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

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

defined in [SLPLDAP] to define an LDAP printer schema.

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

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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.

2. Terminology

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

3. Definition of Object Classes

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

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

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

   1) Use printerService for directory entries containing common printer
   information.

   2) Use both printerService and slpServicePrinter for directory
   entries containing common printer information for SLP registered
   printers.

   3) Use printerService, printerLPR and printerIPP for directory
   entries containing common printer information for printers that
   support both LPR and IPP.

   4) Use printerServiceAuxClass and object classes not defined by this
   document for directory entries containing common printer information.
   In this example, printerServiceAuxClass is used for extending other
   structural classes defining printer information with common printer
   information defined in this document.

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

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

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

3.1. slpServicePrinter

   This auxiliary class defines Service Location Protocol (SLP) specific
   information. It MUST be used with a structural class such as
   printerService. It MAY be used to create new or extend existing
   directory entries with SLP 'service:printer' abstract service type
   information as defined in [SLPPRT]. This object class is derived
   from 'slpService', the parent class for all SLP services, defined in
   [SLPLDAP].

   (<id-oc>.1
   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.

   (<id-oc>.2
   NAME 'printerAbstract'
   DESC 'Printer related information.'
   ABSTRACT
   SUP   top
   MAY   (printer-name $
           printer-natural-language-configured $
           printer-location $ printer-info $ printer-more-info $
           printer-make-and-model $
           printer-multiple-document-jobs-supported $
           printer-charset-configured $ printer-charset-supported $
           printer-generated-natural-language-supported $
           printer-document-format-supported $ printer-color-supported $
           printer-compression-supported $ printer-pages-per-minute $
           printer-pages-per-minute-color $
           printer-finishings-supported $ printer-number-up-supported $
           printer-sides-supported $ printer-media-supported $
           printer-media-local-supported $
           printer-resolution-supported $
           printer-print-quality-supported $
           printer-job-priority-supported $ printer-copies-supported $
           printer-job-k-octets-supported $ printer-current-operator $

```
        printer-service-person $
        printer-delivery-orientation-supported $
        printer-stacking-order-supported $
        printer-output-features-supported )
)
```

3.3. printerService

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

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

```
( <id-oc>.3
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 printerService, printer-uri SHOULD be used as the
attribute type of the directory entry's relative distinguished name
(RDN). printer-uri uniquely identifies each of the printer services
for a given printer. Note that if the printer service changes
domains, printer-uri must be updated with the new domain name.

```
( <id-oc>.4
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.

```
   ( <id-oc>.5
   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.

```
   ( <id-oc>.6
   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 [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
       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.

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

4.2. printer-xri-supported

    A list of XRI (extended resource identifiers) supported by this
    printer. Each value of this list consists of a URI (uniform resource
    identifier) followed by optional authentication and security
    metaparameters. The keywords for URI and their metaparameters are:
        'uri' == IPP 'printer-uri-supported' value
        'auth' == IPP 'uri-authentication-supported' value
        'sec' == IPP 'uri-security-supported' value
    Legal values of the 'auth' metaparameter include
        'none' (no authentication for this URI)
        'requesting-user-name' (from operation request)

```
      'basic' (HTTP/1.1 Basic [RFC 2617])
      'digest' (HTTP/1.1 Basic, [RFC 2617])
      'certificate' (from certificate)
   per IPP Model [3] (extensions MAY also be used).  A missing 'auth'
   metaparameter SHALL mean 'none'.  Legal values of the 'sec'
   metaparameter include
      'none' (no security for this URI)
      'ssl3' (Netscape SSL3)
      'tls' (IETF TLS/1.0, [RFC 2246])
   per IPP Model [3] (extensions MAY also be used).  A missing 'sec'
   metaparameter SHALL mean 'none'.  Each metaparameter of a list member
   is delimited by '<'.  For example:
      'uri=ipp://foo.com< auth=digest< sec=tls<'
      'uri=lpr://bar.com< auth=none< sec=none<'
   Registrations MAY consolidate values for metaparameters, as in the
   following example:
      'uri=ipp://foo.com< auth=basic,digest< sec=tls,ssl3<'

   ( <id-at>.2
   NAME 'printer-xri-supported'
   DESC 'The unordered list of XRI (extended resource identifiers)
         supported by this printer.  Each member of the list consists of
         a URI (uniform resource identifier) followed by optional
         authentication and security metaparameters.'
   EQUALITY caseIgnoreMatch
   ORDERING caseIgnoreOrderingMatch
   SUBSTR caseIgnoreSubstringMatch
   SYNTAX 1.3.6.1.4.1.1466.115.121.1.15
   )
```

4.3. printer-name

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

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

4.4. printer-natural-language-configured

```
( <id-at>.4
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

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

4.6. printer-info

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

```
   SINGLE-VALUE
   )
```

4.7. printer-more-info

```
   ( <id-at>.7
   NAME 'printer-more-info'
   DESC 'A URI used to obtain more information about this specific
         printer.  For example, this could be an HTTP type URI
         referencing an HTML page accessible to a Web Browser.  The
         information obtained from this URI is intended for end user
         consumption.'
   EQUALITY caseIgnoreMatch
   ORDERING caseIgnoreOrderingMatch
   SUBSTR caseIgnoreSubstringMatch
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.15
   SINGLE-VALUE
   )
```

4.8. printer-make-and-model

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

4.9. printer-ipp-versions-supported

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

4.10. printer-multiple-document-jobs-supported

```
( <id-at>.10
NAME 'printer-multiple-document-jobs-supported'
DESC 'Indicates whether or not the printer supports more than one
      document per job, i.e., more than one Send-Document or
      Send-Data operation with document data.'
EQUALITY booleanMatch
SYNTAX  1.3.6.1.4.1.1466.115.121.1.7
SINGLE-VALUE
)
```

4.11. printer-charset-configured

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

4.12. printer-charset-supported

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

4.13. printer-generated-natural-language-supported

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

4.14. printer-document-format-supported

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

4.15. printer-color-supported

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

4.16. printer-compression-supported

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

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

4.17. printer-pages-per-minute

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

4.18. printer-pages-per-minute-color

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

4.19. printer-finishings-supported

```
   ( <id-at>.19
   NAME 'printer-finishings-supported'
   DESC 'The possible finishing operations supported by this printer.
         Legal values include; "none", "staple", "punch", "cover",
         "bind", "saddle-stitch", "edge-stitch", "staple-top-left",
         "staple-bottom-left", "staple-top-right",
         "staple-bottom-right", "edge-stitch-left", "edge-stitch-top",
         "edge-stitch-right", "edge-stitch-bottom", "staple-dual-left",
         "staple-dual-top", "staple-dual-right", "staple-dual-bottom".'
   EQUALITY caseIgnoreMatch
   SUBSTR caseIgnoreSubstringMatch
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{255}
   )
```

4.20. printer-number-up-supported

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

4.21. printer-sides-supported

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

4.22. printer-media-supported

```
( <id-at>.22
NAME 'printer-media-supported'
DESC 'The standard names/types/sizes (and optional color suffixes) of
        the media supported by this printer.  For example: "iso-a4",
        "envelope", or "na-letter-white".  Legal values  conform to ISO
        10175, Document Printing Application (DPA), and any IANA
        registered extensions.'
EQUALITY caseIgnoreMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{255}
)
```

4.23. printer-media-local-supported

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

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

4.25.   printer-print-quality-supported

```
( <id-at>.25
NAME 'printer-print-quality-supported'
DESC 'List of print qualities supported for printing documents on
        this printer.  For example: "draft, normal".  Legal values
        include; "unknown", "draft", "normal", "high".'
EQUALITY caseIgnoreMatch
SUBSTR caseIgnoreSubstringMatch
SYNTAX  1.3.6.1.4.1.1466.115.121.1.15{127}
)
```

4.26.   printer-job-priority-supported

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

```
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.27
   SINGLE-VALUE
   )
```

4.27. printer-copies-supported

```
   ( <id-at>.27
   NAME 'printer-copies-supported'
   DESC 'The maximum number of copies of a document that may be printed
         as a single job.  A value of "0" indicates no maximum limit.  A
         value of "-1" indicates unknown.'
   EQUALITY integerMatch
   ORDERING integerOrderingMatch
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.27
   SINGLE-VALUE
   )
```

4.28. printer-job-k-octets-supported

```
   ( <id-at>.28
   NAME 'printer-job-k-octets-supported'
   DESC 'The maximum size in kilobytes (1,024 octets actually) incoming
         print job that this printer will accept.  A value of "0"
         indicates no maximum limit.  A value of "-1" indicates
         unknown.'
   EQUALITY integerMatch
   ORDERING integerOrderingMatch
   SYNTAX  1.3.6.1.4.1.1466.115.121.1.27
   SINGLE-VALUE
   )
```

4.29. printer-current-operator

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

4.30. printer-service-person

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


4.31. printer-delivery-orientation-supported

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


4.32. printer-stacking-order-supported

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


4.33. printer-output-features-supported

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

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

4.34. printer-aliases

```
   ( <id-at>.34
   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
   [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.

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