070
1071 ~~3. Internet Printing Model~~
1072
1073 ~~3.1 Object Instances~~
1074 Printer object is associated with one or more Job Template
1075 objects.
1076
1076 3.5 Object Identity
1077
1077 All instances of all objects have an identifier attribute that
1078 makes them unique so that they can be unambiguously referenced.
1079 In the object-oriented model, these are the globally unique object
1080 references which are created by factories or constructors.
1081
1082 The following objects have the following mandatory identifier
1083 attributes:
1084
1085 | Object | Identifier | Containing Object |
1086 | --- | --- | --- |
1087 | Printer | printer-name | None |
1088 | Job | job-identifier | Printer |
1089 | | | |
1090 | Job Template | job-template-name | None |
1091
1092
1093
1094
1095 ~~3.2 Limits and Defaults~~
1096

1097   ~~This IPP specification does not include any mechanism for~~
1098   ~~specifying for enforcing "limits" or any other kinds constraints.~~
1099   ~~However, defaults are achieved through the implementati   on of Job~~
1100   ~~Template.~~
1101
1102   ~~3.3~~
1103
1104
1105
1106
1107   ~~4. Operations~~
1108   4. Naming

1109   Clients identify Printer objects by using an HTTP type URL. For
1110   example, a URL for a Printer object named "printer-1" whose
1111   network node's domain name is "some.domain.com", might look like:

1112   http://some.domain.com/printer-1

1113   In this case, the URL identifies the use of the HTTP protocol.
1114   The Printer is located at the node identified by the DNS name
1115   "some.domain.com" and "printer-1" is the   name of the Printer.

1116   Another example is the following URL:

1117   http://1.2.3.4:3042/printer-2

1118   In this case, the URL identifies the use of the HTTP protocol.
1119   The Printer is located at the node identified by the IP address of
1120   "1.2.3.4" using port 3042 for the HTTP server, and "printer-2" is
1121   the name of the Printer.

1122   It is not necessary to expose the Job Template objects that might
1123   be associated with a given printer as separate objects. They can
1124   be exposed in two ways through URL naming.

1125   – The Job Template can be hi dden from the end user by a URL that
1126   represents just Job Template name (but does not expose the
1127   Printer object name) as the two URLS 1)
1128   http://some.domain.com/two-sided-printer and 2)
1129   http://some.domain.com/draft-printer. These look like two
1130   different locations, but underneath they represent the same
1131   Printer object but using two different Job Template default
1132   attribute sets.

1133   – The Job Template can be exposed along with the name of the
1134   Printer object directly in the URL as in:
1135   http://some.domain.com/hr-printe r/resumes. In this case there
1136   is a "resumes" Job Template associated with the "hr-printer"
1137   Printer.

1138   4.1 Directory Services

1139   IPP does not require any specific directory service. However,
1140   this specification does define a generic schema that can be used
1141   for any specific instance of a directory service. That is, some
1142   of the attributes from the Printer object are called out as
1143   attributes that may be added to a directory entry which represents

that Printer. This allows directory users to find and locate IPP
Printers by either a simple name look up or by some filtered
attribute search.

4.2 Directory Entry Schema

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

4.2.1 Status

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

The printer status field in the directory entry is really a
"summary" attribute of the true printer state. The following
mapping takes plac e between the Printer Status attribute in the
directory entry and the printer-state attribute in the Printer
object:

"Not Connected"
    STATE_NOT_CONNECTED
    STATE_PAUSED_NOT_CONNECTED
"Shutdown"
    STATE_SHUTDOWN
"Active"
    STATE_IDLE
    STATE_PAUSED
    STATE_PRINTING
"Stopped"
    STATE_STOPPED
    STATE_PAUSED_STOPPED

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

4.2.2 Resolution

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

4.2.3 Color Supported

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

4.2.4 Maximum Speed

This is the maximum speed of the printer in the units defined in
Maximum Speed Units

1189   4.2.5 Maximum Speed Units

1190   This is the units of the maximum speed rating of the print device.
1191   This can be: pages per minute, sheets per minutes, characters per
1192   second, etc.

1193   4.2.6 Plug and Play Device Id

1194   This attribute can be used for automatic driver download and other
1195   automatic configuration tasks.

1196   4.2.7 Model

1197   This is a simple text string defined by the manufacturer.

1198   4.2.8 Manufacturer

1199   This is a simple text string defined by the manufacturer. There
1200   is no registration, and there is a possibility of overlap, but the
1201   goal is to keep this simple, not too complex.

1202   4.2.9 Type

1203   This is the printing mechanism of the print device: laser, ink
1204   jet, thermal, etc.

1205   4.2.10 PDLs Supported

1206   This is a list of all of the page description languages (PDLs)
1207   that the printer and/or its interpreter(s) support.

1208   4.2.11 Sides Supported

1209   This is either a 1 or a 2 to indicate the maximum number of sides
1210   on which the printer can automatically print.

1211   5. IPP Operations

1212   IPP defines the following end user operations:

1213
1214   The following symbols are used in the tables below:
1215
1216   P   perform the operation directly
1217   PF   perform the operation; forward to Output Device sometimes
1218   UA   unsupported in an Output Device unless it supports queuing
1219   U   unsupported operati on
1220
1221

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

1222

1223
1224
1225   ~~Lower priority (version 2) end user operations are:~~
1226

~~Operation   Print Server   Output Device~~
~~Modify Job   P   UA~~
~~Resubmit Job   P   UA~~
1227
1228
1229   ~~Management operations are (we want these in version 1.0):~~
1230

~~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~~
~~Get Local Attributes   P   P~~
1231   ~~4.1 Common Data Structures~~
1232
1233   ~~This section describes the common data structures that are used by~~
1234   ~~two or more operations.~~
1235
1236
1237
1238   ~~6. User Operations~~
1239
1240   ~~6.1 Print Operation~~
1241   5.1 Print Operation

1242   When an end-user uses GUI to submit a job, the GUI client gets an
1243   HTML form from the default printer. If the end-user changes the
1244   selected printer, the GUI client gets the HTML form from that
1245   printer. The HTML form comes with the values supported by the
1246   printer and it is initialized by the values from the job template
1247   associated with the named printer.

1248
1249   [Further work needs to done to define the above concept.]

1250
1251   ~~6.1.1 Print Argument~~
1252
1253   ~~[We should be trying to create a protocol where the entire job is~~
1254   ~~incorporated into a single transmission. This eliminates the need~~
1255   ~~for Add Document and Clos e Job.]~~
1256   ~~The following abstract data types are part of the Print Argument:~~
1257

	~~.~~
~~Create Job~~	~~the Job Id is returned in the Print Results.~~

~~Printer Name~~	
~~Job and DocumentAttributes~~	
~~All Document Contents~~	
	~~.~~
___	
___	
~~Common Arguments~~	~~Common to all three forms of Print Argument~~

1258
1259
1260 ~~6.1.2 Print Result~~
1261
1262 5.1.1 ~~The following abstract data types are part of the Print~~
1263 ~~Result~~Print Request

1264   The following abstract data types are part of the Print Request:

Printer Name   Note: I do n't think that this is needed

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

1265
1266
1267 5.1.1 Print Response

1268   The following abstract data types are part of the Print Response :

1269

Job Id   Used for all other operations on this Job.

~~Server State~~	~~Optional state information about t he Print Service Provider~~
~~Message~~	~~Optional message~~

Job Status   Job state information

Printer State   Optional Printer state information

Message	Optional message Note: Is this needed?
Errors	Optional Error Information

1270
1271
1272   ~~6.2 Cancel Job Operation~~
1273
1274   ~~6.2.1 Cancel Job Argument~~
1275   5.2 Cancel Job Operation

1276   5.2.1 Cancel Job Request

1277   The following abstract data types are part of the Cancel Job
1278   ~~Argument:~~
1279   Request:

1280

	.

1281

Job Id	The identifier of the job to be canceled .
Document Number	Optional document number of the document to
~~Document Number~~	~~Optional document number of the document to cancel within a given job. [probably not supported]~~
Message	Optional message to the operator.

1282
1283   ~~5.2.2~~ Cancel Job Reponse

~~Retention Period~~	~~Optional period for retaining the cancelled job.~~
~~Common Arguments~~	

1284
1285   ~~Result~~
1286   5.2.3

1287   The following abstract data types are part of the Cancel Job
1288   Res~~ult~~ponse:
1289
Job Status	Optional Job status information
Errors	Optional Error Information

1290
1291   ~~6.3 Get~~
1292
1293   ~~6.3.1 Get Attributes Argument~~
1294   5.3 Get Attributes Operations

1295   5.3.1 Get Attributes Request

1296   The following abstract data types are part of the Get Attributes
1297   ~~Argumen~~Reques t:

Selector   A Job Id or Printer Name URL |

1298

	.
~~SPECIFICATION~~	
~~——~~	
~~——~~	
~~Selector~~	~~A job or printer name URL (the class is implicit in the object named)~~
~~Requested Attributes~~	~~A set of attributes in which the requestor is interested~~
Requested Attributes	A set of attributes in which the requestor is interested

1299
1300   5.3.2 Get Attributes Response

1301   The following abstract data types are part of the Get Attributes
1302   Response:

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

1303
1304   5.4 Get Jobs Operation

1305   Get Jobs Request
1306

~~——~~	
	~~[I would like to get rid of this if possible]~~
~~——~~	
~~——~~	
~~Common Arguments~~	

1307
1308   ~~6.3.1 Get Jobs Argument~~
1309   5.4.1 Get Jobs Request

1310   The following abstract data types are part of the Get Jobs
1311   ~~Argument:~~
1312   Request:
1313

~~Selector~~	~~A printer name~~

1314

Filtering   A lightweight filtering mechanism, such as all
                   jobs versus a particular user's jobs.
~~——~~Requested   A set of job attributes in which the requestor |
Attributes   is interested

1315
1316
1317

Get Jobs Response

~~Common Arguments~~	

1318
1319
1320 ~~6.3.2 Get Attributes and Get Jobs Result~~
1321 5.4.2 Get Jobs Response

1322   The following abstract data types are part of the ~~List Object~~
1323   ~~Attributes Result:~~
1324   Get Jobs Response:
1325

1326

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

1327
1328
1329 ~~6.4 Modify Job Operation~~
1330
1331 ~~6.4.1 Modify Job Argument~~
1332
1333 ~~The following abstract data types are part of the Modify Job~~
1334 ~~Argument (the attributes that can be modified may be severely~~
1335 ~~restricted):~~
1336

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

1337
1338 ~~6.4.2 Modify Job Result~~
1339
1340 ~~The following abstract data types are part of the Modify Job~~
1341 ~~Result:~~
1342
1343

~~Modify Status~~	~~Modify result attributes.~~

~~Errors~~	~~Optional Error Information~~

1344
1345
1346 ~~6.5 Resubmit Job Operation~~
1347
1348 ~~6.5.1 Resubmit Job Argument~~
1349
1350 ~~The following abstract data types are part of the Resubmit~~
1351 ~~Argument:~~
1352

	~~.~~
~~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~~	

1353
1354
1355 ~~6.5.2 Resubmit Job Result~~
1356
1357 ~~The following abstract data types are part of the Resubmit Job~~
1358 ~~Result:~~
1359

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

1360
1361
1362 ~~7. Object Attributes~~
1363
1364
1365 ~~8. Security Considerations~~
1366
1367 ~~This protocol does not identify any new security mechanisms. The~~
1368 ~~authentication mechanisms (as well as extentions) built into the~~
1369 ~~RPC infrastructure are recommended. Also, the Bind operation~~
1370 ~~described in section 5 supports the notion of authentication via~~
1371 ~~simple or cr edential based arguments.~~
1372
1373 ~~9. References~~
1374 6. Object Attributes

1375 This section describes the attributes, syntaxes, and values that
1376 are part of IPP. The sections below show the objects and their
1377 associated attributes which are included within the scope of this

1378   protocol. The text in these sections has been heavily influenced
1379   by the ISO/IEC 10175 DPA (Final, June 1996).

1380
1381   ~~Job Attributes~~
1382   ~~Job Informational Attributes (set by client)~~
1383
1384   ~~job originator (an authenticated value)~~
1385   ~~job name~~
1386   ~~job originating host~~
1387   ~~Job Informational Attributes (set by Printer)~~
1388   ~~job identifier~~
1389   ~~job identifier on output device (used by operator)~~
1390   ~~Printer Selection Attributes (set by client)~~
1391   ~~printer name requested~~
1392   ~~output device requested~~
1393   ~~Job Status Attributes (set by Printer)~~
1394   ~~current job state~~
1395   ~~printer assigned [let's keep it simple]~~
1396   ~~submission time~~
1397   ~~~~
1398   ~~job message from administrator~~
1399   ~~completion time~~
1400   ~~job state reasons~~
1401   ~~impressions completed~~
1402   ~~media sheets completed~~
1403   ~~~~
1404   ~~Job sheet Attributes (set by client)~~
1405   ~~job sheets~~
1406   ~~~~
1407   ~~Job Event Handling Attributes (set by client)~~
1408   ~~notification profile (two classes of events, delivery~~
1409   ~~methods other than email are a problem with internet)~~
1410   ~~Job Scheduling Instructions Attributes (set by client)~~
1411   ~~job hold~~
1412   ~~job priority~~
1413   ~~~~
1414   ~~Job print off peak~~
1415   ~~job retention period~~
1416   ~~~~
1417   ~~Document Description Attribute~~
1418   ~~document format~~
1419   ~~~~
1420   ~~Document Production Instruction Attributes (set by client)~~
1421   ~~document format~~
1422   ~~medium select~~
1423   ~~number up~~
1424   ~~finishing~~
1425   ~~sides~~
1426   ~~copies~~
1427   ~~~~
1428   ~~printer resolution select~~
1429   ~~print quality~~
1430   ~~page select~~
1431   ~~Attributes for Conversion of Text Files (set by client)~~
1432   ~~width~~
1433   ~~length~~
1434   ~~left margin~~
1435   ~~right margin~~

~~1436~~ ~~top margin~~
~~1437~~ ~~bottom margin~~
~~1438~~ ~~repeated tab stops~~
~~1439~~ ~~header text~~
~~1440~~ ~~footer text~~
~~1441~~ ~~number pages~~
~~1442~~ ~~default font~~
~~1443~~ ~~default character set~~
~~1444~~ ~~content orientation   Job Resource Attributes (set by~~
~~1445~~ ~~process which produces PDL file; for use in scheduling)~~
~~1446~~ ~~document format used~~
~~1447~~ ~~fonts used~~
~~1448~~ ~~character sets used~~
~~1449~~ ~~media used~~
~~1450~~ ~~sides used~~
~~1451~~ ~~print quality used~~
~~1452~~ ~~finishing used~~
~~1453~~ ~~printer resolution used   total job octets~~
~~1454~~ ~~job impression count~~
~~1455~~ ~~job media sheet count~~
~~1456~~
~~1457~~ ~~Document Contents (one per document)~~
~~1458~~ ~~number of documents~~
~~1459~~ ~~document content (actual contents or a path reference)~~
~~1460~~ ~~Operation Attributes~~
~~1461~~ ~~operation locale~~
~~1462~~ ~~default delivery addresses~~
~~1463~~ ~~Printer Attributes (Print Servers and Output Devices)~~
~~1464~~ ~~printer name~~
~~1465~~ ~~printer location~~
~~1466~~ ~~printer model~~
~~1467~~ ~~printer types~~
~~1468~~ ~~printer state~~
~~1469~~ ~~printer state message~~
~~1470~~ ~~message~~
~~1471~~ ~~notification profile~~
~~1472~~ ~~access control list~~
~~1473~~
~~1474~~
~~1475~~ ~~fonts supported~~
~~1476~~ ~~font substitutions~~
~~1477~~
~~1478~~ ~~media supported~~
~~1479~~
~~1480~~
~~1481~~ ~~document formats supported~~
~~1482~~ ~~numbers up supported~~
~~1483~~ ~~finishings supported~~
~~1484~~ ~~sides supported~~
~~1485~~ ~~print qualities supported~~
~~1486~~ ~~maximum printer speed~~
~~1487~~ ~~printer resolutions supported~~
~~1488~~ ~~delivery methods supported~~
~~1489~~ ~~character sets supported~~
~~1490~~ ~~job sheets supported~~
~~1491~~
~~1492~~ ~~maximum copies supported~~
~~1493~~ ~~maximum job octets~~
~~1494~~ ~~maximum job retention period~~
~~1495~~ ~~maximum job priority~~

1496   ───── ~~maximum impressions~~
1497   ───── ~~maximum media sheets~~
1498   ───── ~~off peak times~~
1499   ───── ~~notification delivery methods supported~~
1500   ─────
1501   ─────
1502   ───── ~~downstream printers~~
1503   ─────
1504   ─────
1505   ───── ~~events supported~~
1506   ─────
1507   ───── ~~locales supported~~
1508   ───── ~~locale~~
1509   ─────
1510   ─────
1511   ─────
1512   ───── ~~sheet count~~
1513   ───── ~~printer timeout period~~
1514
1515   ── ~~Job Template (attributes from the following sections of Job)~~
1516   ───── ~~Job sheet Attributes~~
1517   ───── ~~Job Event Handling Attributes~~
1518   ───── ~~Job Scheduling Instructions Attributes~~
1519   ───── ~~Document Production Instruction Attributes~~
1520   ───── ~~Attributes for Conversion of Text Files~~
1521

1522   6.1 Attribute Syntaxes

1523   **NOTE: This is what Tom has**

1524   **submitted:**

1525   Each attribute shall be in one of the following data syntaxes:

1526   string   - arbitrary ASCII strings, no control characters,
1527   except <SPACE>.
1528   string pair - strings separated by ":"
1529   name   - arbitrary ASCII strings, no control characters, and
1530   no <SPACE> characters.
1531   type 1 enum - standard names, must revise the standard to add
1532   a new name. No private names are allowed.
1533   type 2 enum - standard names, but an   implementor can add new
1534   by proposing them to the PWG for registration
1535   (or an IANA-appointed registry advisor after the
1536   PWG is no longer certified) anytime. IANA keeps
1537   the registry.
1538   Implementors can add private (un-registered)
1539   with a suitable distinguishing prefix, such as
1540   -xxx- where xxx is the company name
1541   registered with IANA.
1542   type 3 enum - standard nam es, but an implementor can add new
1543   names by submitting a registration request directly
1544   to IANA, no PWG or IANA-appointed registry advisor
1545   review is required.
1546   Implementors can add private (un-registered) names
1547   with a suitable distinguishing prefix, such as
1548   -xxx- where xxx is the company name registered with

```
1549                     IANA.
1550    type 3 pair  - two type 3 enum names separated by ":".
1551    cardina l    - 0 .. n represented as ASCII digits
1552    ordinal      - 1 .. n represented as ASCII digits
1553    ordinal pair - two ordinals separated by ":"
1554    boolean      - tokens: yes, y, true, or t and no, n, false, or f.
1555    date/time    - date/time in ??? format
1556    url          - Universal Resource Locator
1557    octet string - arbitrary binary octets
1558    string units - ordinal followed by type 2 enum units
1559
1560
```

NOTE: This is what Bob has submitted:

1563   The sections below reference the following syntax items:

```
1564    string: TBD
1565    stringPair: string ":" string
1566    stringState: string state
1567    name: TBD
1568    URL: TBD
1569    dateTime: TBD
1570    deltaTime: [hours ":"] minutes
1571    cardinal: TBD
1572    type1Enum: TBD
1573    type2Enum: TBD
1574    type3Enum: TBD
1575    type2EnumState: type2Enum state
1576    type3EnumState: type3Enum state
1577    state: TBD
1578    Boolean: TBD
1579    positiveInteger: TBD
1580    positiveIntegerCross: positiveInteger [ "x" positiveInteger ]
1581    positiveIntegerCrossState: positiveIntegerCross state
1582    positiveIntegerRange: positiveInteger  ":" positiveInteger
1583    positiveIntegerUnits: positiveInteger units
1584    positive IntegerState: positiveInteger state
1585    units: "ppm" | "ipm" | "spm" | "cps" | "lpm"
1586    type3Locale: type3Country ":" type3Language ":" type3CodeSet
1587    type3Country: type3Enum
1588    type3Language: type3Enum
1589    type3CodeSet: type3Enum
1590    type2Format: name [ "/" version ]
1591    version: name
1592    type3LocaleState: type3Locale state
1593
1594
1595    6.2 Job Attributes
1596
1597    A job object contains a set of job attributes and one or more
1598    document s.  A client shall create a job and send it to a server
1599    using the Print operation.  The server shall create a printable job
1600    object in response to a client that invokes one or more Print
```

1601 | ~~abstract operations.~~ A client ~~may~~shall use a job template
1602 associated with the selected printer in order to initialize the
1603 job.

1604
1605 Each section heading below contains the name of an attribute and
1606 its syntax in parentheses using the rules of RFC 822.

1607
1608 ~~The sections below reference the following syntax items:~~

1609
1610 ~~string: TBD~~
1611 ~~stringPair: string ":" string~~
1612 ~~stringState: string state~~
1613 ~~name: TBD~~
1614 ~~URL: TBD~~
1615 ~~dateTime: TBD~~
1616 ~~deltaTime: [hours ":"] minutes~~
1617 ~~cardinal: TBD~~
1618 ~~type1Enum: TBD~~
1619 ~~type2Enum: TBD~~
1620 ~~type3Enum: TBD~~
1621 ~~type2EnumState: type2Enum state~~
1622 ~~type3EnumState: type3Enum state~~
1623 ~~state: TBD~~
1624 ~~Boolean: TBD~~
1625 ~~positiveInteger: TBD~~
1626 ~~positiveIntegerCross: positiveInteger ["x" positiveInteger~~
1627 ~~]~~
1628 ~~positiveIntegerCrossState : positiveIntegerCross state~~
1629 ~~positiveIntegerRange: positiveInteger ":" positiveInteger~~
1630 ~~positiveIntegerUnit s: positiveInteger units~~
1631 ~~positiveIntegerState: positiveInteger state~~
1632 ~~units: "ppm" | "ipm" | "spm" | "cps" | "lpm"~~
1633 ~~type3Locale : type3Country ":" type3Language ":" type3CodeSet~~
1634 ~~type3Country: type3Enum~~
1635 ~~type3Language: type3Enum~~
1636 ~~type3CodeSet: type3Enum~~
1637 ~~type2Format: name ["/" version]~~
1638 ~~version: name~~
1639 ~~type3Locale State: type3Locale state~~
1640
1641 ~~There is a table for each attribute that shows its: name, syntax,~~
1642 ~~multi or single valuedness (S or M), and any relevant notes.~~
1643
1644 6.2.1 ~~7.1.1~~ Job Informational Attributes Set by a Client

1645

1646
1647 The client may specify these attributes in the Print op eration to
1648 provide information to identify a print -job.

1649
1650 The client may also specify these attributes in the operat ions:
1651 Get-Attributes, and Get-Jobs.

1652

1653   6.2.1.1 ~~7.1.1.4~~ job-name (string)

1654
1655
1656   This attribute supplies a human readable string for   naming the
1657   print-job.

1658

1659   This attribute is intended for   to be printed on a start sheet,
1660   returned in a Get- Jobs result, or used in notification messages.

1661

1662   If the client does not specify this attribute,   a Printer shall set
1663   it to the name of the file of the   first document in the job.

1664
1665   6.2.1 ~~7.1.1~~ Job Informational Attributes   Set by a Printer

1666
1667   The~~se~~ Print shall add all of these attributes to a job to provide
1668   ~~i~~ information to identify a print -job.

1669

1670   The client may specify   these attributes in the operations: Get-
1671   Attributes and Get-Jobs , but not in Print .

1672
1673   ~~The client may specify job information attributes in:~~
1674   ~~a) Print: all, except id att job identifier~~
1675   ~~b) ModifyJob: all, except id att job identifier,~~
1676   ~~id att job owner~~
1677   ~~c) ListObjectAttributes: all~~
1678
1679   6.2.1.1 ~~7.1.1.1~~ job-identifier (string)

1680
1681
1682   This attribute provides the job -identifier for this job on the
1683   Printer~~server~~. The Printer ~~server~~ shall generate a job -identifier
1684   value that is unique on that   Printer~~server~~, but need not be unique
1685   across the distributed environment.

1686
1687   The value of the job -identifier attribute shall be returned by the
1688   Printer ~~server~~ as part of the PrintResult in the   ~~first~~ Print
1689   ~~abstract~~ operation ~~for the job~~ . ~~The client shall p ass its value~~
1690   ~~as part of the argument in subsequent abstract   operations for the~~
1691   ~~same job.~~

1692
1693
1694
1695   ~~7.1.1.1 job identifier on output device~~
1696

~~This attribute holds the job identifier assigned by an Output~~
~~Device. It provides a way for a Print Server to relates its copy~~
~~of a job with a job on the Output Device.~~

6.2.1.1 ~~7.1.1.2~~ job-originator (name)

This attribute specifies the name of the person submitting the
print job. The Print er ~~Server or Output Device~~ shall set this
attribute to the most authentic name that it can obtain from the
client. The operation-user-name attribute is intended to be a
source of the most authentic name.

~~[We may choose to call this job owner, but it should still be the~~
~~most authenticated name of the user]~~

6.2.1.1 ~~7.1.1.2~~ job-originating-host (name)

This attribute identifies the originating host of the job. The
Printer shall set this attribute to the value of the operation-
host-name which is intended to be the most auth entic host name of
the client.

6.2.1.1 ~~7.1.5.1~~ notification-address (name)

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

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

Note: The only type of notification is   email.

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

6.2.1.1 ~~7.1.1.2~~ job-locale (type3Locale)

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

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

1743
1744   The type3EnumTrip consists of 3 colon separated type 3 enums. The
1745   first is the country. The second is the language. The third   is the
1746   code-set.

1747
1748   ISSUE: is there a more standard syntax for locale?

1749
1750
1751   7.1.1.3 TBD
1752
1753
1754   7.1.1.4 job name
1755

1756
1757   This attribute supplies a human readable string for the print   job.
1758   This string is used for naming the print   job in human readable
1759   "free form" fashion.
1760
1761   This attribute is intended for enabling a user or the user's
1762   application to convey a job name that may be printed on a start
1763   sheet, returned in a Get Attributes result, or used in
1764   notification or logging messages.
1765
1766   If the client does not specify this attribute, A Print Server or
1767   Output Device shall set it to the name of the file of the first
1768   document in the job.
1769
1770   7.1.1.4 job originating host
1771
1772   The client sets this attribute to contain the host name from which
1773   the job is submitted.
1774
1775   7.1.1.4 number of documents
1776
1777   The client sets this attribute to be the number of document being
1778   submitted.
1779

1780
1781   6.2.1 7.1.2 Printer Selection Attributes

1782
1783   These attributes provide information to help The client shall
1784   specify this attribute to select a particular Pprinter. If more
1785   than one printer selection attribute is specified, the server
1786   shall select a printer that meets all of the criteria.

1787
1788   The client may also specify these attributes in the operations:
1789   Get-Attributes, and Get-Jobs.

1790
1791   **Issue:** this attribute may be impl icit in the specified URL in the
1792   Print operation.

1793
1794   The client may specify printer selection attributes in:

1795   a) Print: all, except the value of printer name requested
1796   (which shall be passed a s an explicit parameter of the first
1797   PrintArgument, rather than as an attribute)
1798   b) ModifyJob: all, except printer name requested
1799   c) ListObjectAttributes: all

1800

1801 6.2.1.1 7.1.2.1 printer-name-requested (URL)

1802
1803

1804   This attribute identifies the printer that the client requests to
1805   be used for printing the job.

1806
1807   ——
1808
1809 7.1.2.1 output device requested

1810
1811
1812 This attribute identifies the Output Device to be used for printing
1813 the job. This attr ibute has significance when the printer name
1814 requested references a Print Server and that Print Server has two or
1815 more downstream Output Devices.

1816
1817
1818 6.2.1 7.1.3 Job Status Attributes

1819
1820   The Printer shall add these attributes to a job when a client
1821   submits a job, and the Printer shall assign appropriate values to
1822   each such job -status attribute.

1823
1824   The Printer uses these attributes to These attributes specify the
1825   job status before, during and after the processing of the
1826   print-job by the Printerserver. The server shall create the job
1827   object with these attributes (if implemented) and shall assign
1828   appropriate values to each such job status attribute.

1829
1830   The client may specify job -status attributes in: Get-Attributes
1831   and Get-Jobs, but not Print.

1832   a) Print: none
1833   b) ModifyJob: none
1834   c) GetAttributes and GetJobs: all

1835
1836 6.2.1.1 7.1.3.1 cuurrent-job-state (type1Enum)

1837
1838
1839   This attribute identifies the current state of the job with the
1840   following values: (unknown, pre-processing, pending, processing,
1841   printing, held, terminating, retained, completed. etc.).

1842
1843   The following job state standard values are defined:
1844   id val job state unknown, id val job state pre processing,
1845   id val job state held, id val job state pending,

~~id val job state processing, id val job state terminating,~~
~~id val job state retained, id val job state completed~~

The IPP protocol supports all values for job states, but ~~P~~printers
are need ~~not required to gener ate all job states,~~ only support
those states which are appropriate for the particular
implementation.

6.2.1.1 ~~7.1.3.2~~ printer-assigned (name)

This attribute identifies the Output Device to which the Printer
has assigned this job ~~has been assigned, if any~~ .

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

If a Print Server implements a Printer , the value shall be empty
until the Printer assigns an Output Device to the job. ~~When the job~~
~~is first submitted and the printer has not yet assigned any~~
~~printers to the job, the value shall be empty~~ .

~~If the Print Server has assigned a printer to the job, the value~~
~~shall contain the assigned Output Device .~~
ISSUE: Is this attribute appropriate for a model in which we are
hiding the downstream Printer.

~~An empty value shall be returned if this attribute is supported,~~
~~but this job has not yet been assigned to any Output Devices .~~

The printers -assigned value shall not be the same as the printer
requested by the user.

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

6.2.1.1 ~~7.1.3.3~~ submission-time (dateTime)

This attribute indicates the time at which the this job was
accepted by the ~~P~~printer. If the ~~P~~printer does not support the
notion of time, the attribute is not stored as part of the job
object.

1895
1896
1897   6.2.1.1 ~~7.1.3.5~~ job-message-from-administrator (string)

1898
1899
1900   This attribute provides a message from an operator, system
1901   administrator or 'intelligent' process to indicate to the user the
1902   reasons for modification or other management action taken on a
1903   job.

1904
1905
1906   6.2.1.1 ~~7.1.3.6~~ completion-time (dateTime)

1907
1908
1909
1910   This attribute indicates the time at which this job completed.
1911   ~~Providing T~~this time is useful for jobs which are retained after
1912   printing.

1913   ——
1914   6.2.1.1 ~~7.1.3.7~~ job-state-reasons (1#type2Enum)

1915
1916
1917   This attribute identifies the reason or reasons that the job is in
1918   the state that it is in (e.g., held, terminating, retained,
1919   completed, etc.). The printer shall indicate the particular
1920   reason(s) by setting the value of the job -state-reasons attribute.
1921   It is valid for the printer to set the value of the
1922   job-state-reasons attribute to the empty set.

1923
1924   The following standard values are defined:
1925   ~~id val reasons~~ documents -needed, ~~id val reasons~~ job-hold-set,
1926   ~~id val reasons~~ job-print -after -specified, job-off-peak-specified,
1927   ~~id val reasons~~ required -resources -not-ready,
1928   ~~id val reasons~~ successful completion,
1929   ~~id val reasons~~ completed -with-warnings,
1930   ~~id val reasons~~ completed -with-errors,
1931   ~~id val reasons~~ cancelled -by-user,
1932   ~~id val reasons~~ cancelled -by-operator,
1933   ~~id val reasons~~ aborted -by-system, ~~id val reasons~~ logfile -pending,
1934   ~~id val reasons~~ logfile -transferring

1935
1936
1937
1938   ~~7.1.3.8 number of documents~~
1939

~~number of docum ents~~	~~cardinalSyntax~~		~~S~~	

1940
1941   ~~This attribute indicates the number of documents in the job.~~
1942
1943
1944

1945
1946
1947
1948
1949   6.2.1.1 ~~7.1.3.9~~ impressions-completed (cardinal)

1950
1951
1952   This attribute contains the number of impressions that the Printer
1953   has completed printing. ~~by the Output Device.~~ If the Printer
1954   cannot report this number, the Printer leaves this attribute
1955   unspecified.

1956
1957   6.2.1.1 ~~7.1.3.9~~ media-sheets-completed (cardinal)

1958
1959
1960   This attribute contains the number of media-sheets that the
1961   Printer has completed printing. ~~by the Output Device~~ If the
1962   Printer cannot report this number, the Printer leaves this
1963   attribute unspecified.

1964
1965   6.2.1 ~~7.1.4~~ Job S~~s~~heet ~~-~~Attributes

1966
1967   The~~se~~ client shall specify these attributes to control the
1968   printing of ~~specify the actions to be undertaken for printing~~ of
1969   job sheets. ~~.~~

1970
1971   The client may also specify job sheet attributes in: Get-
1972   Attributes and Get-Jobs.

1973   ~~The client may specify job results handling attributes in:~~
1974   ~~   a) Print: all~~
1975   ~~   b) ModifyJob: all~~
1976   ~~   c) ListObjectAttributes: all~~
1977
1978   ~~6.2.1.1 7.1.4.1~~ job-sheets (type3Enum)

1979
1980
1981   This attribute determines what type of job-sheets the Printer
1982   ~~Output Device~~ shall ~~should~~ print with the job.

1983
1984   The standard ~~possible enum~~ values are: none, and default ~~-sheet and~~
1985   ~~custom~~.

1986
1987   The value 'None' means that the Printer shall print no job sheets .
1988   ~~should be printed.~~ The value 'Default' means that the Printer
1989   shall print the job sheets defined by an administrator ~~should be~~
1990   ~~used~~. ~~'Custom' means that additional attributes, not defined in~~
1991   ~~this document, determined whether start sheets, end sheets or slip~~
1992   ~~sheets should be in the document~~

1993
1994
1995   6.2.1 ~~7.1.5~~ Notification ~~Job Event Handling~~ Attributes

1996
1997   The client shall specify these attributes to indicate events that
1998   the client is interested in.

1999
2000   The client may also specify notification attributes in: Get-
2001   Attributes and Get-Jobs.

2002
2003
2004
2005   6.2.1.1 ~~7.1.5.1~~ notification ~~profile~~ -events (#type1Enum)

2006
2007
2008   This attribute specifies the ~~is a specification of~~ events about
2009   which the user want ~~and/or designate are~~ to be notified. ~~In~~
2010   ~~addition, this attribute specifies how the event notifications are~~
2011   ~~to be delivered~~ .

2012
2013   This attribute will support three events classes: job-completion
2014   ~~only~~, job-problems and printer-problems. ~~only, and job completion~~
2015   ~~and problems~~ . If attribute contains no values, then the client is
2016   requesting no notification.

2017
2018   This attribute will support only one delivery method, namely
2019   email. The attribute notification-address specifies the email
2020   address.

2021
2022   If this attribute contains the event job-completion,   the Printer
2023   shall notify the client when the job containing this attribute
2024   completes.

2025
2026   If this attribute contains the event job-problem,   the Printer
2027   shall notify the client when the job containing this attribute has
2028   a problem while the job is printing . Problems include: paper jam
2029   and out-of-paper.

2030
2031   If this attribute contains the event printer-problem,   the Printer
2032   shall notify the client when the job containing this attribute has
2033   a problem while the job is printing or waiting to print. Problems
2034   include: paper jam and out-of-paper.

2035
2036
2037   **ISSUE:** is there a problem with an attribute with an empty value
2038   being different from no attribute. Otherwise   , we need a special
2039   value of 'none'. 'none', unlike other values should not be
2040   combined with other values.   This particular case does not seem

2041   like a case where an administrator wants to prevent the use of
2042   'none', so empty seems like a good sol ution.

2043

2044   **ISSUE**: Email ~~This method of notification~~ is quite deficient for
2045   timely notification to an end-user who receives a lot of email,
2046   but there are no other choices. The internet community needs to
2047   solve this problem, perhaps with an extremely-urgent email.

2048
2049
2050
2051
2052   6.2.1 ~~7.1.6~~ Job Scheduling ~~Instructions~~ Attributes

2053
2054   The~~se~~ client shall specify these attributes to provide the Printer
2055   with information ~~additional hints~~ for the scheduling ~~of~~ a
2056   print-job. ~~How a pri nt service uses this information in scheduling~~
2057   ~~jobs is implementation specific.~~

2058
2059   The client may also specify these ~~job scheduling instruction~~
2060   attributes in: Get-Attributes and Get-Jobs.

2061   ~~a) Print: all~~
2062   ~~   b) ModifyJob: all~~
2063   ~~   c) ListObjectAttributes: all~~
2064
2065   ~~6.2.1.1 7.1.6.1~~ job-hold (Boolean)

2066
2067
2068   This attribute specifies whether the print -job is a candidate for
2069   scheduling for printing or not, when the   Printer ~~server~~ would
2070   otherwise place the job in the pending or processing states

2071
2072   When the value is FALSE, the P~~p~~rinter shall not hold the job from
2073   being scheduled for printing, unless there are other reasons (see
2074   the current -job-state and the job -state-reasons job -status
2075   attributes).

2076
2077   When the value is TRUE, the P~~p~~rinter shall place the job in the
2078   held state and add the job -hold-set value to the job's
2079   job-state-reasons attribute and shall not schedule the print -job
2080   for printing. If the job enters the held state because its
2081   job-hold attribute was TRUE, a client shall reset the job's
2082   job-hold at tribute to FALSE by means of the ModifyJob operation
2083   before the printer can schedule the job for printing. When the
2084   value is set to FALSE as a result of the ModifyJob operation, the
2085   printer shall remove the job -hold-set value from the
2086   job-state-reasons attribute and, if no other reasons remain, shall
2087   change the job's current -job-state to pending so that the job
2088   becomes a candidate for being scheduled on printer(s).

2089

2090 ISSUE: the above few sentences assume a ModifyJob operation, which
2091 is not in version 1.0. B ut without this operation, the job-hold
2092 operation is not very useful. **Perhaps we should remove job-hold.**

2093
2094 6.2.1.1 ~~7.1.6.2~~ job-priority (type1Enum)

2095
2096
2097 This attribute specifies a priority for scheduling the print -job.
2098 Printers ~~It is used by servers~~ that employ a priority -based
2099 scheduling algorithm use this attribute .

2100
2101 There are three standard value s: high, medium, and low. Among
2102 those jobs that are ready to print, a Printer shall print all such
2103 jobs with a high priority before printing   those with a medium or
2104 low priority , and a Printer shall print all such jobs with a
2105 medium priority before printing those with a low priority . ~~A~~
2106 ~~higher value specifies a higher priority. The value 1 is defined~~
2107 ~~to indicate the lowest possible priority (a job which a~~
2108 ~~priority based scheduling algorithm shall pass over in favour of~~
2109 ~~higher priority jobs). The value 100 is defined to indicate the~~
2110 ~~highest possible priority. Priority is expected to be evenly or~~
2111 ~~'normally' distributed across this range. The mapping   of~~
2112 ~~vendor defined priority over this range is~~
2113 ~~implementation specific.~~

2114 If the client does not specify ~~The omission of~~ this attribute ,
2115 ~~implies that~~ the Printer assumes that the user places no
2116 constraints concerning priority on the scheduling of the
2117 print-job, and it has a priority value of   the value of the
2118 Printer's maximum-end-user-priority attribute . If that attribute
2119 is unspecified, the Printer uses the value of 'high'.

2120
2121 An operator can modify a job to have any priority. An end-user is
2122 restricted to the value of printer attribute maximum- end-user-
2123 priority ~~end user~~.

2124
2125 6.2.1.1 ~~7.1.6.3~~ job-print- after (dateTime)

2126
2127 This attribute specifies the calendar date and time of day after
2128 which the print-job shall become a candidate for printing.

2129
2130 If the value of this attribute is in the future, the   Printer shall
2131 set the value of the job's **current-job-state** to **held** and add the
2132 **job-print-after-specified** value to the job's **job-state-reasons**
2133 attribute and shall not schedule the print-job for printing until
2134 the specified date and ti me has passed. When the specified date
2135 and time arrives, the Printer shall remove the **job-print-after-**
2136 **specified** value from the job's **job-state-reason** attribute and, if
2137 no other reasons remain, shall change the job's **current-job-state**
2138 to **pending** so that the job becomes a candidate for being scheduled
2139 to print.

2140
2141   If this attribute is unspecified or the value is in the past, the
2142   job shall be a candidate for scheduling immediately.

2143
2144 6.2.1.1 7.1.6.3 job-print-off-peak (type3Enum)

2145
2146
2147   This attribute specifies whether or no t a job should print during
2148   off peak hours.
2149   This attribute specifies the off-peak period during which the
2150   print-job shall become a candidate for printing.

2151
2152   If this attribute is specified present , it contains a value with
2153   which an administrator has associated allowable print times.   An
2154   administrator is encouraged to pick names that suggest the type of
2155   off-peak period, such as 'night', 'weekend', 'thirdShift'.

2156
2157   If this attribute is unspecified, the job shall be a candidate for
2158   scheduling immediately.

2159
2160
2161 6.2.1.1 7.1.6.4 job-retention-period (deltaTime)

2162
2163
2164   The retention time is expressed in hours and minutes,   e.g. 6:00 (6
2165   hours), or 20 (20 minutes).   Delta time provides an integer value
2166   for a period of elapsed time, measured in seconds.

2167
2168   This attribute specifies the minimum period of time following the
2169   completion of job processing and printing that the server shall
2170   keep job attributes , document attributes, and document data. The
2171   Printer server may keep these attributes and data longer than the
2172   value of the job -retention -period attribute.

2173
2174   Job retention period specifies a lower bound on how long job
2175   attributes, document attributes and document data shall be
2176   retained by a server after printing has completed, whilst
2177   job discard time sets an upper bound on retention of the job and
2178   document attributes independent of whether the job is ever
2179   scheduled for, starts or completes printing.
2180
2181   In addition to providing status information to a user after a job
2182   has completed printing, the job retention period also provides the
2183   mechanism for retaining job's document data after it has been
2184   printed, so that the job may be printed again, possibly with
2185   modified attributes, such as the job copies component of the
2186   job results attribute.
2187
2188   NOTE   The mechanism to reprint the job is outside the scope of
2189   this part of ISO/IEC 10175; part 3 of this International Standard

2190   ~~(in preparation) includes a Resubmit abstract   operation to enable~~
2191   ~~this function.~~
2192
2193   ~~7.2 Document Attributes~~
2194
2195   ~~This section discusses attribute that pertain to documents,~~
2196   ~~including the document   content attribute which specifies the~~
2197   ~~document data.~~
2198
2199
2200   ~~7.2.1 Document Description Attributes~~
2201
2202   ~~These attributes identify the intended document format.~~
2203
2204   ~~The client may specify document   description attributes in:~~
2205   ~~a) Print: all~~
2206   ~~b) ModifyJob: none~~
2207   ~~c) ListObjectAttributes: all~~
2208   ~~7.2.1.1 document format~~
2209
2210

~~document format~~	~~docFormatSyntax~~	~~S~~	

2211
2212   ~~This client specifies this attribute if the included documents are~~
2213   ~~not yet in a format acceptable to an Output Device. This attribute~~
2214   ~~specifies the format that the Printer shall translate the~~
2215   ~~documents to in order to print.~~
2216
2217   ~~Note: this attribute is rarely needed.~~
2218
2219
2220   6.2.1 ~~7.2.2~~ Job~~Document~~ Production ~~Instruction~~ Attributes
2221
2222   The client shall specify these ~~se~~ attributes to ~~provide information~~
2223   ~~that~~ affect the rendering , production and finishing of the
2224   document . ~~and are referred to as   document production instructions~~
2225   ~~(DPI).~~ Similar types of instructions   ~~DPI~~ may also be contained in
2226   the document to be printed.
2227
2228   If there is a conflict between the value of one of these
2229   attributes, and a corresponding   instruction in the document
2230   (either implicit or explicit), the value of the attribute shall
2231   take precedence over the document   instruction .
2232
2233   After the information from these attributes has been folded into
2234   the document data (possibly during a translation process of the
2235   document data) , the~~se~~ attributes ~~y~~ are no longer relevant and can
2236   be discarded from a job.   Instead, t~~T~~he resource attributes
2237   specify ~~indicate~~ the resources needed to print the job   as
2238   modif~~ie~~ed by the job production attributes   . ~~from printer features a~~
2239   ~~document needs in order to print correctly.~~
2240
2241   ~~If there is a conflict between the value of one of these~~
2242   ~~attributes, and a corresponding parameter found in the document~~

2243 ~~(either implicit or explicit), the value of the attribute shall~~
2244 ~~take precedence over the document parameter.~~

2245

2246 Note: until companies that supply interpreters for PDL's, such as
2247 PostScript and PCL allow a way to specify overrides for internal
2248 job production instructions, a Printer may not be able to
2249 implement these attributes for some PDL's .

2250

2251 The client may also specify document production -instruction
2252 attributes in: Get-Attributes and GetJobs.

2253

2254 ~~a) Print: all~~
2255 ~~b) ModifyJob: all~~
2256 ~~c) ListObjectAttributes: all~~
2257
2258
2259
2260 ~~6.2.1.1 7.2.2.2~~ medium-select (type2Enum)

2261
2262
2263
2264 This attribute identifies the medium that the Printer   ~~r~~shall use
2265 for all pages of the document regardless of what media are
2266 specified within the document.

2267

2268 The values for medium include medium-names, medium-sizes, input-
2269 trays and electronic forms so that one attribute specifies the
2270 media.

2271

2272 Standard values are defined: TBD

2273
2274
2275
2276 6.2.1.1 ~~7.2.2.3~~ number-up (positiveInteger)

2277
2278
2279 ~~A CardinalSyntax allows attribute values that can specify either a~~
2280 ~~Cardinal or an OID (that normally names a Cardinal).~~

2281

2282 This attribute specifies the number of source page -images to
2283 impose upon a single instance of a selected medium.   ~~The attribute~~
2284 ~~can be specified either by a number directly or by naming an~~
2285 ~~imposition object which specifies some particular number   up~~
2286 ~~imposition~~.

2287

2288 In general, only certain numeric values are valid for this
2289 attribute, depending upon the ~~server and~~ ~~P~~printer implementation ~~s~~
2290 to which the print -request is directed. Typical supported values
2291 are 2 and 4. ~~A value of 0 or none shall suppress any server~~
2292 ~~default number up, if any.~~

2293

2294 If this attribute is unspecified or has a value of 1, then   the
2295 Printer does not apply any   number-up transformation to the pages.

2296

2297 This attribute primarily controls the translation, scaling and
2298 rotation of page images, but a site may choose to add
2299 embellishments, such as borders to each logical page.   ~~A site may~~
2300 ~~even choose to add an attribute to control the presence or~~
2301 ~~characteristics of such embellishments.~~

2302

2303 ISSUE: should there be a separate attribute to control
2304 embellishments, especially for t he 1-up case.

2305

2306 ~~The following standard values are defined: id   val generic none,~~
2307 ~~id val imposition simple 1 up, id val imposition simple 2 up,~~
2308 ~~id val imposition simple 4 up.~~
2309
2310 ~~NOTE   The value 0 or none specifies that no convenience~~
2311 ~~imposition functions shall be performed; 0 or none is needed to~~
2312 ~~suppress any special number up operation because a value of 1 for~~
2313 ~~some sites may cause the server to alter the placement, or size of~~
2314 ~~the page image, or to add embellishments, such as borders or to~~
2315 ~~rotate the page depe nding on content orientation.~~
2316
2317 ~~The server may support three values for number   up besides 0 (and~~
2318 ~~id val generic none), namely 1 (and id val imposition 1 up), 2~~
2319 ~~(and id val imposition simple 2 up) and 4 (and~~
2320 ~~id val imposition simple 4 up), which this document will reference~~
2321 ~~by the respective names of 0 up, 1 up, 2 up and 4 up, henceforth.~~
2322 ~~These 1 up, 2 up and 4 up values provide a simple means for users~~
2323 ~~to request the printing of compact documents of a temporary or~~
2324 ~~informal nature.~~
2325
2326 ~~6.2.1.1 7.2.2.4~~ finishing (type2E num)

2327
2328
2329
2330 This attribute identifies the finishing operation that the Printer
2331 should apply to ~~a sequence of one or more finishing   processes to~~
2332 ~~be applied to~~ each copy of the printed document.

2333
2334 ~~Finishing encompasses the operations that may be applied to the~~
2335 ~~media output of a print job.~~ Examples include stapling,
2336 saddle-stitching, hole -drilling, binding with tape, etc.

2337
2338 ~~This attribute allows the requester to specify one or more~~
2339 ~~individual finishing processes may be specified in   the finishing~~
2340 ~~attribute. Each of the individual processes is specified by~~
2341 ~~including the required parameters for each of the individual~~
2342 ~~finishing processes in the finishing attribute.~~

2343   Standard values for this attribute are   include ~~defined~~ : TBD ~~TBD~~ .

2344
2345   6.2.1.1 ~~7.2.2.5~~ sides (type2Enum)

2346
2347
2348
2349
2350   This attribute specifies whether the document should be printed in
2351   one of three ways: 1-sided (simplex), 2-sided- ~~flip on~~ long-edge
2352   (duplex), 2-sided- ~~flip on~~ short-edge (tumble) .

2353
2354   The standard values are: 1 -sided, 2-sided-long-edge, 2-sided-
2355   short-edge. ~~,~~

2356
2357   6.2.1.1 ~~7.2.2.6~~ cop ~~y~~ ies- (positiveInteger)

2358
2359
2360
2361   This attribute specifies the number of copies of the job to be
2362   printed. If this attribute is unspecified, its default value is 1
2363   copy.

2364

2365

2366
2367   ~~A value of 1 for copies shall generate a single human perceptible~~
2368   ~~copy of the electronic document.~~
2369
2370
2371   6.2.1.1 ~~7.2.2.1~~ printer-resolution-select (positiveInteger Cross)

2372   ~~6.2.1.1~~

2373
2374
2375   This attribute specifies the resolution that the Printer should
2376   use.

2377
2378   The syntax allows a single integer to specify the resolution or a
2379   pair of integers to specify the resolution when the x and y
2380   dimensions differ. When two integers are specified, the first is
2381   in the p aper feed direction.

2382
2383   6.2.1.1 ~~7.2.2.1~~ print-quality (type2Enum)

2384
2385
2386   This attribute specifies the print quality that the Printer should
2387   use.

2388
2389   The standard values are: TBD.

2390
2391 6.2.1.1 ~~7.2.2.1~~ page-select (positiveIntegerRange)

2392
2393
2394   This attribute specifies the pages in the document that the
2395   Printer shall ~~should~~ use. This attribute is unlikely to be useful
2396   for jobs with more than one document or in Job Templates . If this
2397   attribute is unspecified, then the Printer prints all pages in a
2398   document.

2399
2400 6.2.1.1 ~~7.2.2.1~~ files-are-one-document (Boolean)

2401
2402
2403
2404   This attribute is relevant only if a job consists of two or more
2405   documents ~~files~~. It controls finishing operations, ~~and~~ job-sheet
2406   placement , and the order of documents when the copies attribute
2407   exceeds 1.

2408
2409   If the files for the job are a and b and this attribute is   **true,**
2410   then files a and b are treated as a single document for finishing
2411   operations. Also, there will be no slip sheets between files a and
2412   b. If more than one copy is made, the ordering must be a, b, a,
2413   b, …. The attribute **files-are-interleaved** is ignored.

2414
2415   If the files for the job are a and b and this attribute is   **false**
2416   **or unspecified**, then each file is treated as a single document for
2417   finishing operations. Also, a client may specify that a slip sheet
2418   be between files a and b. If more than one copy is made, and the
2419   attribute **files-are-interleaved** false or unspecified, the ordering
2420   is a, a, b, b, …. If more than one copy is made, and the attribute
2421   **files-are-interleaved** true, the ordering is a, b, a, b, ….

2422
2423 6.2.1.1 ~~7.2.2.1~~ files-are-interleaved (Boolean)

2424
2425   This attribute is used in conjunction with **files-are-one-document**
2426   (q.v.).

2427
2428 6.2.1 ~~7.2.2~~ Attributes for Conversion of Text Files ~~(set by client)~~

2429
2430   The client shall specify these attributes to control ~~in this~~
2431   ~~section specify~~ formatting for text documents or HTML documents .
2432   If the client does not specify any of these attributes ~~is not~~
2433   ~~specified~~, a Printer shall uses its own defaults.

2434   A client need not specify these attributes for   other types of
2435   documents, such as PostScript or PCL.

2436
2437   6.2.1.1 7.2.2.1 width (cardinalUnits)

2438   7.2.2.1
2439
2440   This attribute specifies the media width for the document.

2441
2442   6.2.1.1 7.2.2.1 length (cardinalUnits)

2443
2444   This attribute specifies the media length for the document.

2445
2446   6.2.1.1 7.2.2.1 left-margin (cardinalUnits)

2447
2448   This attribute specifies the left-margin for the document.

2449
2450   6.2.1.1 7.2.2.1 right-margin (cardinalUnits)

2451
2452   This attribute specifies the right-margin for the document.

2453
2454   6.2.1.1 7.2.2.1 top-margin (cardinalUnits)

2455
2456   This attribute specifies the top-margin for the document.

2457
2458   6.2.1.1 7.2.2.1 bottom-margin (cardinalUnits)

2459   7.2.2.1
2460
2461   This attribute specifies the bottom-margin for the document.

2462
2463   6.2.1.1 7.2.2.1 repeated-tab-stops (cardinalUnits)

2464
2465   This attribute specifies the tab stops for the document.

2466
2467   6.2.1.1 7.2.2.1 header-text (string)

2468
2469   This attribute specifies the header text for the document.

2470
2471   6.2.1.1 7.2.2.1 footer-text (string)

2472
2473   This attribute specifies the footer text for the document.

6.2.1.1 ~~7.2.2.1~~ number-pages (Boolean)

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

~~6.2.1.1 7.2.2.1~~ default-font (string)

     This attribute specifies the font to use for all text in the document.

6.2.1.1 ~~7.2.2.1~~ default- code ~~character~~ -set (type3Enum)

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

6.2.1.1 ~~7.2.2.1~~ content-orientation (type2Enum)

     This attribute specifies the orientation of the document . ÷

     The standard values are: landscape or portrait.

6.2.1 ~~7.2.3~~ Job Resource Attributes

     ~~This~~ A program described below shall add these ~~group of~~ attributes , which describe ~~s~~ the resources needed to print the job. ~~The values provided by these attributes are intended to assist the print server in validating and scheduling the print job. Providing t~~

     A Printer may use these attributes to validate and schedule the print-job ~~hese attributes independent of the docume nt allows the server to schedule a job or to validate the resources required to print the document~~ without interpreting the contents of the document. This provides the opportunity for a Printer ~~server~~ to support a broad set of document formats yet still support fast efficient scheduling and validation of each job . ÷

     ~~The values of t hese attributes are hints to the server about production instructions and resources needed to print a document, but the printer does not use these attributes during the actual printing of a document.~~

     The client shall not specify these attributes. Instead, i ~~I~~ t is the duty of the program ~~process~~ that translates — the document to the printer's PDL (or analyzes it) to add ~~provide~~ these attributes s

2520 and their values to the job . If any of these attributes is such
2521 values are unspecified lacking, the Printer shall assume that the
2522 all resources required by the document of the type specified by
2523 the missing attributes are ready. doesn't ask for any resources
2524 that are unavailable. Such value These attributes may be
2525 unspecified missing if the translation programprocess fails to
2526 provides such values, or if no translation occurs (e.g. the
2527 document is a PostScript document.

2528
2529 Note: The Printer does not use these attributes during the actual
2530 printing of a document.

2531
2532 Note: the se attributes allow more than one value wherever it is
2533 possible for a job to specify more than one value of the
2534 corresponding job attribute , possibly by embedded instructions .

2535
2536 The client may specify these document characterist ic attributes
2537 in: Get-Attributes and Get-Jobs.

2538 a) Print: all (translation process, not the end user)
2539 b) ModifyJob: none
2540 c) ListObjectAttributes: all
2541
2542 6.2.1.1 7.2.3.1 document-format-used (1#type2 Format)

2543
2544 This attribute identifies the document format needed to print this
2545 job.

2546
2547 This attribute identifies the overall print document format used
2548 for the document. It consists of three elements, a
2549 document format, a document format variants and a
2550 document format version. The latter two element s are optional.
2551
2552 A format consists of two elements, a name and a version. The
2553 latter element is optional.

2554
2555 The syntax is for type2Format :

2556
2557 name ["/" version]

2558
2559 Examples include: PostScript, PostScript/2.0 and PCL/5e

2560
2561 IISSUE: do we want the version to be optional?

2562
2563 X[The format needs to be simplified, but I'll leave in the text
2564 below for now.]
2565

2566 ~~The document format element identifies a particular family of~~
2567 ~~document formats, of which there may exist several versions or~~
2568 ~~variants. The document format variants and~~
2569 ~~document format version elements identify a specific instance of a~~
2570 ~~document format. The variant refers to a particular functional~~
2571 ~~subset of a format. For example, the format PostScript has~~
2572 ~~variants of level 1 and level 2, and the format PCL has several~~
2573 ~~variants, including PCL4 and PCL5.~~

2574
2575 ~~The version distinguishes among successive releases of the same~~
2576 ~~basic format and variant. For example, successive versions of~~
2577 ~~Xerox Interpress include versions 2.0, 2.1, 3.0, 3.1, etc.~~

2578
2579 ~~The document format variants element consists of a single text~~
2580 ~~string. If it is necessary to identify more than one variant, the~~
2581 ~~respective variant values shall all be contained in the~~
2582 ~~document format variants element, separated from one another by~~
2583 ~~commas.~~

2584
2585 ~~If the client omits the document   format variants or~~
2586 ~~document format version elements, the server may supply a~~
2587 ~~format specific default.~~

2588
2589 ~~Proprietary values for the document   format,~~
2590 ~~document format variants, and document format version elements are~~
2591 ~~assigned by the owners of those formats.~~

2592
2593 6.2.1.1 ~~7.2.3.1~~ fonts-used (1#string)

2594
2595   This attribute identifies the font resources used in the job.

2596
2597 6.2.1.1 ~~7.2.3.1~~ code~~character~~-sets-used (1#type3Enum)

2598
2599   This attribute identifies the code~~character~~-sets used in the
2600   document. This attribute is relevant only for files that are not
2601   in ASCII, such as text files and possibly PCL files. PostScript
2602   files are always ASCII. Normally there is at most 1 code-set.

2603
2604   Standard values are defined in the se ction on default-fonts.

2605 6.2.1.1 ~~7.2.3.2~~ media-used (1#type2Enum)

2606
2607
2608   This attribute identifies the media, media-sizes, input-trays or
2609   electronic forms needed to print the job.

2610
2611
2612
2613   Standard values for this attribute are defined in the section on
2614   medium-select. ~~: TBD~~

2615
2616

2617 ~~This attribute is intended for scheduling and validation. The~~
2618 ~~server uses this attribute with the printer attributes~~
2619 ~~media supported for validation and media ready for scheduling.~~
2620
2621 6.2.1.1 ~~7.2.3.2~~ sides-used (type2Enum)

2622
2623 This attribute specifies whether a job needs one-sided, two-sided-
2624 long-edge, or two-sided-short-edge ~~simplex, duplex or tumble~~
2625 printing.

2626
2627 Standard values for this attribute are defined in the section on
2628 sides.

2629
2630
2631 ~~7.2.3.2 output bin used~~
2632
2633 ~~This attribute specifies what output bins the job needs.~~
2634
2635 6.2.1.1 ~~7.2.3.2~~ print-quality-used (type2Enum)

2636
2637 This attribute specifies what print quality the job needs.

2638
2639 Standard values for this attribute are defined in the section on
2640 print-quality.

2641
2642
2643 6.2.1.1 ~~7.2.3.2~~ finishing-used (type2Enum)

2644
2645 This attribute specifies what finishing the job needs.

2646
2647 Standard values for this attribute are defined in the section on
2648 finishing.

2649
2650
2651 6.2.1.1 ~~7.2.3.2~~ printer-resolution-used (positiveIntegerCrossState)

2652
2653 This attribute specifies what resolution the job needs. ~~This~~
2654 ~~attribute is the first of three that a client can use to specify~~
2655 ~~the size of a job.~~

2656
2657 6.2.1.1 ~~7.2.3.2~~ total-job-octets (positiveInteger)

2658
2659 This attribute specifies the total size of the job in octets. This
2660 attribute is the first of three that a translation program can use
2661 to specify the size of a job.

6.2.1.1 ~~7.2.3.2~~ job-impression-count (positiveInteger)

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

6.2.1.1 ~~7.2.3.2~~ job-media-sheet-count (positiveInteger)

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

6.2.1 ~~7.2.4~~ Number of Documents

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

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

6.2.1.1 ~~7.2.1.1~~ number-of-documents (positiveInteger)

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

6.2.1 ~~7.2.4~~ Document Data ~~Contents (one per document)~~

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

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

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

    Except for document-content,   the client may spec ify document -data
    attributes in: Get-Attributes, and Get-Jobs.

~~7.2.1 Document Description Attributes~~

2705   These attributes name and reference the individual documents in a
2706   job.
2707
2708   The client may specify document description attributes in:
2709   a) Print: all, except document type, transfer method, and
2710   document content shall be passed as explicit parameters of the
2711   Print abstract operation and shall not be passed as attributes.
2712   b) ModifyJob: none
2713   c) ListObjectAttributes: all, except id att document content
2714
2715 7.2.1.1 number of documents
2716
2717   This attribute specifies the number of documents in the job.
2718
2719 6.2.1.1 7.2.3.1 document-format (type2 Format)

2720
2721   This attribute identifies the document format   of this document.

2722
2723   If the client does not specify this attribute , then the Printer
2724   shall attempt to determine the format in order to decide if the
2725   document data needs to be   translated.

2726
2727   ISSUE: do we want the version to be o ptional?

2728
2729 6.2.1.1 7.2.1.2 document-name (name)

2730
2731   This attribute contains the name of the document used by the
2732   client to initially identify the document .

2733
2734 6.2.1.1 7.2.1.2 document-URL (name)

2735
2736   This attribute contains the URL of the document if   the client
2737   specified the document with a URL.

2738
2739   If this attribute is specified , then document-content and
2740   document-path shall be unspecified.

2741
2742 6.2.1.1 7.2.1.2 document-content (octetString)

2743
2744   This attribute contains the actu al contents of the document.

2745
2746   If this attribute is specified, then   document-path and document-
2747   URL shall be unspecified.

2748
2749   This attribute shall be used during the   transmission of the Print
2750   operation over a network. A Printer shall   save the document data

2751   to a file and reference it with the document-URL or document-path
2752   attribute. A Get-Attribute or Get-Jobs operation   shall always find
2753   that this attribute is unspecified.

2754
2755 6.2.1.1 7.2.1.2 document-path (name)

2756
2757   This attribute contains a path which references a file containing
2758   the document.

2759
2760   If this attribute is specified, then document-content and
2761   document-URL shall be unspecified.

2762
2763   TThis attribute shall not be used during the transmission of the
2764   Print operation over a network.   It is intended to reference the
2765   file when document data is on the printer.

2766
2767   ISSUE: is this attribute necessary or is document-URL sufficient?

2768
2769
2770   This attribute is a sequence with one element for each document in
2771   the job. Each element contains the following fields:

2772
2773   document name: the name of the document specified by the end
2774   user.
2775   file reference: the path to the current location of the file
2776   URL: the URL of the file.
2777   contents: actual contents of the file.
2778
2779   Of the last three fields, only one should be present at any time.
2780
2781 6.3 7.3 Operation Attributes

2782
2783   The client shall set these attributes and associate them   with an
2784   operation rather than an object.

2785
2786   It is intended that a client program rather than an end-user has
2787   control over the setting of these values so that they cannot be
2788   easily forged.

2789
2790 6.2.1 7.4.1 operation-locale (type3Locale)

2791
2792   This attribute identifies the locale of the client . The Printer
2793   uses this attribute to determine the locale of messages in the
2794   result of the operation or in errors returned by the operation .

2795

2796 The type3EnumTrip consists of 3 colon separated   type 3 enums. The
2797 first is the country. The second is the language. The third is the
2798 code-set.

2799
2800 If an operation does not specify th is attribute , the Printer shall
2801 assume that the operation has the same locale as the Printer.

2802
2803 ~~TBD~~
2804 6.2.1 ~~7.4.1~~ operation- notification -address (name)

2805
2806 This attribute identifies the   email-address of the client. The
2807 Printer uses this attribute to determine the   email address for any
2808 notifications that occur in the Printer .

2809
2810 ISSUE: can this address be determined from the next two
2811 attributes: operation-user-name and operation-host-name?

2812
2813 6.2.1 ~~7.4.1~~ operation-user-name (name)

2814
2815 This attribute identifies the most authentica ted user name that
2816 the client can supply . This name identifies the user performing
2817 the operation .

2818
2819 This value shall be set by the system rather than the end -user in
2820 order to minimize the chance of forgery.

2821
2822 6.2.1 ~~7.4.1~~ operation- host-name (name)

2823
2824 This attribute identifies the most authenticated host name that
2825 the client can supply.   This name identifies the host from which
2826 the operation comes.

2827
2828 This value shall be set by the system rather than the end-user in
2829 order to minimize the chance of forgery.

2830
2831 6.3 ~~7.4~~ Printer Attributes

2832
2833 A printer object may be realized in ~~represent~~ either a Print
2834 Server or Output Device .

2835
2836 A Printer Object in an Output Device contains a set of printer
2837 object attributes that represent an Output Device capable of
2838 rendering a document in visible form. Examples include electronic
2839 and electro -mechanical printers such as laser printers, ink -jet
2840 printers, and various kinds of impact printers, but may include

2841   other types of output devices such as microfiche imagers and
2842   plotters as well.

2843

2844   A Printer Object in a Print Server contains a set of printer
2845   object attributes that are the union of the Printer objects in the
2846   downstream Output Devices. This object extends the capabilities
2847   of an Output Device. For example, an administrator might define a
2848   single Print Server to represent all of the Output Devices of the
2849   same type and capability in a single location, associated with a
2850   particular server. A user/client would normally send a print -job
2851   to a Print Server , and allow the Print Server to assign the job
2852   to a particular Output Device based on the relative load and
2853   availability of the printers under its control, thus providing a
2854   load balancing service. However, nothing precludes a   n
2855   administrator from configuring a print system so that a
2856   user/client can ~~from~~ send~~ing~~ a print -job directly to an Output
2857   Device . ~~Such a restriction is up to the policy of the system~~
2858   ~~administrator and the access control that the administrator~~
2859   ~~specifies.~~

2860
2861   A Print Server , in the most common case , controls exactly one
2862   downstream Output Device. The Print Server 's Printer object has
2863   attributes whose values are the same as those of the Printer
2864   object in the downstream Output Device.

2865
2866
2867
2868   The attributes defined in this section ~~subclause~~ provide
2869   information about a particular Printer ~~Print Server or Output~~
2870   ~~Device ; all of the attributes apply to Print Servers and Output~~
2871   ~~Devices~~ .

2872
2873
2874
2875
2876
2877   6.2.1 ~~7.4.1~~ printer-name (name)

2878
2879   This attribute uniquely identifies the printer   on its host .

2880
2881   6.2.1 ~~7.4.1~~ printer-location text (string)

2882
2883   This attribute identifies the location of this printer.

2884
2885   6.2.1 ~~7.4.1~~ printer-model (string)

2886
2887   This attribute identifies the make and model of the printer   .

2888

2889   6.2.1 ~~7.4.1~~ printer-types (type2Enum)

2890
2891   This attribute identifies the marking technology of the printer.

2892
2893   The value for this attribute are the descriptive names specified
2894   by ISO DPA. These values are: other, unknown. electrophotographic-
2895   LED, electrophotographic-laser, electrophotographic-other, impact-
2896   moving-head-dot-matrix-9-pin,   impact-moving-head-dot-matrix-24-
2897   pin, impact-moving-head, dot-matrix-other, impact-moving-head-
2898   fully-formed , impact-band, impact-other, inkjet-aqueous, inkjet-
2899   solid, inkjet-other, pen, thermal-transfer, thermal-sensitive,
2900   thermal-diffusion, thermal-other, electro, erosion, electro-
2901   static, photographic-microfiche, photographic-imagesetter,
2902   photographic-other , ion-deposition, E-beam, typesetter .

2903
2904   **ISSUE:** Should they be from the printer MIB instead. In the printer
2905   MIB hyphens do not exist. Instead the first letter after a hyphen
2906   is upper case.

2907
2908   6.2.1 ~~7.4.2~~ printer-state (type1Enum)

2909
2910   This attribute identifies the current state of the printer. The
2911   ~~LDPA~~ protocol support all values for printer states, however   a
2912   ~~P~~printer~~s are not required to~~ shall only generate ~~all~~ the printer
2913   states~~, only those~~ which are appropriate for the particular
2914   implementation.

2915
2916   The following standard values are defined:
2917   ~~id val printer state~~ unknown, ~~id val printer state~~ idle,
2918   ~~id val printer state~~ printing,
2919   ~~id val printer state~~ needs-attention, ~~id val printer state~~ paused,
2920   ~~id val printer state~~ shutdown,
2921   ~~id val printer state~~ job-start-wait,
2922   ~~id val printer state~~ job-end-wait,
2923   ~~id val printer state~~ job-password-wait,
2924   ~~id val printer state~~ needs-key-operator,

2925   ~~id val printer state~~ connecting-to-printer,

2926   ~~id val printer~~ state-timed-out

2927
2928   6.2.1 ~~7.4.2~~ printer-state- message~~reasons~~ (string)

2929
2930   This attributes specifies a message that gives further information
2931   about the current printer state. ~~reasons for being in a printer~~
2932   ~~state~~.

2933

6.2.1 ~~7.4.3~~ message (string)

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

6.2.1 ~~7.4.6~~ locale (type3Locale)

    This attribute specifies the locale that the Printer operates in.

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

6.2.1 ~~7.4.6~~ notification-events (#type2Enum)

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

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

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

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

6.2.1 ~~7.4.6~~ notification-addresses (#name)

    This attribute specifies the   email addresses to which the Printer
    should send message s when events specified by the notification -
    events attribute occur.

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

6.2.1 ~~7.4.6~~ end-user- acl (#name)

    This attribute specifies the users who are allowed to print on the
    Printer.

2978
2979   If the attribute is unspecified or empty, the Printer   allows
2980   anyone to print .

2981
2982   ISSUE: this does not fully solve the internet authorization
2983   problem because of authentication issues.

2984
2985   6.2.1 ~~7.4.15~~ maximum-printer-speed (positiveIntegerUnit s)

2986
2987   This attribute indicates the maximum printer speed of the Printer.
2988   A job cannot control a Printer's speed, but a Printer Browser can
2989   use printer speed as a criteria.

2990
2991   The standard units are a type2Enum and are: ppm, ipm, spm, lpm,
2992   cps.

2993
2994   6.2.1 ~~7.4.6~~ fonts-substitutions (#stringPair)

2995
2996   This attribute specifies an appropriate substitute for a font that
2997   is advertised as supported in the fonts-supported   attribute , even
2998   though the Printer doesn't actually have   the font available.

2999
3000   This attribute consists of a set of font pairs: a font name and
3001   the font to use instead.

3002
3003
3004   6.2.1 ~~7.4.6~~ fonts-supported (1#stringState)

3005
3006   This attribute identifies the font resources supported by this
3007   printer and indicates the state of readiness for each font.

3008
3009   The standard names are defined in the section on default-font.

3010
3011   Each item in the list contains the pair consisting of a font name
3012   and a state indicating the font's readiness state.

3013
3014
3015   6.2.1 ~~7.4.8~~ media-supported (1#nameState)

3016
3017   This attribute identifies the media, media-sizes, input trays, and
3018   electronic forms supported by this printer, and indicates the
3019   state of readiness for each medium resource.

3020

3021   There may be just two states: ready and needs-installing, or there
3022   may be a third state: needs-purchasing.

3024   The standard names are defined in the section on the section on
3025   the medium-select .

3027 6.2.1 ~~7.4.11~~ document-formats-supported   (1#type2 Format State)

3029   This attribute identifies the document -formats, including the
3030   ~~document format variants and~~ document -format -versions, supported
3031   by the Printer ~~Output Device and the server soft ware collectively~~ .
3032   This set includes both the formats that are native to the   Printer
3033   ~~Output Device~~ and those formats that the Printer ~~server software~~
3034   can translate to one that is native to the   Printer ~~Output Device~~ .
3035   From the client's point of view, this set contains all formats in
3036   which documents can be submitted to this   P~~p~~rinter.

3038   Proprietary document format identifiers, ~~variants,~~ and versions
3039   are assigned by the owners of those formats.

3041   The state of readiness for each format is also include d, though
3042   all formats should normally always be ready.

3044 6.2.1 ~~7.4.12~~ numbers-up-supported   (1#positiveInteger State)

3046   This attribute identifies the number -up values ~~and imposition~~
3047   ~~objects~~ supported by this printer. ~~ The cardinal range is an~~
3048   ~~alternative (shorthand) way of specifying consecutive~~
3049   ~~cardinal values~~ .

3051   The state of readiness for each number-up value is also included,
3052   though all number-up conversion s should always be ready.

3054   ~~There are no standard values defined.~~

3056 6.2.1 ~~7.4.13~~ finishings-supported   (#type2EnumState)

3058   This attribute identifies the per -document finishing operations
3059   ~~objects~~ supported by this P~~p~~rinter and state s of readiness for
3060   each finishing .~~, that is the server installed finishing objects~~
3061   ~~that may be used as values of the finishing document attribute.~~

3063   The standard finishing objects are defined in the section on the
3064   finishing attribute .

3065   ~~NOTE: What are the values of this attribute since we have no~~
3066   ~~Finishing objects.~~

3067
3068   6.2.1 ~~7.4.14 s~~sides-supported (1#type2EnumState)

3069

3070   This attribute indicates the values of the sides attribute
3071   supported by this printer and the states of readiness of each
3072   value. ~~, i.e., the different numbers of surfaces of a medium that~~
3073   ~~can be imaged by this printer.~~

3074

3075   The standard values are defined in the section on the sides
3076   attribute.

3077

3078   6.2.1 ~~7.4.15~~ print-qualities-supported (1#type2EnumState)

3079

3080   This attribute indicates the values of the printer-quality
3081   attribute supported by this printer and the state s of readiness
3082   for each print-quality value .

3083

3084   The standard values are defined in the printer-quality attribute.

3085

3086   6.2.1 ~~7.4.15~~ printer-resolutions-supported
3087   (1#positiveIntegerCross State)

3088

3089   This attribute indicates the values of the printer-resolution-
3090   select attribute supported by this printer and their state s of
3091   readiness.

3092

3093   The state of readiness for each printer resolution is also
3094   included, though normally all printer-resolutions should always be
3095   ready.

3096

3097   The syntax is discussed in the section on the printer-resolution-
3098   select attribute .

3099

3100   6.2.1 ~~7.4.15~~ code-sets-supported (1#type3EnumState)

3101

3102   This attribute indicates the values of the default-code-set
3103   attribute supported by this printer and the state s of readiness
3104   for each code-set .

3105

3106   The standard values are defined in the default-code-set attribute.

3107

3108   6.2.1 ~~7.4.17~~ off-peak-times-supported (#type3Enum State)

3109

This attribute indicates the values of the job-print-off-peak
attribute supported by this printer and the s tates of readiness
for each value.

If this attribute is unspecified, then the Printer has no off-peak
periods.

The standard values are defined in the section on the job-print-
off-peak attribute.

Note: this document does not define how an administrator
associates the off-peak names with actual time periods.

6.2.1 ~~7.4.18~~ events-supported (#type2Enum State)

This attribute indicates the values of the job   and printer
notification-events attribute support ed by this Printer and the
states of readiness for each value.

If this attribute is unspecified, then the Printer   does not
support notification .

The standard values are defined in the section on the
notification-events attribute.

6.2.1 ~~7.4.18~~ locales-supported (1#type3Locale State)

This attribute indicates the values of the job -locale attribute
supported by this Printer and the states of readiness for each
value.

The standard values are defined in th e section on the job-locale
attribute.

6.2.1 ~~7.4.15~~ job-sheets-supported (#type3EnumState)

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

To allow no job sheets, the system administrator shall include the
value ~~id val generic~~ none as a value for this attribute. The
client specifies that there are no job sheets by using the value
~~id val generic~~ none as the value of the job -sheets a ttribute.

3155
3156   If the job -sheets attribute is not specified or contains a value
3157   which the ~~P~~printer does not support, ~~and the job sheets value is~~
3158   ~~non compulsory (so that the server accepts the job),~~ then the
3159   server shall ~~may~~ select from among the values of this attribute.
3160   The server shall not select the value ~~id val generic~~ none unless
3161   it is the only value specified for the job -sheets -supported
3162   attribute.

3163
3164   NOTE – It is preferable for the server to produce some job
3165   job~~auxiliary~~ sheet, even if not the desired one, rather than
3166   produce none at all or reject the job .

3167
3168   ~~7.4.16 document sheets supported~~
3169
3170   ~~This attribute identifies the auxiliary sheets values supported by~~
3171   ~~this printer.~~
3172
3173   ~~To allow no document sheets, the system administrator shall~~
3174   ~~include the value id val generic none as a value for this~~
3175   ~~attribute. The client specifies that there are no document sheets~~
3176   ~~by using the value id val generic none as the value of the~~
3177   ~~document sheets attribute.~~
3178
3179   ~~If the document sheets attribute is not specified or contains a~~
3180   ~~value which the printer does not support, and the document   sheets~~
3181   ~~value is non compulsory (so that the server accepts the job), then~~
3182   ~~the server may select from among the values of this attribute. The~~
3183   ~~server shall not select the value id val generic none unless it is~~
3184   ~~the only value specified for the document   sheets supported~~
3185   ~~attribute.~~
3186
3187   ~~NOTE It is preferable for the server to produce some job~~
3188   ~~auxiliary sheet, even if not the desired one, rather than produce~~
3189   ~~none at all.~~
3190
3191 6.2.1 ~~7.4.17~~ maximum-copies ~~supported~~ (positiveInteger)

3192
3193   This attribute indicates the maximum number of copies of a
3194   document that can be rendered by this printer in a single
3195   print -job.

3196
3197   ~~A server shall ensure that neither a document's copy   count~~
3198   ~~attribute nor any single job copies element of a ResultsProfile~~
3199   ~~exceeds the value specified in this attribute. A server may~~
3200   ~~ensure that for each document the product of the document's~~
3201   ~~copy count and the sum of all job copies in all result sets does~~
3202   ~~not exceed this value.~~
3203
3204   If the attribute is unspecified or has a ~~A~~ value of 0 , ~~shall~~
3205   ~~indicate~~ there is no limit on the maximum number of ~~document~~
3206   copies for this ~~P~~printer.

3207
3208

6.2.1 ~~7.4.17~~ maximum-job-octets (positiveInteger)

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

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

6.2.1 ~~7.4.17~~ maximum-impressions (positiveInteger)

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

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

6.2.1 ~~7.4.17~~ maximum-media-sheets (positiveInteger)

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

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

6.2.1 ~~7.4.17~~ maximum-job-retention-period (deltaTime)

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

If this attribute is unspecified, then the Printe r places no limit
on the retention time.

6.2.1 ~~7.4.17~~ maximum-end-user-priority (type1Enum)

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

3253
3254   If this attribute is unspecified, then the Printer places no limit
3255   on the job-priority time.

3256
3257   The standard values are defined in the   section on the job-priority
3258   attribute.

3259
3260
3261 7.4.18 notification delivery methods supported
3262
3263 7.4.19 physical printers supported
3264
3265   This attribute identifies the physical printers (printer's
3266   realization attribute is either physical or logical   and physical)
3267   supported by this server.
3268
3269 7.4.20 Logical printers supported
3270
3271   This attribute identifies the logical printers (printer's
3272   realization attribute is e ither logical or logical and physical)
3273   supported by this server.
3274
3275 7.4.21 events supported
3276
3277   This attribute identifies the event types and event classes
3278   supported by this printer.
3279
3280 7.4.22 transfer methods supported
3281
3282   This attribute identifies the transfer   methods supported by this
3283   server.
3284
3285 7.4.23 locales supported
3286
3287   TBD
3288
3289 7.4.24 multiple documents supported
3290
3291   This attribute indicates whether this object (printer or server)
3292   is capable of processing and printing multiple documents per job.
3293
3294   This printershall not support any operation involving multiple
3295   documents unless this attribute has the value TRUE. In spite of
3296   this requirement, it is still a printer driver implementation
3297   option of whether to support modifying and/or cancelling
3298   individual documents within a multi   document job or not.
3299
3300 7.4.28 cancel individual document supported
3301
3302   This attribute indicates whether this object (printer or server)
3303   is capable of cancelling the printing of individual documents
3304   within a multiple document job.
3305
3306 7.4.29 modify individual document supported
3307

3308 ~~This attribute indicates whether the server is capable of~~
3309 ~~modifying the print request parameters for individual documents~~
3310 ~~within a multiple document job.~~
3311
3312 6.3 ~~7.5~~ Job Templates ~~Initial Value Job Attributes~~

3313

3314 The attributes for a Job Template ~~an Initial Value Job object~~ can
3315 be any of the Job object attributes defined in the section~~s:~~ ~~7.1.~~

3316
3317   Job Sheet Attributes
3318   Notification Attributes
3319   Job Scheduling Attributes
3320   (except job-print-after)
3321   Job Production Attributes
3322   (except page-select)
3323   Attributes for Conversion of Text Files
3324
3325 ~~7.6 Initial Value Document Attributes~~
3326
3327 ~~The attributes for an Initial Value Document object can be an y of~~
3328 ~~the Document object attributes defined in section 7.2.~~
3329
3330 6.3 ~~7.7~~ Conformance ~~Relationship to ISO/IEC 10175 Conformance Levels~~

3331

3332 ~~In ISO/IEC 10175 DPA Appendix E, three Conformance Levels are~~
3333 ~~defined. For levels 1 and 2, an additional set of attributes for~~
3334 ~~multiple document job support are defined. These additional~~
3335 ~~levels are indicated by the letter M. Thus, level 2M indicates~~
3336 ~~support for a basic set of operations and attributes with~~
3337 ~~additional support for multiple document jobs. The scope of LDPA~~
3338 ~~is essentially the same as level 2M as defined by DPA.~~
3339
3340 A conforming implementation shall implement all operations   ,
3341 objects and attributes defined in this document.

3342
3343 IPP~~LDPA~~ is explicitly designed to be extensible. This means that
3344 in addition to the attributes defined in this specification,
3345 specific implementation instances may support not only the basic
3346 protocol as defined in this specification, but might add vendor
3347 specific extentions.

3348
3349 Also, for the core set of attributes listed in this specification,
3350 it is not required that a conforming server support all (standard)
3351 values of all supported attributes. For example, it is not
3352 required that a printer implement all finishing methods indicated
3353 by the standard values.

3354
3355 The explicit requirement of the term "supported", with respect to
3356 one of the attributes that deal with printer functions or
3357 resources, is that the server shall recognize the attribute and
3358 those values that are supported, and shall be able to respond to a
3359 query about which values that printer does, in fact, support.

3360
3361
3362   7. Security Considerations

3363   This protocol does not identify any new authentication mechanisms.
3364   The authentication mechanisms built into HTTP (such as SSL and
3365   HTTPS) are recommended.

3366   This protocol does define a simple authorization mechanism by
3367   introducing the "end-user-acl" attribute as part of the Printer
3368   object. This ACL attribute is a multi-valued list of all of the
3369   authenticated names of end-users. This protocol does not spe cifiy
3370   what the domain is for names in this ACL attribute

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3410
3411
3412   ~~10. Author's Address~~

9. Author's Address

Scott A. Isaacson
Novell, Inc.
122 E 1700 S
Provo, UT   84606

    Phone: 801-861-7366
    Fax: 801 -861-4025
    EMail: scott_isaacson@novell.com

F. Devon Taylor
Novell, Inc.
122 E 1700 S
Provo, UT   84606

    Phone: 801-861-7179
    Fax: 801 -861-4025
    EMail: devon_taylor@novell.com

Mike MacKay
Novell, Inc.
2180 Fortune Dr.
San Jose, CA   95131

    Phone: 408-577-6368
    Fax: 408-577-5151
    EMail: mmackay@novell.com

Peter Zehler
Xerox Corporation
800 Phillips Rd. M/S 111-01X
Webster, NY 14580

    Phone: 716-265-8755
    Fax: 716-265-8792
    EMail: peter_zehler@wb.xerox.com

Carl-Uno Manros
Xerox Corporation
701 S. Aviation Blvd.
El Segundo, CA   90245

    Phone: 310-333-8273
    Fax: 310-333-5514
    EMail: cmanros@cp10.es.xerox.com

Tom Hastings
Xerox Corporation
701 S. Aviation Blvd.
El Segundo, CA   90245

    Phone: 310-333-6413
    Fax: 310-333-5514
    EMail: hastings@cp10.es.xerox.com

Robert Herriot
Sun Microsystems Inc.
2550 Garcia Ave., MPK-17

3471   Mountain View, CA 94043
3472
3473   Phone: 415-786-8995
3474   Fax: 415-786- 7077
3475   Email: robert.herriot@eng.sun.com
3476
3477   Roger deBry
3478   HUC/003 G
3479   IBM Corporation
3480   P.O. Box 1900
3481   Boulder, CO 80301-9191
3482
3483   Phone: (303) 924-4080
3484   Fax: (303) 924-9889
3485   Email: debry@vnet.ibm.com
3486

3487   10. Appendix A: Extended Operations

3488   The following symbols are used in the tables below:

3489   P   perform the operation directly
3490   PF   perform the operation; forward to Output Device sometimes
3491   UA   unsupported in an Output Device unless it supports queuing
3492   U   unsupported operation
3493
3494   Lower priority end user operations are:

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

3495
3496   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

3497
3498
3499   10.1 Modify Job Operation

3500   10.1.1 Modify Job Argument

3501   The following abstract data types are part of the Modify Job
3502   Argument (the attributes that can be modified may be severely
3503   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	

3504
3505   10.1.2 Modify Job Result

3506   The following abstract data types are part of the Modify Job
3507   Result:

Modify Status	Modify result attributes.
Errors	Optional Error Information

10.2 Resubmit Job Operation

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

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	

10.2.2 Resubmit Job Result

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

Resubmit Job Set	A set of jobs that were resubmitted. Ea ch 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