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Internet Printing Protocol (IPP): LDAP Schema for Printer Services

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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 SLP printer templates. 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.

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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.

An additional object class, sunPrinter, is defined to illustrate how Sun Microsystems will support its current installed base. These systems currently use a "nameservice" to obtain information about printers. The nameservice may be, at its simplest, a collection of files in the local filesystem which are opened and searched. Other nameservices include the Network Information Name Service (NIS) and the next version of this product (NIS+). Printer information which is now being kept in these nameservices will be available in LDAP through the use of this Sun specific object class. This extends current support for [RFC 2307]. The reader is encouraged to refer to this RFC for more information regarding LDAP as a nameservice. Extensions for similar mapping of nameservices to LDAP are anticipated on various other operating system platforms.

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, LPR and Sun Microsystems.

slpServicePrinter - auxiliary class for SLP registered printers
servicePrinter - 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
sunPrinter - auxiliary class for Sun Microsystems 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 the use of the abstract object class servicePrinter 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 modify the list of MAY OIDs, but MUST NOT modify the list of MUST 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].

```
( 1.3.6.1.4.1.42.2.27.5.2.8
NAME 'slpServicePrinter'
DESC 'Service Location Protocol (SLP) information.'
SUP slpService
AUXILIARY
)
```

3.2. servicePrinter

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.

```
( 1.3.6.1.4.1.42.2.27.5.2.9
NAME 'servicePrinter'
DESC 'Printer related information.'
ABSTRACT
SUP top
MUST ( printer-uri $ printer-xri-supported $ printer-name )
MAY ( 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 servicePrinter 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 MUST be used as the attribute type of the directory entry's relative distinguished name (RDN).

```
( 1.3.6.1.4.1.42.2.27.5.2.10
NAME  'printerService'
DESC  'Printer information.'
SUP   servicePrinter
STRUCTURAL
)
```

3.4. printerServiceAuxClass

This auxiliary class defines printer information. It is derived from class servicePrinter and thus inherits common printer attributes. This class MUST be used with a structural class, such as printerService.

```
( 1.3.6.1.4.1.42.2.27.5.2.11
NAME  'printerServiceAuxClass'
DESC  'Printer information.'
SUP   servicePrinter
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.

```
( 1.3.6.1.4.1.42.2.27.5.2.12
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 extend structural classes with LPR specific printer information.

```
( 1.3.6.1.4.1.42.2.27.5.2.13
NAME  'printerLPR'
DESC  'LPR information.'
SUP   top
AUXILIARY
)
```

3.7. sunPrinter

Current Sun Microsystems print implementations use the Line Printer Daemon (LPD) Protocol described in [RFC 1179] to communicate between print clients and servers. In addition to this print clients make use of nameservices to obtain information about the printer. It is desirable to extend the current print client nameservice support to include LDAP while keeping existing functionality. This is done by defining a Sun specific object class. The "sunPrinter" object contains two attributes. The sun-printer-bsdaddr attribute identifies the server host name associated with a print queue and whether or not Solaris specific extensions to the LPD protocol should be generated. The second attribute sun-printer-kvp contains a set of key values pairs. These values may have meaning to the print subsystem or they may be user defined.

```
( 1.3.6.1.4.1.42.2.27.5.2.14
NAME 'sunPrinter'
DESC 'Sun printer information'
SUP  top
AUXILIARY
MAY  ( sun-printer-bsdaddr $ sun-printer-kvp )
)
```

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 [IPPMOD]
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	

printer-service-person
printer-delivery-orientation-supported
printer-stacking-order-supported
printer-output-features-supported
sun-printer-bsdaddr
sun-print-kvp

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 [RFC 2279])
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.

```
( 1.3.6.1.4.1.42.2.27.5.1.30
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])
'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<'

```
( 1.3.6.1.4.1.42.2.27.5.1.31
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]).

```
( 1.3.6.1.4.1.42.2.27.5.1.32
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
   )
```

4.4. printer-natural-language-configured

```
   ( 1.3.6.1.4.1.42.2.27.5.1.33
   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

```
   ( 1.3.6.1.4.1.42.2.27.5.1.34
   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

```
   ( 1.3.6.1.4.1.42.2.27.5.1.35
   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}
   SINGLE-VALUE
   )
```

4.7. printer-more-info

```
   ( 1.3.6.1.4.1.42.2.27.5.1.36
   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 caseExactMatch
   ORDERING caseExactOrderingMatch
   SUBSTR caseExactSubstringMatch
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.15
   SINGLE-VALUE
   )
```

4.8. printer-make-and-model

```
   ( 1.3.6.1.4.1.42.2.27.5.1.37
   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

```
   ( 1.3.6.1.4.1.42.2.27.5.1.38
   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

```
( 1.3.6.1.4.1.42.2.27.5.1.39
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

```
( 1.3.6.1.4.1.42.2.27.5.1.40
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
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{63}
SINGLE-VALUE
)
```

4.12. printer-charset-supported

```
( 1.3.6.1.4.1.42.2.27.5.1.41
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
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{63}
```

```
   )
```

4.13. printer-generated-natural-language-supported

```
   ( 1.3.6.1.4.1.42.2.27.5.1.42
   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

```
   ( 1.3.6.1.4.1.42.2.27.5.1.43
   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
   ORDERING caseIgnoreOrderingMatch
   SUBSTR caseIgnoreSubstringMatch
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{127}
   )
```

4.15. printer-color-supported

```
   ( 1.3.6.1.4.1.42.2.27.5.1.44
   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

```
   ( 1.3.6.1.4.1.42.2.27.5.1.45
   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
   ORDERING caseIgnoreOrderingMatch
   SUBSTR caseIgnoreSubstringMatch
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{255}
   )
```

4.17. printer-pages-per-minute

```
   ( 1.3.6.1.4.1.42.2.27.5.1.46
   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

```
   ( 1.3.6.1.4.1.42.2.27.5.1.47
   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

```
   ( 1.3.6.1.4.1.42.2.27.5.1.48
   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
```

```
   ORDERING caseIgnoreOrderingMatch
   SUBSTR caseIgnoreSubstringMatch
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{255}
   )
```

4.20. printer-number-up-supported

```
   ( 1.3.6.1.4.1.42.2.27.5.1.49
   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

```
   ( 1.3.6.1.4.1.42.2.27.5.1.50
   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
   ORDERING caseIgnoreOrderingMatch
   SUBSTR caseIgnoreSubstringMatch
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{127}
   )
```

4.22. printer-media-supported

```
   ( 1.3.6.1.4.1.42.2.27.5.1.51
   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
   ORDERING caseIgnoreOrderingMatch
   SUBSTR caseIgnoreSubstringMatch
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{255}
   )
```

4.23. printer-media-local-supported

```
( 1.3.6.1.4.1.42.2.27.5.1.52
NAME 'printer-media-local-supported'
DESC 'Site-specific names of media supported by this printer, in the
      language in "printer-generated-natural-language-configured".
      For example: "purchasing-form" (site-specific name) as opposed
      to (in "printer-media-supported"): "na-letter" (standard
      keyword from ISO 10175).'
EQUALITY caseIgnoreMatch
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{255}
)
```

4.24. printer-resolution-supported

```
( 1.3.6.1.4.1.42.2.27.5.1.53
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
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{255}
)
```

4.25. printer-print-quality-supported

```
( 1.3.6.1.4.1.42.2.27.5.1.54
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
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{127}
)
```

4.26. printer-job-priority-supported

```
( 1.3.6.1.4.1.42.2.27.5.1.55
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
SYNTAX 1.3.6.1.4.1.1466.115.121.1.27
SINGLE-VALUE
)
```

4.27. printer-copies-supported

```
( 1.3.6.1.4.1.42.2.27.5.1.56
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

```
( 1.3.6.1.4.1.42.2.27.5.1.57
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

```
( 1.3.6.1.4.1.42.2.27.5.1.58
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

```
( 1.3.6.1.4.1.42.2.27.5.1.59
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

```
( 1.3.6.1.4.1.42.2.27.5.1.60
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
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{127}
)
```

4.32. printer-stacking-order-supported

```
( 1.3.6.1.4.1.42.2.27.5.1.61
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
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{127}
)
```

4.33. printer-output-features-supported

```
( 1.3.6.1.4.1.42.2.27.5.1.62
NAME 'printer-output-features-supported'
DESC 'The possible output features supported by this printer. Legal
      values include; "unknown", "bursting", "decollating",
      "page-collating", "offset-stacking".'
EQUALITY caseIgnoreMatch
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{127}
)
```

4.34. sun-printer-bsdaddr

```
( 1.3.6.1.4.1.42.2.27.5.1.63
NAME 'sun-printer-bsdaddr'
DESC 'Sets the server, print queue destination name and whether the
      client generates protocol extensions. "Solaris" specifies a
      Solaris print server extension.  The value is represented by
      the following value: server "," destination ", Solaris".'
EQUALITY caseIgnoreIA5Match
SYNTAX  1.3.6.1.4.1.1466.115.121.1.15
SINGLE-VALUE
)
```

4.35. sun-printer-kvp

```
( 1.3.6.1.4.1.42.2.27.5.1.64
NAME 'sun-print-kvp'
DESC 'This attribute contains a set of key value pairs which may have
      meaning to the print subsystem or may be user defined.  Each
      value is represented by the following: key "=" value.'
```

```
   EQUALITY caseIgnoreIA5Match
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.15
   )
```

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

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10. Acknowledgments

This document is a submission to the IPP Working group.

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