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              Definition of the Printer Abstract Service Type
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Abstract

    This document is a product of the Service Location and Internet
    Printing Protocol Working Groups of the Internet Engineering Task
    Force (IETF). Comments should be sent to the srvloc@srvloc.org and
    ipp@pwg.org mailing lists.

    This document defines the 'printer:' abstract service type and the
    attributes associated with it. This 'printer:' service template is
    designed to be used in conjunction with the Service Location
    Protocol, Version 2 (SLPv2) [13], but may be used with any directory
    service which supports attribute/value pair registration, such as the
    Lightweight Directory Access Protocol, Version 3 (LDAPv3, RFC 2251).

    The 'printer:' service type is specified as an abstract service type.
    Printers advertised with the 'printer:' abstract service type may be
    accessible by one or more print protocols, such as IPP [3] and LPR
    [2].

Table of Contents

1.   Introduction

     Service Type templates are used to describe in a standard way those
     services which use the 'service:' URL. The template described in
     this document is an abstract service type that includes concrete
     types such as the printing protocol defined in RFC 1179 [2], "Line
     Printer Daemon Protocol". The service type for this 'service:' URL
     is 'printer:'.

     The 'printer:' abstract service type supports consistent registration
     of printer services. The attributes described within this document
     are derived from previous specifications developed by the IETF IPP WG
     and IETF Printer MIB WG.

     The attributes specified are intended to facilitate both automatic
     and manual selection of services, not to provide service state,
     statistics, or notification. The target audience of service
     attributes consists of users, either software agents or end users.

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 [14].

3. Template url-path Definition

The 'printer:' type is an abstract service type. Because an abstract
service type may contain one of many concrete types, the 'url-path'
associated with a 'printer:' service URL may vary. IPP and LPR
printers are presently supported by this 'printer:' template. Other
printer protocols MAY be supported by extension templates or by
future updates of this abstract 'printer:' template.

3.1. IPP

An IPP Printer object is defined in "IPP/1.1 Model and Semantics"
[3]. An IPP printer concrete URL is defined in "IPP/1.1 Encoding and
Transport" [9].

Examples of valid 'service:' URLs for IPP printers include:

service:printer:ipp://server.sun.com/cgi-bin/public-printer
service:printer:ipp://foo.sun.com/printers?public-printer

3.2. LPR

An LPR accessible printer MAY include a queue name as the last part
of the URL. If the queue name is absent, the print server is assumed
to use a default print queue. The definition of an LPR printer
concrete URL is specified in this document, in the 'printer:' service
template.

Examples of valid 'service:' URLs for LPR printers include:

service:printer:lpr://server.sun.com
service:printer:lpr://server.sun.com/public-printer

227
228
229   4. Printer Service Template
230
231   The 'printer:' service template defined below conforms to the grammar
232   described in "Service Templates and service: Schemes". Please refer
233   to [4] for detailed explanation of the syntax.
234
235   Name of submitters: Pete St. Pierre <Pete.StPierre@eng.sun.com>
236   Scott Isaacson <sisaacson@novell.com>
237   Ira McDonald <imcdonald@sharplabs.com>
238
239   Language of service template: en (English)
240
241   Security Considerations:
242   By advertising the security methods associated with each supported
243   printer URL via the mandatory attributes 'printer-uri-supported'
244   'uri-authentication-supported', and 'uri-security-supported', the
245   the printer may expose information useful to attackers. SLPv2
246   security or another security method SHOULD be used to authenticate
247   any service advertisements.
248
249   Template Text:
250   ------------------- template begins here --------------------
251   template-type = printer
252
253   template-version = 1.0
254
255   template-description =
256   The 'printer:' service template describes the attributes
257   supported by network printing devices. Devices may be
258   either directly connected to a network or managed by a
259   print server. The device or server understands one or
260   more network print protocols such as IPP or LPR.
261
262   template-url-syntax =
263   url-path   = ippurl / lprurl
264   ippurl   = IPP URL as defined in [9]
265   lprurl   = "lpr://" hostport ["/" qname]
266   hostport   = host [":" port]
267   host   = hostname / hostnumber
268   hostname   = *(domainlabel ".") toplabel
269   domainlabel = alphanum /
270   alphanum * [alphanum / "-"] alphanum
271   toplabel   = alpha / alpha * [alphanum / "-"] alphanum
272   hostnumber = ipv4-number / ipv6-number
273   ipv4-number = 1*3digit 3*3("." 1*3digit)
274   ipv6-number = 32*hex
275   3digit   = digit digit digit
276   port   = 1*digit
277   alphanum   = alpha / digit
278

282
```
283                alpha        = "a" / "b" / "c" / "d" / "e" / "f" / "g" /
284                               "h" / "i" / "j" / "k" / "l" / "m" / "n" /
285                               "o" / "p" / "q" / "r" / "s" / "t" / "u" /
286                               "v" / "w" / "x" / "y" / "z" /
287                               "A" / "B" / "C" / "D" / "E" / "F" / "G" /
288                               "H" / "I" / "J" / "K" / "L" / "M" / "N" /
289                               "O" / "P" / "Q" / "R" / "S" / "T" / "U" /
290                               "V" / "W" / "X" / "Y" / "Z"
291            digit        = "0" / "1" / "2" / "3" / "4" / "5" / "6" /
292                               "7" / "8" / "9"
293
294        printer-uri-supported = STRING L
295            # REQUIRED for all registrations by conforming SLP SAs
296            # IPP 'printer-uri-supported'
297            # The ORDERED list of URI supported by this printer,
298            # correlated with 'uri-authentication-supported' values
299            # and correlated with 'uri-security-supported' values.
300            # Each list member (including the last) is delimited by '>'.
301            # For example:
302            #    'lpr://foo.com> ipp://bar.com>'
303
304        uri-authentication-supported = STRING L
305            # REQUIRED for all registrations by conforming SLP SAs
306            # IPP 'uri-authentication-supported'
307            # The ORDERED list of authentication supported for each URI
308            # specified in 'printer-uri-supported' for this printer.
309            # Each list member (including the last) is delimited by '>'.
310            # For example:
311            #    'none> basic> certificate>'
312            # (see example of 'printer-uri-supported' above).
313            # Legal values include
314            #    'none' (no authentication for this URI)
315            #    'requesting-user-name' (from operation request)
316            #    'basic' (HTTP/1.1 Basic, RFC 2617)
317            #    'digest' (HTTP/1.1 Basic, RFC 2617)
318            #    'certificate' (from certificate)
319            # per IPP Model [3] (extensions MAY also be used).
320            # URI that do not support authentication SHALL specify
321            # 'none'.
322
323        uri-security-supported = STRING L
324            # REQUIRED for all registrations by conforming SLP SAs
325            # IPP 'uri-security-supported'
326            # The ORDERED list of security supported for each URI
327            # specified in 'printer-uri-supported' for this printer.
328            # Each list member (including the last) is delimited by '>'.
329            # For example:
330            #    'none> tls>'
331            # (see example of 'printer-uri-supported' above).
332            # Legal values include
333            #    'none' (no security for this URI)
```
334

```
                    #   'ssl3' (Netscape SSL3)
                    #   'tls' (IETF TLS/1.0, RFC 2246)
                    # per IPP Model [3] (extensions MAY also be used).
                    # URI that do not support security SHALL specify
                    # 'none'.

          printer-name = STRING
                    # REQUIRED for all registrations by conforming SLP SAs
                    # IPP 'printer-name'
                    # The site-specific administrative name of this printer,
                    # in the language in 'natural-language-configured'.
                    # 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).
                    # If this printer information is not known to the SLP SA,
                    # then this attribute SHALL be set to 'unknown'.
                    # This attribute SHOULD be static (time of registration)
                    # and SHOULD NOT be dynamically refreshed (subsequently).

          printer-location = STRING O
                    unknown
                    # IPP 'printer-location'
                    # The physical location of this printer,
                    # in the language in 'natural-language-configured'.
                    # A free form description of this printer's physical
                    # location, for example:
                    #   'Orlando office, 2nd floor, near the fire escape'
                    # If this printer information is not known to the SLP SA,
                    # then this attribute SHALL be set to 'unknown'.
                    # However, it is STRONGLY RECOMMENDED that this attribute
                    # be supported and that it be set to a meaningful value so
                    # that users can determine this printer's physical location
                    # for printer selection (before print job submission) and
                    # for output collection (after print job completion).

          printer-info = STRING O
                    unknown
                    # IPP 'printer-info'
                    # Additional descriptive information on this printer,
                    # in the language in 'natural-language-configured'.
                    # A free form string that may contain any site-specific
                    # descriptive information about this printer.
                    # If this printer information is not known to the SLP SA,
                    # then this attribute SHALL be set to 'unknown'.

          printer-more-info = STRING L O
                    unknown
                    # IPP 'printer-more-info'
                    # A URI used to obtain more information about this specific
                    # printer.  For example, this could be an 'http:' URI
```

394
395   # referencing an HTML page accessible to a Web Browser.
396   # The information obtained from this URI is intended for
397   # end user consumption.
398   # If this printer information is not known to the SLP SA,
399   # then this attribute SHALL be set to 'unknown'.
400
401   printer-make-and-model = STRING O
402   unknown
403   # IPP 'printer-make-and-model'
404   # The manufacturer, make, and model of this printer,
405   # a simple text string defined by the manufacturer,
406   # in the language in 'natural-language-configured'.
407   # If this printer information is not known to the SLP SA,
408   # then this attribute SHALL be set to 'unknown'.
409
410   ipp-versions-supported = STRING L M O
411   none
412   # IPP 'ipp-versions-supported'
413   # The unordered list of 'major.minor' IPP versions
414   # supported by this printer or 'none'.
415   # For example:
416   #   '1.0, 1.1'
417   # Legal values include 'none', '1.0', and '1.1',
418   # per IPP Model [3] (extensions MAY also be used).
419   # If this printer information is not known to the SLP SA,
420   # then this attribute SHALL be set to 'none'.
421
422   multiple-document-jobs-supported = STRING L O
423   unknown
424   # IPP 'multiple-document-jobs-supported'
425   # Indicates whether this printer supports more than one
426   # document per job.
427   # This template attribute is an extended boolean.
428   # If this printer information is not known to the SLP SA,
429   # then this attribute SHALL be set to 'unknown'.
430   unknown, true, false
431
432   charset-configured = STRING L O
433   utf-8
434   # IPP 'charset-configured'
435   # The configured charset in which error and status messages
436   # will be generated (by default) by this printer.
437   # Also, a possible charset for printer string attributes
438   # set by operator, system administrator, or manufacturer.
439   # For example:
440   #   'utf-8' (ISO 10646/Unicode) or 'iso-8859-1' (Latin1)
441   # Legal values of charset tags (names/aliases) come from
442   # the IANA Registry of Coded Character Sets [6] and
443   # the '(preferred MIME name)' SHALL be used as the tag.
444   # For coherence with IPP Model [3], charset tags in this
445   # attribute SHALL be lowercase normalized.
446

```
                    # This attribute SHOULD be static (time of registration)
                    # and SHOULD NOT be dynamically refreshed (subsequently).


            charset-supported = STRING L M O
                    utf-8
                    # IPP 'charset-supported'
                    # The possible charsets in which error and status messages
                    # may be generated (if requested) by this printer.
                    # Also, the possible charsets 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 of charset tags (names/aliases) come from
                    # the IANA Registry of Coded Character Sets [6] and
                    # the '(preferred MIME name)' SHALL be used as the tag.
                    # This attribute SHALL include the value 'utf-8', per
                    # RFC 2277, 'IETF Policy on Charsets and Languages' [12].
                    # For coherence with IPP Model [3], charset tags in this
                    # attribute SHALL be lowercase normalized.


            natural-language-configured = STRING L
                    # REQUIRED for all registrations by conforming SLP SAs
                    # IPP 'natural-language-configured'
                    # 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' [5].
                    # For coherence with IPP Model [3], language tags in this
                    # attribute SHALL be lowercase normalized.
                    # This attribute SHOULD be static (time of registration)
                    # and SHOULD NOT be dynamically refreshed (subsequently).


            natural-language-supported = STRING L M
                    # REQUIRED for all registrations by conforming SLP SAs
                    # IPP 'generated-natural-language-supported'
                    # The possible languages in which error and status messages
                    # may be generated (if requested) by this printer.
                    # Also, the possible languages for printer string attributes
                    # set by operator, system administrator, or manufacturer.
                    # 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' [5].
                    # For coherence with IPP Model [3], language tags in this
```

```
                # attribute SHALL be lowercase normalized.

        document-format-supported = STRING L M
            # REQUIRED for all registrations by conforming SLP SAs
            # IPP 'document-format-supported'
            # The possible document formats in which data may be
            # interpreted and printed by this printer.
            # Legal values of document formats (MIME types) come from
            # the IANA Registry of Internet Media Types [11].
            # If this printer information is not known to the SLP SA,
            # then this attribute SHALL be set to 'unknown'.

        color-supported = STRING L O
            unknown
            # IPP 'color-supported'
            # Indicates whether this printer is capable of any type of
            # color printing at all, including highlight color.
            # This template attribute is an extended boolean.
            # If this printer information is not known to the SLP SA,
            # then this attribute SHALL be set to 'unknown'.
            unknown, true, false

        compression-supported = STRING L M
            # REQUIRED for all registrations by conforming SLP SAs
            # IPP 'compression-supported'
            # The unordered list of compression algorithms supported
            # by this printer.
            # For example:
            #   'deflate, gzip'
            # Legal values include
            #   'none'
            #   'deflate' (public domain ZIP)
            #   'gzip' (GNU ZIP)
            #   'compress' (UNIX)
            # per IPP Model [3] (extensions MAY also be used).
            # If this printer information is not known to the SLP SA,
            # then this attribute SHALL be set to 'none'.

        pages-per-minute = INTEGER O
                -1
            # IPP 'pages-per-minute'
            # The nominal number of pages per minute which may be
            # output by this printer (e.g., simplex, black-and-white).
            # This attribute is informative, NOT a service guarantee.
            # Typically, it is the value used in marketing literature
            # to describe this printer.
            # A value of '-1' indicates unknown.
            # If this printer information is not known to the SLP SA,
            # then this attribute SHALL be set to '-1'.

        pages-per-minute-color = INTEGER O
```

```
                -1
                # IPP 'pages-per-minute-color'
                # The nominal number of color pages per minute which may be
                # output by this printer (e.g., simplex, color).
                # This attribute is informative, NOT a service guarantee.
                # Typically, it is the value used in marketing literature
                # to describe this printer.
                # A value of '-1' indicates unknown.
                # If this printer information is not known to the SLP SA,
                # then this attribute SHALL be set to '-1'.

        finishings-supported = STRING L M O
            none
            # IPP 'finishings-supported'
            # The possible finishing operations supported by this
            # printer.
            # Legal values of finishings are defined in IPP Model [3].
            # If this printer information is not known to the SLP SA,
            # then this attribute SHALL be set to 'none'.
            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

        number-up-supported = INTEGER M O
            1
            # IPP 'number-up-supported'
            # The possible numbers of print-stream pages to impose
            # upon a single side of an instance of a selected
            # medium.
            # Legal values of this attribute include 1, 2, and 4 [3].
            # Implementations may support other values.
            # If this printer information is not known to the SLP SA,
            # then this attribute SHALL be set to '1'.

        sides-supported = STRING L M O
            one-sided
            # IPP 'sides-supported'
            # (Compare with Salutation 'duplex-mode')
            # The number of impression sides (one or two) and the
            # two-sided impression rotations supported by this printer.
            # Salutation 'simplex' == IPP 'one-sided'
            # Salutation 'duplex' == IPP 'two-sided-long-edge'
            # Salutation 'tumble' == IPP 'two-sided-short-edge'
            # If this printer information is not known to the SLP SA,
            # then this attribute SHALL be set to 'one-sided'.
            one-sided, two-sided-long-edge, two-sided-short-edge
```

```
        media-supported = STRING L M O
            unknown
            # IPP 'media-supported' - only the standard keyword values
            # The standard names/types/sizes (and optional color
            # suffixes) of the media supported by this printer.
            # The values specified are NOT localized according to the
            # value of 'natural-language-configured', but are in a
            # fixed language of 'en-us' (US English).  For example:
            #   'iso-a4' or 'envelope' or 'na-letter-white'
            # Legal values of this attribute conform to ISO 10175
            # 'Document Printing Application (DPA)' [10] and
            # any IANA registered extensions, per IPP Model [3].
            # If this printer information is not known to the SLP SA,
            # then this attribute SHALL be set to 'unknown'.

        media-local-supported = STRING M O
            unknown
            # IPP 'media-supported' - only site-specific name values
            # Site-specific names of media supported by this printer,
            # in the language in 'natural-language-configured'.
            # For example:
            #   'purchasing-form' (site-specific name)
            # as opposed to (in 'media-supported' above):
            #   'na-letter' (standard keyword from ISO 10175 [10]).
            # If this printer information is not known to the SLP SA,
            # then this attribute SHALL be set to 'unknown'.

        printer-resolution-supported = STRING L M O
            unknown
            # IPP 'printer-resolution-supported'
            # (Compare with 'printer-uri-supported' in this template)
            # The unordered list of resolutions supported for printing
            # documents by this printer.
            # Each resolution supported is a string with 3 fields:
            # 1) Crossfeed direction resolution (positive integer)
            # 2) Feed direction resolution (positive integer)
            # 3) Resolution unit (enumerated value - see below)
            # Each resolution field is delimited by '>', for example:
            #   '300> 300> dpi>, 600> 600> dpi>'
            # Legal values of resolution unit are
            #   'dpi' (dots per inch)
            #   'dpcm' (dots per centimeter)
            # per IPP Model [3] (extensions SHOULD NOT be used).
            # This attribute is derived from the Printer MIB [7].
            # If this printer information is not known to the SLP SA,
            # then this attribute SHALL be set to 'unknown'.

        print-quality-supported = STRING L M O
            unknown
            # IPP 'print-quality-supported'
```

```
               # The unordered list of print qualities supported for
               # printing documents on this printer.
               # For example:
               #   'draft, normal'
               # Legal values are defined in IPP Model [3].
               # If this printer information is not known to the SLP SA,
               # then this attribute SHALL be set to 'unknown'.
             unknown, draft, normal, high

         job-priority-supported = INTEGER O
             1
             # IPP 'job-priority-supported'
             # (Compare with Salutation 'priority-levels-supported')
             # 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 template attribute describes the 'granularity'.
             # Legal values of this attribute are from '1' to '100'.
             # If this printer information is not known to the SLP SA,
             # then this attribute SHALL be set to '1'.

         copies-supported = INTEGER O
             -1
             # IPP 'copies-supported'
             # 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.
             # If this printer information is not known to the SLP SA,
             # then this attribute SHALL be set to '-1'.

         job-k-octets-supported = INTEGER O
             -1
             # IPP 'job-k-octets-supported'
             # 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.
             # If this printer information is not known to the SLP SA,
             # then this attribute SHALL be set to '-1'.

         printer-current-operator = STRING M O
             unknown
             # Printer MIB 'prtGeneralCurrentOperator'
             # 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.
             # If this printer information is not known to the SLP SA,
             # then this attribute SHALL be set to 'unknown'.
```

```
                # This attribute SHOULD be static (time of registration)
                # and SHOULD NOT be dynamically refreshed (subsequently).

        printer-service-person = STRING M O
            unknown
            # Printer MIB 'prtGeneralServicePerson'
            # The name of the current 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.
            # If this printer information is not known to the SLP SA,
            # then this attribute SHALL be set to 'unknown'.
            # This attribute SHOULD be static (time of registration)
            # and SHOULD NOT be dynamically refreshed (subsequently).

        delivery-orientation-supported = STRING L O
            unknown
            # Printer MIB 'prtOutputPageDeliveryOrientation'
            # The possible delivery orientations of pages as they are
            # printed and ejected from this printer.
            # If this printer information is not known to the SLP SA,
            # then this attribute SHALL be set to 'unknown'.
            unknown, face-up, face-down

        stacking-order-supported = STRING L M O
            unknown
            # Printer MIB 'prtOutputStackingOrder'
            # (Compare with Salutation 'paper-output')
            # The possible stacking order of pages as they are printed
            # and ejected from this printer.
            # If this printer information is not known to the SLP SA,
            # then this attribute SHALL be set to 'unknown'.
            unknown, first-to-last, last-to-first

        output-features-supported = STRING L M O
            unknown
            # Printer MIB 'prtOutputFeaturesGroup'
            # (Compare with Salutation 'paper-output')
            # The possible output features supported by this printer.
            # 'bursting' == Printer MIB 'prtOutputBursting'
            # 'decollating' == Printer MIB 'prtOutputDecollating'
            # 'page-collating' == Printer MIB 'prtOutputPageCollated'
            # 'offset-stacking' == Printer MIB 'prtOutputOffestStacking'
            # If this printer information is not known to the SLP SA,
            # then this attribute SHALL be set to 'unknown'.
            unknown, bursting, decollating, page-collating,
            offset-stacking

    ------------------- template ends here ---------------------
```

5.   Summary of Required Attributes

   Attributes are associated with 'service:' URLs in order to provide a
   dynamic search capability to service location clients, not to burden
   servers implementations during registrations.

   A small subset (8) of the attributes defined in 'printer:' are
   REQUIRED in all compliant service registrations by SLP SAs:

   SLP Required Attribute   IPP Generic Directory Schema
   ----------------------   ----------------------------
   printer-uri-supported   r
   uri-authentication-supported   r
   uri-security-supported   r
   printer-name   r
   natural-language-configured   m (SLP enhancement)
   natural-language-supported   o (SLP enhancement)
   document-format-supported   r
   compression-supported   r

   r   RECOMMENDED - Appendix E 'Generic Directory Schema' IPP Model [3]
       REQUIRED - SLP 'printer:' template
   o   OPTIONAL - Appendix E 'Generic Directory Schema' IPP Model [3]
       REQUIRED - SLP 'printer:' template
   m   Missing - Appendix E 'Generic Directory Schema' IPP Model [3]
       REQUIRED - SLP 'printer:' template

5.1.   Rationale for Required Attributes

   'natural-language-configured'
   - REQUIRED in SLP 'printer:' template to specify language tags for
   'printer-name', 'printer-location', 'printer-info', and
   'printer-make-and-model' attributes;
   - missing in Appendix E 'Generic Directory Schema' of IPP Model [3],
   because the corresponding IPP attributes are language tagged in-band
   via the IPP 'textWithLanguage' syntax.

   'natural-language-supported'
   - REQUIRED in SLP 'printer:' template to assist users in selecting
   appropriate printers;
   - missing in Appendix E 'Generic Directory Schema' of IPP Model [3].

   All other REQUIRED SLP 'printer:' template attributes are RECOMMENDED
   in Appendix E 'Generic Directory Schema' IPP Model [3].

6.   Summary of Optional Attributes

Many of the attributes defined in 'printer:' are OPTIONAL in all
compliant service registrations by SLP SAs:

SLP Optional Attribute	IPP Generic Directory Schema
printer-location	r
printer-info	o
printer-more-info	o
printer-make-and-model	r
ipp-versions-supported	r
multiple-document-jobs-supported	o
charset-configured	m (SLP enhancement)
charset-supported	o
color-supported	r
finishings-supported	r
number-up-supported	o
sides-supported	r
media-supported	r
media-local-supported	m (part of 'media-supported')
pages-per-minute	o
pages-per-minute-color	o
printer-resolution-supported	o
print-quality-supported	o
job-priority-supported	m (SLP enhancement)
copies-supported	m (SLP enhancement)
job-k-octets-supported	m (SLP enhancement)
printer-current-operator	m (from Printer MIB)
printer-service-person	m (from Printer MIB)
delivery-orientation-supported	m (from Printer MIB)
stacking-order-supported	m (from Printer MIB)
output-features-supported	m (from Printer MIB)

```
r   RECOMMENDED - Appendix E 'Generic Directory Schema' IPP Model [3]
    OPTIONAL - SLP 'printer:' template (with specified default)
o   OPTIONAL - Appendix E 'Generic Directory Schema' IPP Model [3]
    OPTIONAL - SLP 'printer:' template (with specified default)
m   Missing - Appendix E 'Generic Directory Schema' IPP Model [3]
    OPTIONAL - SLP 'printer:' template (with specified default)
```

6.1.   Rationale for Optional Attributes

'printer-location', 'printer-make-and-model', 'color-supported',
'finishings-supported', 'sides-supported', 'media-supported', and
'local-media-supported'

      - OPTIONAL in SLP 'printer:' template because network print servers
      may not be able to determine this information;
      - RECOMMENDED in Appendix E 'Generic Directory Schema' of IPP Model
      [3].

      'ipp-versions-supported'
      - OPTIONAL in SLP 'printer:' template because network printers may
      not support IPP;
      - RECOMMENDED in Appendix E 'Generic Directory Schema' of IPP Model
      [3].

      'charset-configured'
      - OPTIONAL in SLP 'printer:' template to assist users in selecting
      appropriate printers;
      - missing in Appendix E 'Generic Directory Schema' of IPP Model [3].

      'job-priority-supported', 'copies-supported', and
      'job-k-octets-supported'
      - OPTIONAL in SLP 'printer:' template to assist users in selecting
      appropriate printers;
      - missing in Appendix E 'Generic Directory Schema' of IPP Model [3].

      'printer-current-operator', 'printer-service-person',
      'delivery-orientation-supported', 'stacking-order-supported', and
      'output-features-supported'
      - OPTIONAL in SLP 'printer:' template to assist users in selecting
      appropriate printers;
      - missing in Appendix E 'Generic Directory Schema' of IPP Model [3],
      because they are only specified in the Printer MIB [7], not in IPP.

      All other OPTIONAL SLP 'printer:' template attributes are OPTIONAL in
      Appendix E 'Generic Directory Schema' IPP Model [3].

7.   Summary of Attribute Origins

     The following table summarizes the origins of all of the attributes
     in the 'printer:' service template (except 'template-xxx' generic
     attributes defined in "Service Templates and service: Schemes" [4]
     and required for all 'service:' templates).

Attribute Name	IPP[3]	Printer MIB[7]
printer-uri-supported	X	
uri-authentication-supported	X	
uri-security-supported	X	
printer-name	X	
printer-location	X	
printer-info	X	
printer-more-info	X	
printer-make-and-model	X	
ipp-versions-supported	X	
multiple-document-jobs-supported	X	
charset-configured	X	
charset-supported	X	
natural-language-configured	X	
natural-language-supported	X	
document-format-supported	X	
color-supported	X	
compression-supported	X	
pages-per-minute	X	
pages-per-minute-color	X	
finishings-supported	X	
number-up-supported	X	
sides-supported	X	
media-supported	X	
media-local-supported	X	
printer-resolution-supported	X	
print-quality-supported	X	
job-priority-supported	X	
copies-supported	X	
job-k-octets-supported	X	
printer-current-operator		X
printer-service-person		X
delivery-orientation-supported		X
stacking-order-supported		X
output-features-supported		X

8.   IANA Considerations

     Registration of this 'printer:' service template will follow the
     procedures defined in section 4 'A Procedure for Standardizing New
     Service Types' and section 5 'IANA Considerations' of "Service
     Templates and service: Schemes" [4].

9.   Internationalization Considerations

     All attribute values in registrations using this 'printer:' service
     template MUST be encoded in UTF-8 characters, as required by "Service
     Location Protocol, Version 2" [13]. Thus, all registrations using
     this 'printer:' service template conform to "IETF Policy on Character
     Sets and Languages" [12].

10.   Security Considerations

     When used with SLPv2, this 'printer:' service template inherits all
     of the security issues described in section 17 'Security
     Considerations' of "Service Location Protocol, Version 2" [13].

11.   References

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   'Generic Directory Schema' in IPP/1.1 Model [3] (recommended and
   optional attributes for registering IPP printers) was the primary
   input to this version of the 'printer:' service template.

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