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

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Abstract

This document is a product of the Internet Printing Protocol Working Group, chartered by the IETF. Comments should be sent to the ipp@pwg.org mailing list and the principal editor flemingp@us.ibm.com.

This document defines a common printer schema for use with directory services that support the Lightweight Directory Access Protocol (LDAP) [RFC 2251]. 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 [RFC 2911], the 'printer:' service template defined in [SLPPRT], and the mapping between SLP service advertisements and LDAP descriptions of services

defined in [RFC 2926] 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 [RFC 2911] 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 [RFC 2911] 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 [RFC 2911] have been prefixed with 'printer-' as recommended in [SLPPRT] and [RFC 2926].

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 [RFC 2926].

```
( 1.3.18.0.2.6.254
NAME  'slpServicePrinter'
DESC  'Service Location Protocol (SLP) information.'
AUXILIARY
SUP   slpService
)
```

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.

```
( 1.3.18.0.2.6.258
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.

```
( 1.3.18.0.2.6.255
NAME 'printerService'
DESC 'Printer information.'
STRUCTURAL
SUP  printerAbstract
MAY  ( printer-uri $ printer-xri-supported )
)
```

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 printerServiceAuxClass, 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.

```
( 1.3.18.0.2.6.257
NAME 'printerServiceAuxClass'
DESC 'Printer information.'
```

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

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.

```
   ( 1.3.18.0.2.6.256
   NAME  'printerIPP'
   DESC  'Internet Printing Protocol (IPP) information.'
   AUXILIARY
   SUP   top
   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.

```
   ( 1.3.18.0.2.6.253
   NAME  'printerLPR'
   DESC  'LPR information.'
   AUXILIARY
   SUP   top
   MUST ( printer-name )
   MAY ( printer-aliases)
   )
```

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 [RFC 2911]. Some attribute names described in [RFC 2911] have been prefixed with 'printer-' as recommended in [RFC 2926], to address the flat namespace for LDAP identifiers.

LDAP & SLP Printer Schema	IPP Model [RFC 2911]
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
printer-aliases

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.

```
( 1.3.18.0.2.4.1140
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<'

```
( 1.3.18.0.2.4.1107
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]).

```
( 1.3.18.0.2.4.1135
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

```
( 1.3.18.0.2.4.1119
NAME 'printer-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

```
( 1.3.18.0.2.4.1136
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

```
( 1.3.18.0.2.4.1139
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

```
   ( 1.3.18.0.2.4.1134
   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

```
   ( 1.3.18.0.2.4.1138
   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

```
   ( 1.3.18.0.2.4.1133
   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

```
( 1.3.18.0.2.4.1132
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

```
( 1.3.18.0.2.4.1109
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
SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{63}
SINGLE-VALUE
)
```

4.12. printer-charset-supported

```
( 1.3.18.0.2.4.1131
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
SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{63}
)
```

4.13. printer-generated-natural-language-supported

```
( 1.3.18.0.2.4.1137
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

```
( 1.3.18.0.2.4.1130
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
SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{127}
)
```

4.15. printer-color-supported

```
( 1.3.18.0.2.4.1129
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

```
( 1.3.18.0.2.4.1128
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
SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{255}
)
```

4.17. printer-pages-per-minute

```
( 1.3.18.0.2.4.1127
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

```
( 1.3.18.0.2.4.1126
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

```
( 1.3.18.0.2.4.1125
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

```
( 1.3.18.0.2.4.1124
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

```
( 1.3.18.0.2.4.1123
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
SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{127}
)
```

4.22. printer-media-supported

```
( 1.3.18.0.2.4.1122
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
SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{255}
)
```

4.23. printer-media-local-supported

```
( 1.3.18.0.2.4.1117
NAME 'printer-media-local-supported'
DESC 'Site-specific names of media supported by this printer, in the
      language in "printer-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
   SUBSTR caseIgnoreSubstringMatch
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{255}
   )
```

4.24. printer-resolution-supported

```
   ( 1.3.18.0.2.4.1121
   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

```
   ( 1.3.18.0.2.4.1120
   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
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{127}
   )
```

4.26. printer-job-priority-supported

```
   ( 1.3.18.0.2.4.1110
   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

```
( 1.3.18.0.2.4.1118
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

```
( 1.3.18.0.2.4.1111
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

```
( 1.3.18.0.2.4.1112
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

```
( 1.3.18.0.2.4.1113
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

```
   ( 1.3.18.0.2.4.1114
   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
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{127}
   )
```

4.32. printer-stacking-order-supported

```
   ( 1.3.18.0.2.4.1115
   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
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{127}
   )
```

4.33. printer-output-features-supported

```
   ( 1.3.18.0.2.4.1116
   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
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{127}
   )
```

4.34. printer-aliases

```
( 1.3.18.0.2.4.1108
NAME 'printer-aliases'
DESC 'Site-specific administrative names of this printer in addition
     the printer name specified for printer-name.'
EQUALITY caseIgnoreMatch
ORDERING caseIgnoreOrderingMatch
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 [RFC 2911].

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

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