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Pat Fleming
IBM
Ken Jones
eStarCom
Harry Lewis
IBM
Ira McDonald
High North Inc
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Internet Printing Protocol (IPP): LDAP Schema for Printer Services

Status of This Memo

Abstract

This document provides information for the Internet community. It does not specify an Internet standard of any kind. This document defines an LDAP schema, object classes and attributes, for printers and printer services, for use with directories that support Lightweight Directory Access Protocol (LDAPv3) [RFC2251]. This document is based on the printer attributes listed in Appendix E of Internet Printing Protocol (IPP/1.1) [RFC2911], the Service Location Protocol (SLPv2) [RFC2608] 'service:printer:' template defined in [SLPPRT], and the mapping between SLP service advertisements and LDAP descriptions of services defined in [RFC2926]. Send comments to the IPP WG <ipp@pwg.org> and the editor <flemingp@us.ibm.com>.

Table of Contents

1. Introduction

This document provides information for the Internet community. It does not specify an Internet standard of any kind. This document defines an LDAP schema, object classes and attributes, for printers and printer services, for use with directories that support Lightweight Directory Access Protocol (LDAPv3) [RFC2251]. This document is based on the printer attributes listed in Appendix E of Internet Printing Protocol (IPP/1.1) [RFC2911], the Service Location Protocol (SLPv2) [RFC2608] 'service:printer:' template defined in [SLPPRT], and the mapping between SLP service advertisements and LDAP descriptions of services defined in [RFC2926]. Send comments to the IPP WG <ipp@pwg.org> and the editor <flemingp@us.ibm.com>.

Appendix E of IPP/1.1 [RFC2911] specifies a list of printer 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 [RFC2911] and [SLPPRT]. This document takes these attributes and maps them to LDAP attributes and object classes.

This document defines several object classes to provide LDAP applications with flexible 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 SLPv2 [RFC2608], IPP/1.1 [RFC2911], and LPR [RFC1179] specific information.

2. Terminology

This document provides information for the Internet community. It does not specify an Internet standard of any kind.

For systems which choose to support this LDAP printer schema, the key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in sections 3 and 4 of this document are to be interpreted as described in [RFC2119].

3. Definition of Object Classes

We define the following LDAP object classes for use with both generic printer related information and services specific to SLPv2 [RFC2608], IPP/1.1 [RFC2911], and LPR [RFC1179].

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 [RFC2251].

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 [RFC2911] have been prefixed with 'printer-' as recommended in [SLPPRT] and [RFC2926].

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 (SLPv2) [RFC2608] 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 [RFC2926].

```
( 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/1.1) [RFC2911] 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 [RFC1179] 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 attribute types reference syntax OIDs defined in Section 6 of [RFC2252] (see Section 5 'Definition of Syntaxes' below).

The following attribute types reference matching rule names (instead of OIDs) for clarity (see Section 6 below). 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 [RFC2252] and/or Section 6 of [X.520]. (see Section 6 'Definition of Matching Rules' below).

Note: Some implementations of LDAP servers do not support some or all of the [X.520] matching rules in the EQUALITY, ORDERING, or SUBSTR clauses of attribute definitions. Administrators may wish to:

1) Omit the EQUALITY clause (or at least the 'booleanMatch', which is not defined in [RFC2252]);

2) Omit the ORDERING clause (or at least the 'integerOrderingMatch', which is not defined in [RFC2252]);

3) Omit the SUBSTR clause.

The following table is a summary of the attribute names defined by this document and their corresponding names from [RFC2911]. Some attribute names described in [RFC2911] have been prefixed with 'printer-' as recommended in [RFC2926], to address the flat namespace for LDAP identifiers.

LDAP & SLP Printer Schema	IPP Model [RFC2911]
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
```

4.1. printer-uri

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

```
( 1.3.18.0.2.4.1140
NAME 'printer-uri'
DESC 'A URI supported by this printer.
      This URI SHOULD be used as a relative distinguished name (RDN).
      If printer-xri-supported is implemented, then this URI value
      MUST be listed in a member value of printer-xri-supported.'
EQUALITY caseIgnoreMatch
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringsMatch
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 [RFC2617])
'digest' (HTTP/1.1 Basic, [RFC2617])
'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, [RFC2246])

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 caseIgnoreSubstringsMatch
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 [RFC2396]).

```
( 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 caseIgnoreSubstringsMatch
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 [RFC3066] "Tags for
      the Identification of Languages".'
EQUALITY caseIgnoreMatch
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringsMatch
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 caseIgnoreSubstringsMatch
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 caseIgnoreSubstringsMatch
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 caseIgnoreSubstringsMatch
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 caseIgnoreSubstringsMatch
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 caseIgnoreSubstringsMatch
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 [RFC3066], Tags for the
      Identification of Languages.'
EQUALITY caseIgnoreMatch
ORDERING caseIgnoreOrderingMatch
SUBSTR caseIgnoreSubstringsMatch
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 caseIgnoreSubstringsMatch
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'
```

```
        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 caseIgnoreSubstringsMatch
    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 caseIgnoreSubstringsMatch
    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 caseIgnoreSubstringsMatch
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 caseIgnoreSubstringsMatch
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 caseIgnoreSubstringsMatch
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{127}
   )
```

5. Definition of Syntaxes

No new attribute syntaxes are defined by this document.

The attribute types defined in Section 4 above reference syntax OIDs defined in Section 6 of [RFC2252], 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 [RFC2279])
1.3.6.1.4.1.1466.115.121.1.27	Integer

6. Definition of Matching Rules

No new matching rules are defined by this document.

The attribute types defined in Section 4 above reference matching rules defined in Section 8 of [RFC2252] and/or Section 6 of [X.520], which are summarized below:

Matching Rule OID	Matching Rule Name	Usage
2.5.13.13*	booleanMatch	EQUALITY
2.5.13.2	caseIgnoreMatch	EQUALITY
2.5.13.14	integerMatch	EQUALITY
2.5.13.3	caseIgnoreOrderingMatch	ORDERING
2.5.13.15*	integerOrderingMatch	ORDERING
2.5.13.4	caseIgnoreSubstringsMatch	SUBSTR

* - Defined in ITU-T X.520:1996 [X.520] but not listed in [RFC2252]

Note: Some implementations of LDAP servers do not support some or all of the [X.520] matching rules in the EQUALITY, ORDERING, or SUBSTR clauses of attribute definitions. Administrators may wish to:

1) Omit the EQUALITY clause (or at least the 'booleanMatch', which is not defined in [RFC2252]);

2) Omit the ORDERING clause (or at least the 'integerOrderingMatch', which is not defined in [RFC2252]);

3) Omit the SUBSTR clause.

7. IANA Considerations

There are no IANA registration considerations defined by this document.

8. Internationalization Considerations

All text string attribute values in objects of the printerService class MUST be encoded in UTF-8 [RFC2279] characters, as required by the syntax 'Directory String' [RFC2252]. Also, a language tag [RFC3066] 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 the "IETF Policy on Character Sets and Languages" [RFC2277].

9. 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 LDAP printer schema. For additional considerations of deploying printers in an IPP environment, the reader is referred to Section 8 of [RFC2911].

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.

10. References

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Reviewed and approved by IETF SLP Designated Expert, according to Section 5 'IANA Considerations' in [RFC2609].
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ftp://isi.edu/in-notes/iana/assignments/svrloc-templates/
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11. Acknowledgments

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12. Authors' Addresses

Principal Editor:
Pat Fleming
IBM
Highway 52 N.
Rochester, MN 55901
USA
Phone: +1 507-253-7583
EMail: flemingp@us.ibm.com

Ken Jones
eStarCom
400 S McCaslin Blvd Suite 211
Louisville, CO 80027
USA
Phone: +1 720-890-7507
EMail: kenjones@estarcom.com

Harry Lewis
IBM
6300 Diagonal Hwy
Boulder, CO 80301
USA
Phone: +1 303-924-5337
EMail: harryl@us.ibm.com

Ira McDonald
High North Inc
221 Ridge Ave
Grand Marais, MI 49839
USA
Phone: +1 906-494-2434
Email: imcdonald@crt.xerox.com

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