

Internet Printing Protocol Working Group  
INTERNET DRAFT  
Expires 27 October 2000

Pat Fleming  
IBM  
Ken Jones  
Sun Microsystems  
Harry Lewis  
IBM  
Ira McDonald  
High North Inc  
27 April 2000

Internet Printing Protocol (IPP):  
LDAP Schema for Printer Services  
<[draft-ietf-ipp-ldap-printer-schema-01.txt](#)>

Copyright (C) The Internet Society (2000). All Rights Reserved.

#### Status of This Memo

This document is an Internet-Draft and is in full conformance with all provisions of [Section 10 of RFC 2026](#). Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

The list of current Internet-Drafts can be accessed at  
<http://www.ietf.org/ietf/lid-abstracts.txt>

The list of Internet-Draft Shadow Directories can be accessed at  
<http://www.ietf.org/shadow.html>.

#### Abstract

This document defines a common printer schema for use with LDAP directories (a directory service supporting the Lightweight Directory Access Protocol (LDAP)). Using this common printer schema enables client applications to use LDAP to search for printers using application or user specified search criteria. Searches are defined based on the entry's type and attributes independent of the LDAP directory being used.

This document describes the LDAP schema, object classes and attributes, for printers and printer services. This document uses the printer attributes defined in [Appendix E](#) of [IPPMOD], the 'printer:' service template defined in [SLPPRT], and the mapping

between SLP service advertisements and LDAP descriptions of services defined in [[SLPLDAP](#)] to define an LDAP printer schema.

The goal of this document is to define a consistent schema to be used by printers and print servers. The LDAP printer schema described in this document MAY be used in part or whole.

## Table of Contents

<a href="#">1.</a>	Introduction .....	<a href="#">4</a>
<a href="#">2.</a>	Terminology .....	<a href="#">4</a>
<a href="#">3.</a>	Definition of Object Classes .....	<a href="#">5</a>
<a href="#">3.1.</a>	slpServicePrinter .....	<a href="#">6</a>
<a href="#">3.2.</a>	printerAbstract .....	<a href="#">6</a>
<a href="#">3.3.</a>	printerService .....	<a href="#">7</a>
<a href="#">3.4.</a>	printerServiceAuxClass .....	<a href="#">7</a>
<a href="#">3.5.</a>	printerIPP .....	<a href="#">8</a>
<a href="#">3.6.</a>	printerLPR .....	<a href="#">8</a>
<a href="#">4.</a>	Definition of Attribute Types .....	<a href="#">9</a>
<a href="#">4.1.</a>	printer-uri .....	<a href="#">10</a>
<a href="#">4.2.</a>	printer-xri-supported .....	<a href="#">10</a>
<a href="#">4.3.</a>	printer-name .....	<a href="#">11</a>
<a href="#">4.4.</a>	printer-natural-language-configured .....	<a href="#">12</a>
<a href="#">4.5.</a>	printer-location .....	<a href="#">12</a>
<a href="#">4.6.</a>	printer-info .....	<a href="#">12</a>
<a href="#">4.7.</a>	printer-more-info .....	<a href="#">13</a>
<a href="#">4.8.</a>	printer-make-and-model .....	<a href="#">13</a>
<a href="#">4.9.</a>	printer-ipp-versions-supported .....	<a href="#">13</a>
<a href="#">4.10.</a>	printer-multiple-document-jobs-supported .....	<a href="#">14</a>
<a href="#">4.11.</a>	printer-charset-configured .....	<a href="#">14</a>
<a href="#">4.12.</a>	printer-charset-supported .....	<a href="#">14</a>
<a href="#">4.13.</a>	printer-generated-natural-language-supported .....	<a href="#">15</a>
<a href="#">4.14.</a>	printer-document-format-supported .....	<a href="#">15</a>
<a href="#">4.15.</a>	printer-color-supported .....	<a href="#">15</a>
<a href="#">4.16.</a>	printer-compression-supported .....	<a href="#">15</a>
<a href="#">4.17.</a>	printer-pages-per-minute .....	<a href="#">16</a>
<a href="#">4.18.</a>	printer-pages-per-minute-color .....	<a href="#">16</a>
<a href="#">4.19.</a>	printer-finishings-supported .....	<a href="#">16</a>
<a href="#">4.20.</a>	printer-number-up-supported .....	<a href="#">17</a>
<a href="#">4.21.</a>	printer-sides-supported .....	<a href="#">17</a>
<a href="#">4.22.</a>	printer-media-supported .....	<a href="#">17</a>
<a href="#">4.23.</a>	printer-media-local-supported .....	<a href="#">17</a>
<a href="#">4.24.</a>	printer-resolution-supported .....	<a href="#">18</a>
<a href="#">4.25.</a>	printer-print-quality-supported .....	<a href="#">18</a>
<a href="#">4.26.</a>	printer-job-priority-supported .....	<a href="#">18</a>
<a href="#">4.27.</a>	printer-copies-supported .....	<a href="#">19</a>

<a href="#">4.28.</a>	printer-job-k-octets-supported .....	<a href="#">19</a>
<a href="#">4.29.</a>	printer-current-operator .....	<a href="#">19</a>
<a href="#">4.30.</a>	printer-service-person .....	<a href="#">20</a>
<a href="#">4.31.</a>	printer-delivery-orientation-supported .....	<a href="#">20</a>
<a href="#">4.32.</a>	printer-stacking-order-supported .....	<a href="#">20</a>
<a href="#">4.33.</a>	printer-output-features-supported .....	<a href="#">20</a>
<a href="#">5.</a>	Definition of Syntaxes .....	<a href="#">22</a>
<a href="#">6.</a>	IANA Considerations .....	<a href="#">22</a>
<a href="#">7.</a>	Internationalization Considerations .....	<a href="#">22</a>
<a href="#">8.</a>	Security Considerations .....	<a href="#">22</a>
<a href="#">9.</a>	References .....	<a href="#">22</a>
<a href="#">10.</a>	Acknowledgments .....	<a href="#">23</a>
<a href="#">11.</a>	Author's Addresses .....	<a href="#">24</a>

Fleming, Jones, Lewis, McDonald Expires 27 October 2000 [Page 2]

---

Internet Draft LDAP Schema for Printer Services 27 April 2000

<a href="#">12.</a>	Full Copyright Statement .....	<a href="#">25</a>
---------------------	--------------------------------	--------------------

## 1. Introduction

The use of directory services based on the Lightweight Directory Access Protocol [[RFC 2251](#)] is becoming increasingly popular for distributed services. To ensure interoperability between vendor implementations it is crucial to standardize the schemas which describe these services.

Under the auspices of the IETF IPP Working Group the IPP protocol is being developed to bring a standards based printing solution to the Internet.

Section 16 of [[IPPMOD](#)] describes a list of attributes which should be included in a general directory schema describing IPP print services. The syntax for each of these attributes is described in detail in [[IPPMOD](#)] and [[SLPPRT](#)]. This document will take these attributes and map them to LDAP attributes and object classes.

This document defines several object classes to provide LDAP applications with multiple options in defining printer information using LDAP schema. Classes are provided for defining directory entries with common printer information and for extending existing

directory entries with SLP, IPP, and LPR specific information.

## [2.](#) Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [[RFC 2119](#)].

## [3.](#) Definition of Object Classes

We define the following LDAP object classes for use with both generic printer related information and services specific to SLP, IPP, and LPR.

slpServicePrinter - auxiliary class for SLP registered printers  
printerAbstract - abstract class for all printer classes  
printerService - structural class for printers  
printerServiceAuxClass - auxiliary class for printers  
printerIPP - auxiliary class for IPP printers  
printerLPR - auxiliary class for LPR printers

The following are some examples of how applications MAY choose to use these classes when creating directory entries:

- 1) Use `printerService` for directory entries containing common printer information.
- 2) Use both `printerService` and `slpServicePrinter` for directory entries containing common printer information for SLP registered printers.
- 3) Use `printerService`, `printerLPR` and `printerIPP` for directory entries containing common printer information for printers that support both LPR and IPP.
- 4) Use `printerServiceAuxClass` and object classes not defined by this document for directory entries containing common printer information. In this example, `printerServiceAuxClass` is used for extending other structural classes defining printer information with common printer information defined in this document.

Note that specifying the abstract object class `printerAbstract` is OPTIONAL when using `printerService` or `printerServiceAuxClass` to create directory entries per [\[RFC 2251\]](#).

Refer to [section 4](#) for definition of attribute types referenced by these object classes. We use names instead of OIDs in MUST and MAY for clarity. Some attribute names described in [\[IPPMOD\]](#) have been prefixed with 'printer-' as recommended in [\[SLPPRT\]](#) and [\[SLPLDAP\]](#).

For the object classes defined in this section, schema developers MAY add to the list of MAY OIDs, but MUST NOT modify the list of MUST OIDs and MUST NOT remove OIDs from the list of MAY OIDs. Schema developers MAY derive additional classes from the abstract and structural classes defined in this section. Note, an object class definition SHOULD NOT be changed without having a new name and OID assigned to it.

### [3.1.](#) `slpServicePrinter`

This auxiliary class defines Service Location Protocol (SLP) specific information. It MUST be used with a structural class such as `printerService`. It MAY be used to create new or extend existing directory entries with SLP 'service:printer' abstract service type information as defined in [\[SLPPRT\]](#). This object class is derived

from 'slpService', the parent class for all SLP services, defined in [\[SLPLDAP\]](#).

```
( <id-oc>.8
NAME 'slpServicePrinter'
DESC 'Service Location Protocol (SLP) information.'
SUP   slpService
AUXILIARY
)
```

### [3.2.](#) printerAbstract

This abstract class defines printer information. It is a base class for deriving other printer related classes, such as, but not limited to, classes defined in this document. It defines a common set of printer attributes that are not specific to any one type of service, protocol or operating system.

```
( <id-oc>.9
NAME 'printerAbstract'
DESC 'Printer related information.'
ABSTRACT
SUP   top
MAY   ( printer-name $
        printer-natural-language-configured $
        printer-location $ printer-info $ printer-more-info $
        printer-make-and-model $
        printer-multiple-document-jobs-supported $
        printer-charset-configured $ printer-charset-supported $
        printer-generated-natural-language-supported $
        printer-document-format-supported $ printer-color-supported $
        printer-compression-supported $ printer-pages-per-minute $
        printer-pages-per-minute-color $
        printer-finishings-supported $ printer-number-up-supported $
        printer-sides-supported $ printer-media-supported $
        printer-media-local-supported $
        printer-resolution-supported $
        printer-print-quality-supported $
        printer-job-priority-supported $ printer-copies-supported $
        printer-job-k-octets-supported $ printer-current-operator $
```

```
printer-service-person $
printer-delivery-orientation-supported $
printer-stacking-order-supported $
```

```
        printer-output-features-supported )
    )
```

### [3.3.](#) printerService

This structural class defines printer information. It is derived from class printerAbstract and thus inherits common printer attributes. This class can be used with or without auxiliary classes to define printer information. Auxiliary classes can be used to extend the common printer information with protocol, service or operating system specific information. Note that when extending other structural classes with auxiliary classes, printerService MUST NOT be used.

LDAP applications SHOULD use printer-uri as the naming attribute. That is, when using printerService, printer-uri SHOULD be used as the attribute type of the directory entry's relative distinguished name (RDN). printer-uri uniquely identifies each of the printer services for a given printer. Note that if the printer service changes domains, printer-uri must be updated with the new domain name.

```
( <id-oc>.10
NAME 'printerService'
DESC 'Printer information.'
SUP  printerAbstract
MAY  ( printer-uri $ printer-xri-supported )
STRUCTURAL
)
```

### [3.4.](#) printerServiceAuxClass

This auxiliary class defines printer information. It is derived from class printerAbstract and thus inherits common printer attributes. This class MUST be used with a structural class.

LDAP applications SHOULD use printer-uri as the naming attribute. That is, when using printerService, printer-uri SHOULD be used as the attribute type of the directory entry's relative distinguished name (RDN). printer-uri uniquely identifies each of the printer services for a given printer. Note that if the printer service changes domains, printer-uri must be updated with the new domain name.

```
( <id-oc>.11
NAME 'printerServiceAuxClass'
DESC 'Printer information.'
SUP  printerAbstract
```



```
MAY    ( printer-uri $ printer-xri-supported )  
AUXILIARY  
)
```

### [3.5.](#) printerIPP

This auxiliary class defines Internet Printing Protocol (IPP) information. It MUST be used with a structural class such as printerService. It is used to extend structural classes with IPP specific printer information.

```
( <id-oc>.12  
NAME 'printerIPP'  
DESC 'Internet Printing Protocol (IPP) information.'  
SUP   top  
AUXILIARY  
MAY    ( printer-ipp-versions-supported $  
          printer-multiple-document-jobs-supported )  
)
```

### [3.6.](#) printerLPR

This auxiliary class defines LPR information. It MUST be used with a structural class such as printerService. It is used to identify directory entries that support LPR.

```
( <id-oc>.13  
NAME 'printerLPR'  
DESC 'LPR information.'  
SUP   top  
AUXILIARY  
)
```

#### 4. Definition of Attribute Types

The following attribute types are referenced by the object classes defined in [section 3](#).

The following table is a summary of the attribute names referenced by this document and their corresponding names from [\[IPPMOD\]](#). Some attribute names described in [\[IPPMOD\]](#) have been prefixed with 'printer-' as recommended in [\[SLPLDAP\]](#), to address the flat namespace for LDAP identifiers.

LDAP & SLP Printer Schema	IPP Model <a href="#">[IPPMOD]</a>
-----	-----
printer-uri	
printer-xri-supported	
	[IPP printer-uri-supported]
	[IPP uri-authentication-supported]
	[IPP uri-security-supported]
printer-name	printer-name
printer-natural-language-configured	
	natural-language-configured
printer-location	printer-location
printer-info	printer-info
printer-more-info	printer-more-info
printer-make-and-model	printer-make-and-model
printer-ipp-versions-supported	ipp-versions-supported
printer-multiple-document-jobs-supported	
	multiple-document-jobs-supported
printer-charset-configured	charset-configured
printer-charset-supported	charset-supported
printer-generated-natural-language-supported	
	generated-natural-language-supported
printer-document-format-supported	
	document-format-supported
printer-color-supported	color-supported
printer-compression-supported	compression-supported
printer-pages-per-minute	pages-per-minute
printer-pages-per-minute-color	pages-per-minute-color
printer-finishings-supported	finishings-supported

printer-number-up-supported	number-up-supported
printer-sides-supported	sides-supported
printer-media-supported	media-supported
printer-media-local-supported	[site names from IPP media-supported]
printer-resolution-supported	printer-resolution-supported
printer-print-quality-supported	print-quality-supported
printer-job-priority-supported	job-priority-supported
printer-copies-supported	copies-supported
printer-job-k-octets-supported	job-k-octets-supported
printer-current-operator	

Fleming, Jones, Lewis, McDonald

Expires 27 October 2000

[Page 9]

Internet Draft

LDAP Schema for Printer Services

27 April 2000

```

printer-service-person
printer-delivery-orientation-supported
printer-stacking-order-supported
printer-output-features-supported

```

In the following definitions, we use matching rule names instead of OIDs for clarity. Note that if the printer information is not known, the attribute value is not set (for optional attributes). In the following definitions, referenced matching rules are defined in [section 8 of \[RFC 2252\]](#).

The following definitions reference syntax OIDs as defined in [RFC 2252], which are summarized below:

Syntax OID	Syntax Description
-----	-----
1.3.6.1.4.1.1466.115.121.1.7	Boolean
1.3.6.1.4.1.1466.115.121.1.15	Directory String (UTF-8 <a href="#">[RFC 2279]</a> )
1.3.6.1.4.1.1466.115.121.1.27	Integer

#### [4.1.](#) printer-uri

Note, that for SLP registered printers, the LDAP printer-uri attribute should set to the value of the registered URL of the printer.

```

( <id-at>.1
NAME 'printer-uri'
DESC 'The URI supported by this printer.'
EQUALITY caseIgnoreMatch
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15

```

SINGLE-VALUE

)

#### [4.2.](#) printer-xri-supported

A list of XRI (extended resource identifiers) supported by this printer. Each value of this list consists of a URI (uniform resource identifier) followed by optional authentication and security metaparameters. The keywords for URI and their metaparameters are:

'uri' == IPP 'printer-uri-supported' value

'auth' == IPP 'uri-authentication-supported' value

'sec' == IPP 'uri-security-supported' value

Legal values of the 'auth' metaparameter include

'none' (no authentication for this URI)

'requesting-user-name' (from operation request)

'basic' (HTTP/1.1 Basic [[RFC 2617](#)])

Fleming, Jones, Lewis, McDonald

Expires 27 October 2000

[Page 10]

---

Internet Draft

LDAP Schema for Printer Services

27 April 2000

'digest' (HTTP/1.1 Basic, [[RFC 2617](#)])

'certificate' (from certificate)

per IPP Model [3] (extensions MAY also be used). A missing 'auth' metaparameter SHALL mean 'none'. Legal values of the 'sec' metaparameter include

'none' (no security for this URI)

'ssl3' (Netscape SSL3)

'tls' (IETF TLS/1.0, [[RFC 2246](#)])

per IPP Model [3] (extensions MAY also be used). A missing 'sec' metaparameter SHALL mean 'none'. Each metaparameter of a list member is delimited by '<'. For example:

'uri=ipp://foo.com< auth=digest< sec=tls<'

'uri=lpr://bar.com< auth=none< sec=none<'

Registrations MAY consolidate values for metaparameters, as in the following example:

'uri=ipp://foo.com< auth=basic,digest< sec=tls,ssl3<'

( <id-at>.2

NAME 'printer-xri-supported'

DESC 'The unordered list of XRI (extended resource identifiers) supported by this printer. Each member of the list consists of a URI (uniform resource identifier) followed by optional authentication and security metaparameters.'

EQUALITY caseIgnoreMatch

ORDERING caseIgnoreOrderingMatch

SUBSTR caseIgnoreSubstringMatch

SYNTAX 1.3.6.1.4.1.1466.115.121.1.15

)

#### [4.3.](#) printer-name

The site-specific administrative name of this printer. This value of this attribute SHOULD be in the language specified in 'printer-natural-language-configured' (although the printer's name may be in any language). This name MAY be the last part of the printer's URI or it MAY be completely unrelated. This name MAY contain characters that are not allowed in a conventional URI (which conforms to [[RFC 2396](#)]).

```
( <id-at>.3
NAME 'printer-name'
DESC 'The site-specific administrative name of this printer, more
      end-user friendly than a URI.'
EQUALITY caseIgnoreMatch
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{127}
SINGLE-VALUE
)
```

Fleming, Jones, Lewis, McDonald Expires 27 October 2000 [Page 11]

---

Internet Draft LDAP Schema for Printer Services 27 April 2000

#### [4.4.](#) printer-natural-language-configured

```
( <id-at>.4
NAME 'printer-generated-natural-language-configured'
DESC 'The configured language in which error and status messages will
      be generated (by default) by this printer. Also, a possible
      language for printer string attributes set by operator, system
      administrator, or manufacturer. Also, the (declared) language
      of the "printer-name", "printer-location", "printer-info", and
      "printer-make-and-model" attributes of this printer. For
      example: "en-us" (US English) or "fr-fr" (French in France)
      Legal values of language tags conform to [RFC 1766] "Tags for
      the Identification of Languages".'
EQUALITY caseIgnoreMatch
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{127}
SINGLE-VALUE
```

)

#### [4.5.](#) printer-location

```
( <id-at>.5
NAME 'printer-location'
DESC 'Identifies the location of the printer. This could include
      things like: "in Room 123A", "second floor of building XYZ".'
EQUALITY caseIgnoreMatch
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{127}
SINGLE-VALUE
)
```

#### [4.6.](#) printer-info

```
( <id-at>.6
NAME 'printer-info'
DESC 'Identifies the descriptive information about this printer.
      This could include things like: "This printer can be used for
      printing color transparencies for HR presentations", or "Out
      of courtesy for others, please print only small (1-5 page) jobs
      at this printer", or even "This printer is going away on July
      1, 1997, please find a new printer".'
EQUALITY caseIgnoreMatch
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{127}
```

Fleming, Jones, Lewis, McDonald Expires 27 October 2000 [Page 12]

---

Internet Draft LDAP Schema for Printer Services 27 April 2000

```
SINGLE-VALUE
)
```

#### [4.7.](#) printer-more-info

```
( <id-at>.7
NAME 'printer-more-info'
DESC 'A URI used to obtain more information about this specific
      printer. For example, this could be an HTTP type URI
      referencing an HTML page accessible to a Web Browser. The
      information obtained from this URI is intended for end user
      consumption.'
```

```
EQUALITY caseIgnoreMatch
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15
SINGLE-VALUE
)
```

#### [4.8.](#) printer-make-and-model

```
( <id-at>.8
NAME 'printer-make-and-model'
DESC 'Identifies the make and model of the device. The device
      manufacturer may initially populate this attribute.'
EQUALITY caseIgnoreMatch
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{127}
SINGLE-VALUE
)
```

#### [4.9.](#) printer-ipp-versions-supported

```
( <id-at>.9
NAME 'printer-ipp-versions-supported'
DESC 'Identifies the IPP protocol version(s) that this printer
      supports, including major and minor versions, i.e., the version
      numbers for which this Printer implementation meets the
      conformance requirements.'
EQUALITY caseIgnoreMatch
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{127}
)
```

#### [4.10.](#) printer-multiple-document-jobs-supported

```
( <id-at>.10
NAME 'printer-multiple-document-jobs-supported'
```

```

DESC 'Indicates whether or not the printer supports more than one
      document per job, i.e., more than one Send-Document or
      Send-Data operation with document data.'
EQUALITY booleanMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.7
SINGLE-VALUE
)

```

#### [4.11.](#) printer-charset-configured

```

( <id-at>.11
NAME 'printer-charset-configured'
DESC 'The configured charset in which error and status messages will
      be generated (by default) by this printer. Also, a possible
      charset for printer string attributes set by operator, system
      administrator, or manufacturer. For example: "utf-8" (ISO
      10646/Unicode) or "iso-8859-1" (Latin1). Legal values are
      defined by the IANA Registry of Coded Character Sets and the
      "(preferred MIME name)" SHALL be used as the tag. For
      coherence with IPP Model, charset tags in this attribute SHALL
      be lowercase normalized. This attribute SHOULD be static (time
      of registration) and SHOULD NOT be dynamically refreshed
      (subsequently).'
EQUALITY caseIgnoreMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{63}
SINGLE-VALUE
)

```

#### [4.12.](#) printer-charset-supported

```

( <id-at>.12
NAME 'printer-charset-supported'
DESC 'Identifies the set of charsets supported for attribute type
      values of type Directory String for this directory entry. For
      example: "utf-8" (ISO 10646/Unicode) or "iso-8859-1" (Latin1).
      Legal values are defined by the IANA Registry of Coded
      Character Sets and the preferred MIME name.'
EQUALITY caseIgnoreMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{63}
)

```



#### [4.13.](#) printer-generated-natural-language-supported

```
( <id-at>.13
NAME 'printer-generated-natural-language-supported'
DESC 'Identifies the natural language(s) supported for this directory
      entry.  For example: "en-us" (US English) or "fr-fr" (French in
      France).  Legal values conform to [RFC 1766], Tags for the
      Identification of Languages.'
EQUALITY caseIgnoreMatch
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{63}
)
```

#### [4.14.](#) printer-document-format-supported

```
( <id-at>.14
NAME 'printer-document-format-supported'
DESC 'The possible document formats in which data may be interpreted
      and printed by this printer.  Legal values are MIME types come
      from the IANA Registry of Internet Media Types.'
EQUALITY caseIgnoreMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{127}
)
```

#### [4.15.](#) printer-color-supported

```
( <id-at>.15
NAME 'printer-color-supported'
DESC 'Indicates whether this printer is capable of any type of color
      printing at all, including highlight color.'
EQUALITY booleanMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.7
SINGLE-VALUE
)
```

#### [4.16.](#) printer-compression-supported

```
( <id-at>.16
NAME 'printer-compression-supported'
DESC 'Compression algorithms supported by this printer.  For example:
      "deflate, gzip".  Legal values include; "none", "deflate"
      (public domain ZIP), "gzip" (GNU ZIP), "compress" (UNIX).'
EQUALITY caseIgnoreMatch
```

Internet Draft

LDAP Schema for Printer Services

27 April 2000

```
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{255}
)
```

#### [4.17.](#) printer-pages-per-minute

```
( <id-at>.17
NAME 'printer-pages-per-minute'
DESC 'The nominal number of pages per minute which may be output by
      this printer (e.g., a simplex or black-and-white printer).
      This attribute is informative, NOT a service guarantee.
      Typically, it is the value used in marketing literature to
      describe this printer.'
EQUALITY integerMatch
ORDERING integerOrderingMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.27
SINGLE-VALUE
)
```

#### [4.18.](#) printer-pages-per-minute-color

```
( <id-at>.18
NAME 'printer-pages-per-minute-color'
DESC 'The nominal number of color pages per minute which may be
      output by this printer (e.g., a simplex or color printer).
      This attribute is informative, NOT a service guarantee.
      Typically, it is the value used in marketing literature to
      describe this printer.'
EQUALITY integerMatch
ORDERING integerOrderingMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.27
SINGLE-VALUE
)
```

#### [4.19.](#) printer-finishings-supported

```
( <id-at>.19
NAME 'printer-finishings-supported'
DESC 'The possible finishing operations supported by this printer.
      Legal values include; "none", "staple", "punch", "cover",
      "bind", "saddle-stitch", "edge-stitch", "staple-top-left",
```

```

        "staple-bottom-left", "staple-top-right",
        "staple-bottom-right", "edge-stitch-left", "edge-stitch-top",
        "edge-stitch-right", "edge-stitch-bottom", "staple-dual-left",
        "staple-dual-top", "staple-dual-right", "staple-dual-bottom".'
EQUALITY caseIgnoreMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{255}
)

```

#### [4.20.](#) printer-number-up-supported

```

( <id-at>.20
NAME 'printer-number-up-supported'
DESC 'The possible numbers of print-stream pages to impose upon a
      single side of an instance of a selected medium. Legal values
      include; 1, 2, and 4. Implementations may support other
      values.'
EQUALITY integerMatch
ORDERING integerOrderingMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.27
)

```

#### [4.21.](#) printer-sides-supported

```

( <id-at>.21
NAME 'printer-sides-supported'
DESC 'The number of impression sides (one or two) and the two-sided
      impression rotations supported by this printer. Legal values
      include; "one-sided", "two-sided-long-edge",
      "two-sided-short-edge".'
EQUALITY caseIgnoreMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{127}
)

```

#### [4.22.](#) printer-media-supported

```

( <id-at>.22
NAME 'printer-media-supported'
DESC 'The standard names/types/sizes (and optional color suffixes) of
      the media supported by this printer. For example: "iso-a4",

```

"envelope", or "na-letter-white". Legal values conform to ISO 10175, Document Printing Application (DPA), and any IANA registered extensions.'

EQUALITY caseIgnoreMatch  
 SUBSTR caseIgnoreSubstringMatch  
 SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{255}  
 )

#### [4.23.](#) printer-media-local-supported

( <id-at>.23  
 NAME 'printer-media-local-supported'  
 DESC 'Site-specific names of media supported by this printer, in the language in "printer-generated-natural-language-configured".

Fleming, Jones, Lewis, McDonald Expires 27 October 2000 [Page 17]

---

Internet Draft LDAP Schema for Printer Services 27 April 2000

For example: "purchasing-form" (site-specific name) as opposed to (in "printer-media-supported"): "na-letter" (standard keyword from ISO 10175).'

EQUALITY caseIgnoreMatch  
 SUBSTR caseIgnoreSubstringMatch  
 SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{255}  
 )

#### [4.24.](#) printer-resolution-supported

( <id-at>.24  
 NAME 'printer-resolution-supported'  
 DESC 'List of resolutions supported for printing documents by this printer. Each resolution value is a string with 3 fields:  
 1) Cross feed direction resolution (positive integer), 2) Feed direction resolution (positive integer), 3) Resolution unit. Legal values are "dpi" (dots per inch) and "dpcm" (dots per centimeter). Each resolution field is delimited by ">". For example: "300> 300> dpi>".'  
 EQUALITY caseIgnoreMatch  
 SUBSTR caseIgnoreSubstringMatch  
 SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{255}  
 )

#### [4.25.](#) printer-print-quality-supported

( <id-at>.25

```

NAME 'printer-print-quality-supported'
DESC 'List of print qualities supported for printing documents on
      this printer.  For example: "draft, normal".  Legal values
      include; "unknown", "draft", "normal", "high".'
```

EQUALITY caseIgnoreMatch  
SUBSTR caseIgnoreSubstringMatch  
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{127}  
)

#### [4.26.](#) printer-job-priority-supported

```

( <id-at>.26
NAME 'printer-job-priority-supported'
DESC 'Indicates the number of job priority levels supported.  An IPP
      conformant printer which supports job priority must always
      support a full range of priorities from "1" to "100" (to ensure
      consistent behavior), therefore this attribute describes the
      "granularity".  Legal values of this attribute are from "1" to
      "100".'
```

EQUALITY integerMatch  
ORDERING integerOrderingMatch

Fleming, Jones, Lewis, McDonald Expires 27 October 2000 [Page 18]

---

Internet Draft LDAP Schema for Printer Services 27 April 2000

```

SYNTAX 1.3.6.1.4.1.1466.115.121.1.27
SINGLE-VALUE
)
```

#### [4.27.](#) printer-copies-supported

```

( <id-at>.27
NAME 'printer-copies-supported'
DESC 'The maximum number of copies of a document that may be printed
      as a single job.  A value of "0" indicates no maximum limit.  A
      value of "-1" indicates unknown.'
```

EQUALITY integerMatch  
ORDERING integerOrderingMatch  
SYNTAX 1.3.6.1.4.1.1466.115.121.1.27  
SINGLE-VALUE  
)

#### [4.28.](#) printer-job-k-octets-supported

```

( <id-at>.28
```

```

NAME 'printer-job-k-octets-supported'
DESC 'The maximum size in kilobytes (1,024 octets actually) incoming
      print job that this printer will accept.  A value of "0"
      indicates no maximum limit.  A value of "-1" indicates
      unknown.'
EQUALITY integerMatch
ORDERING integerOrderingMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.27
SINGLE-VALUE
)

```

#### [4.29.](#) printer-current-operator

```

( <id-at>.29
NAME 'printer-current-operator'
DESC 'The name of the current human operator responsible for
      operating this printer.  It is suggested that this string
      include information that would enable other humans to reach the
      operator, such as a phone number.'
EQUALITY caseIgnoreMatch
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{127}
SINGLE-VALUE
)

```

#### [4.30.](#) printer-service-person

```

( <id-at>.30
NAME 'printer-service-person'
DESC 'The name of the current human service person responsible for
      servicing this printer.  It is suggested that this string
      include information that would enable other humans to reach the
      service person, such as a phone number.'
EQUALITY caseIgnoreMatch
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{127}
SINGLE-VALUE
)

```

)

#### [4.31.](#) printer-delivery-orientation-supported

```
( <id-at>.31
NAME 'printer-delivery-orientation-supported'
DESC 'The possible delivery orientations of pages as they are printed
      and ejected from this printer. Legal values include;
      "unknown", "face-up", and "face-down".'
EQUALITY caseIgnoreMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{127}
)
```

#### [4.32.](#) printer-stacking-order-supported

```
( <id-at>.32
NAME 'printer-stacking-order-supported'
DESC 'The possible stacking order of pages as they are printed and
      ejected from this printer. Legal values include; "unknown",
      "first-to-last", "last-to-first".'
EQUALITY caseIgnoreMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{127}
)
```

#### [4.33.](#) printer-output-features-supported

```
( <id-at>.33
NAME 'printer-output-features-supported'
DESC 'The possible output features supported by this printer. Legal
      values include; "unknown", "bursting", "decollating",
      "page-collating", "offset-stacking".'
)
```

Fleming, Jones, Lewis, McDonald Expires 27 October 2000 [Page 20]

---

Internet Draft LDAP Schema for Printer Services 27 April 2000

```
EQUALITY caseIgnoreMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{127}
)
```





## 5. Definition of Syntaxes

No new syntaxes are defined by this document.

## 6. IANA Considerations

There are no IANA registration considerations defined by this document.

## 7. Internationalization Considerations

All text string attribute values in objects of the `printerService` class MUST be encoded in UTF-8 [[RFC 2279](#)] characters, as required by the syntax 'Directory String' [[RFC 2252](#)]. Also, a language tag for all of the text string attributes in objects of the `printerService` class SHOULD be supplied in 'printer-natural-language-configured'. Therefore, all objects of the `printerService` class conform to "IETF Policy on Character Sets and Languages" [[RFC 2277](#)].

## 8. Security Considerations

As with any LDAP schema, it is important to protect specific entries and attributes with the appropriate access control. It is particularly important that only administrators can modify entries defined in this schema. For additional considerations of deploying printers in an IPP environment the reader is referred to section 8 of [[IPPMOD](#)].

By advertising the security methods for each supported printer URL the printer may expose information useful to attackers. Suitable security methods SHOULD be used to authenticate any service advertisements.

Obtaining a reference to an object and storing it in the directory may make a handle to the object available to a wider audience. This may have security implications.

## 9. References

[IPPMOD] deBry, Hastings, Herriot, Isaacson, Powell. Internet Printing Protocol/1.1: Model and Semantics, [<draft-ietf-ipp-model-v11-06.txt>](#), (work in progress), March 2000.

Internet Draft

LDAP Schema for Printer Services

27 April 2000

[SLPPRT] St. Pierre, Isaacson, McDonald. Definition of the Printer Abstract Service Type v2.0, <[draft-ietf-svrlloc-printer-schema-06.txt](#)>, (work in progress), March 2000.

[SLPLDAP] Kempf, Moats, St. Pierre. Conversion of LDAP Schemas to and from SLP Templates, <[draft-ietf-svrlloc-template-conversion-05.txt](#)>, (work in progress), October 1999.

[RFC 1179] McLaughlin. Line Printer Daemon Protocol, [RFC 1179](#), August 1990.

[RFC 1766] Alvestrand. Tags for the Identification of Languages, [RFC 1766](#). March 1995.

[RFC 2119] Bradner. Key words for use in RFCs to Indicate Requirement Levels, [RFC 2119](#), March 1997.

[RFC 2246] Dierks, Allen. TLS Protocol Version 1.0, [RFC 2246](#), January 1999.

[RFC 2251] Wahl, Howes, Kille. Lightweight Directory Access Protocol (v3), [RFC 2251](#), December 1997.

[RFC 2252] Wahl, Coulbeck, Howes, Kille. Lightweight Directory Access Protocol (v3): Attribute Syntax Definitions, [RFC 2252](#), December 1997.

[RFC 2277] Alvestrand. IETF Policy on Character Sets and Languages, [RFC 2277](#), January 1998.

[RFC 2279] Yergeau. UTF-8, a Transformation Format of ISO 10646, [RFC 2279](#), January 1998.

[RFC 2307] Howard. An Approach for Using LDAP as a Network Information Service, [RFC 2307](#), March 1998.

[RFC 2396] Berners-Lee, Fielding, Masinter. URI Generic Syntax, [RFC 2396](#), August 1998.

## 10. Acknowledgments

This document is a submission to the IPP Working group.

Thanks to Kimberly Reger (IBM), Robert Moore (IBM) and Lee Rafalow (IBM) for their review comments and help in preparing this document.

Fleming, Jones, Lewis, McDonald      Expires 27 October 2000      [Page 23]

---

Internet Draft      LDAP Schema for Printer Services      27 April 2000

## 11. Author's Addresses

Pat Fleming  
IBM  
Highway 52 N.  
Rochester, MN 55901  
USA  
Phone: 507-253-7583  
EMail: flemingp@us.ibm.com

Ken Jones  
Sun Microsystems Inc.  
17 Network Circle  
Menlo Park, CA 94025  
USA  
Phone: +1 650 786 4164  
EMail: kenjones@eng.sun.com

Harry Lewis  
IBM  
6300 Diagonal Hwy  
Boulder, CO 80301  
USA  
Phone: 303-924-5337  
EMail: harryl@us.ibm.com

Ira McDonald  
High North Inc  
221 Ridge Ave  
Grand Marais, MI 49839  
USA  
Phone: 906-494-2434 (or 2697)  
Email: imcdonald@sharplabs.com  
Email: imcdonal@sdsp.mc.xerox.com

## [12.](#) Full Copyright Statement

Copyright (C) The Internet Society (2000). All Rights Reserved.

This document and translations of it may be copied and furnished to others, and derivative works that comment on or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and this paragraph are included on all such copies and derivative works. However, this document itself may not be modified in any way, such as by removing the copyright notice or references to the Internet Society or other Internet organizations, except as needed for the purpose of developing Internet standards in which case the procedures for copyrights defined in the Internet Standards process must be followed, or as required to translate it into languages other than English.

The limited permissions granted above are perpetual and will not be revoked by the Internet Society or its successors or assigns.

This document and the information contained herein is provided on an "AS IS" basis and THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE."

Fleming, Jones, Lewis, McDonald

Expires 27 October 2000

[Page 25]