1   INTERNET-DRAFT
2   <draft-ietf-ipp-install-01.txt>
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9   November 7, 2000

10   Internet Printing Protocol (IPP):

11   **Printer Installation Extension**

12

14   Status of this Memo

23   **Abstract**

24   Various client platforms require that some setting up take place at the workstation before the client can properly
25   submit jobs to a specific printer.   This setup process is sometimes referred to as printer installation. Most clients
26   need some information about the printer being installed as well as support files to complete the printer installation.
27   The nature of the support files varies depending on the specific client platform, from simple configuration files to
28   highly sophisticated printer drivers. This document refers to these support files as "Client Print Support Files".
29   Traditionally, the selection and installation of the correct Client Print Support Files has been error prone. The
30   selection and installation process can be simplified and even automated if the workstation can learn some key
31   information about the printer and which sets of Client Print Support Files are available. Such key information
32   includes: operating system type, CPU type, document-format (PDL), natural language, etc. This document
33   describes the IPP extensions that enable workstations to obtain the information needed to perform a proper printer
34   driver installation using IPP.

35

35   The full set of IPP documents includes:

36   Design Goals for an Internet Printing Protocol [RFC2567]
37   Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]
38   Internet Printing Protocol/1.1: Model and Semantics [RFC2911]
39   Internet Printing Protocol/1.1: Encoding and Transport [RFC2910]
40   Internet Printing Protocol/1.1: Implementer's Guide [ipp-iig]
41   Mapping between LPD and IPP Protocols [RFC2569]
42

43   The "Design Goals for an Internet Printing Protocol" document takes a broad look at distributed printing
44   functionality, and it enumerates real-life scenarios that help to clarify the features that need to be included in a
45   printing protocol for the Internet. It identifies requirements for three types of users: end users, operators, and
46   administrators. It calls out a subset of end user requirements that are satisfied in IPP/1.0. A few OPTIONAL
47   operator operations have been added to IPP/1.1.

48   The "Rationale for the Structure and Model and Protocol for the Internet Printing Protocol" document describes
49   IPP from a high level view, defines a roadmap for the various documents that form the suite of IPP specification
50   documents, and gives background and rationale for the IETF working group's major decisions.

51   The "Internet Printing Protocol/1.1: Encoding and Transport" document is a formal mapping of the abstract
52   operations and attributes defined in the model document onto HTTP/1.1 [RFC2616]. It defines the encoding rules
53   for a new Internet MIME media type called "application/ipp". This document also defines the rules for transporting
54   a message body over HTTP whose Content-Type is "application/ipp". This document defines a new scheme
55   named 'ipp' for identifying IPP printers and jobs.

56   The "Internet Printing Protocol/1.1: Implementer's Guide" document gives insight and advice to implementers of
57   IPP clients and IPP objects. It is intended to help them understand IPP/1.1 and some of the considerations that
58   may assist them in the design of their client and/or IPP object implementations. For example, a typical order of
59   processing requests is given, including error checking. Motivation for some of the specification decisions is also
60   included.

61   The "Mapping between LPD and IPP Protocols" document gives some advice to implementers of gateways
62   between IPP and LPD (Line Printer Daemon) implementations.

63

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Tables

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90

90 1   Introduction

91   A common configuration for printing from a workstation requires that some Client Print Support Files (e.g., PPD,
92   printer driver files) specific to the target printer be installed on that workstation. Selection and configuration of the
93   appropriate Client Print Support Files can be simplified and even automated if the workstation can obtain some key
94   information about the printer and which sets of Client Print Support Files are available. Such key information
95   includes: operating system type, CPU type, document-format (PDL), natural language, etc. With a few extensions,
96   IPP provides a simple and reliable vehicle for printers to convey this information to interested workstations. The
97   IPP extensions described in this document enable a flexible solution for installing Client Print Support Files on
98   workstations running different operating systems and for printers of all makes and models. It allows Client Print
99   Support Files to be downloaded from repositories of different sorts. A possible repository for the files is the
100 printer itself. The extensions necessary for getting Client Print Support Files from the printer are included in this
101 document.

102 2   Terminology

103 Client Print Support Files - a set of files, such as a printer driver, font metric file, printer configuration file (PPD,
104 GPD, etc.) that support a client printing to a particular Printer. A Printer can have multiple sets of Client Print
105 Support Files that work for different operating systems, document formats, natural languages, CPUs, etc.

106 This document uses terms such as "attributes", "keywords", and "support". These terms have special meaning and
107 are defined in the model terminology [RFC2911] section 12.2.

108 Capitalized terms, such as MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, MAY, NEED NOT,
109 and OPTIONAL, have special meaning relating to conformance. These terms are defined in [RFC2911] section
110 12.1 on conformance terminology, most of which is taken from RFC 2119 [RFC2119].

111 This section defines the following additional terms that are used throughout this document:

112   REQUIRED: if an implementation supports the extensions described in this document, it MUST support a
113   REQUIRED feature.
114   OPTIONAL: if an implementation supports the extensions described in this document, it MAY support an
115   OPTIONAL feature.

116 3   Model Extensions

117 To assist workstations in the printer installation process, an IPP printer needs to provide the workstation with
118 information about the Client Print Support Files, such as the their name and location/s. This information needs to
119 match the workstation's specific environment, such as its operating system, preferred natural language, and
120 preferred document format.

121 The following extensions to the IPP model enable assisted or automated printer installation. This section describes
122 each extension in detail.

123   -   A new REQUIRED Printer Description attribute: "client-print-support-files-supported" (1setOf
124   octetString(MAX)).

125   -   A new REQUIRED Get-Printer-Attributes operation attribute: "client-print-support-files-filter"
126   (octetString(MAX)).

127   -   A new RECOMMENDED printer operation: Get-Client-Print-Support-Files.

128   **3.1   client-print-support-files-supported (1setOf octetString(MAX))**

129   An IPP Printer uses the REQUIRED Printer Description attribute "client-print-support-files-supported" to
130   represent relevant information about all of the Client Print Support Files it supports. Each value is a composite
131   UTF-8 string with well-defined fields (see Table 1). Each value string MUST be formatted as follows:

132   "uri=val$_1$< field-name$_2$=val$_{21}$,…,val$_{2p}$< … < field-name$_n$=val$_{n1}$,…,val$_{nq}$<"

133   The first field MUST be the "uri" field. The remaining fields MAY be in any order.

134   The string MUST NOT include any control characters (hex 00 to 1F), even the so-called white space control
135   characters (TAB, CR, and LF) anywhere. Only zero or more UTF-8 SPACE characters (hex 20) can be included
136   and they can be included only IMMEDIATELY AFTER the punctuation character: "<", but NOT anywhere else,
137   including after "=" and ",". However, if the UTF-8 SPACE character is needed in a file name value, then each
138   occurrence is included directly, without escaping (see example). On the other hand, if the UTF-8 SPACE
139   character is needed in a URL value, then each occurrence is escaped as: "\x20" (URI conventions - see
140   [RFC2396]).

141   Table 1 lists the REQUIRED fields that a Printer MUST support and the OPTIONAL fields that a Printer MAY
142   support in the "client-print-support-files-supported" (1setOf octetString(MAX)) Printer Description attribute. A
143   Printer implementation MAY support additional fields using the same syntax. Values are defined to be either
144   CASE-SENSITIVE or ALL-LOWER-CASE according to the definitions for the attribute syntaxes from
145   [RFC2911] (set off by single quotes in the table). The CASE-SENSITIVE values MAY have upper and lower
146   case letters as for the corresponding attribute syntaxes in [RFC2911]. The LOWER-CASE values MUST have
147   all lower case alphabetic letters. Additional characters, such as digits, hyphen-minus (-), period (.), and slash (/)
148   are according to the corresponding attribute syntaxes in [RFC2911].

149   Clients SHOULD ignore fields they don't recognize in a given value. This allows for future extensions to the format
150   of the string without breaking compatibility with earlier clients.

Table 1 - "client-print-support-files-supported" attribute fields

Field name	Field value
"uri"	One REQUIRED CASE-SENSITIVE 'uri' string identifying the uri where to obtain the support files for each OS platform, document format, and natural language the printer supports. This MUST be the first field in each value. Examples of uri schemes that MAY be found here are ftp, http, and ipp. The ftp and http schemed URIs identify the archive file that contains all the necessary client support files. The ipp schemed URIs also identify the archive file which may be obtained from the Printer using the Get-Client-Print-Support-Files operation (see section 3.3). In order to distinguish between multiple Client Print Support Files, the ipp URL is used to distinguish between them in an implementation dependent manner, such as using a file URL parameter (' file=xxx). A Printer SHOULD support the ipp scheme.
"os-type"	One or more REQUIRED comma-separated LOWER-CASE strings identifying the operating system types supported by this set of Client Print Support Files. Valid values include the operating system names defined in the IANA document [os-names]. Although the IANA registry requires that the names be all upper-case, the values MUST be all lower case in this field (plus hyphen-minus (-), period (.), and slash (/)). Examples: linux, linux-2.2, os/2, sun-os-4.0, unix, unix-bsd, win32, windows-95, windows-98, windows-ce, windows-nt, windows-nt-4, windows-nt-5.
"cpu-type"	One or more REQUIRED comma-separated LOWER-CASE strings identifying the CPU types supported by this set of Client Print Support Files. Values (or compatible): 'unknown', 'x86-16', 'x86-32', 'x86-64', 'dec-vax', 'alpha', 'power-pc', 'm-6800', 'sparc', 'itantium', 'mips', 'arm'.
"document-format"	One or more REQUIRED comma-separated CASE-SENSITIVE 'document-format' strings identifying the document formats supported by this set of Client Print Support Files. Valid values are the string representation of the IPP mimeMediaType syntax (see [RFC2911]). 'unknown' is a valid value.
"natural-language"	One or more REQUIRED comma-separated LOWER-CASE 'naturalLanguage' strings identifying the natural language used by this set of Client Print Support Files. Valid values are the string representation of the IPP naturalLanguage syntax. 'unknown' is a valid value.
"compression"	One REQUIRED LOWER-CASE 'keyword' string identifying the mechanism used to compress this set of Client Print Support Files. All files needed for the installation of a printer driver MUST be compressed into a single file. Valid values are: 'deflate', 'gzip', 'compress'. The 'none' value is allowed but limits the uncompressed Client Print Support File to a single file.
"file-type"	One or more REQUIRED comma-separated LOWER-CASE 'keyword' strings identifying the type of the Client Print Support Files. Valid values are: 'printer-driver', 'ppd', 'updf', 'gpd'.
"file-name"	One REQUIRED CASE-SENSITIVE string identifying the name by which the Client Print Support Files will be installed on the workstation. For Client Print Support Files of type

Field name	Field value
	'printer-driver', this is also the name that identifies this printer driver in an .inf file.
"policy"	One REQUIRED LOWER-CASE 'keyword' string indicating the policy for automatic loading. Values: 'unknown', 'manufacturer-recommended', 'administrator-recommended', 'manufacturer-experimental, and 'administrator-experimental'. The experimental values are for beta test.
"file-size"	One OPTIONAL file size in octets represented as ASCII decimal digits.
"file-version"	One OPTIONAL LOWER-CASE version number. Recommended to be of the form "Major.minor[.revision]" "Major" is the major version number, "minor" is the minor version number and "revision" is an optional revision number.
"file-date-time"	One OPTIONAL File CASE-SENSITIVE creation date and time according to ISO 8601 where all fields are fixed length with leading zeroes (see [RFC2518] Appendix 2). Examples: 2000-01-01T23:09:05Z and 2000-01-01T02:59:59-04.00

152 Each value MUST refer to one and only one set of Client Print Support Files, even if the files are downloadable
153 from various repositories (i.e., even if they are associated with multiple URIs).

154 The following illustrates what two valid values of the "client-print-support-files-supported" (1setOf
155 octetString(MAX)) Printer Description attribute might look like:

156   uri=ipp://mycompany.com/myprinter<
157   os-type=windows-95< cpu-type=x86-32<
158   document-format=application/postscript<
159   natural-language=en< compression=gzip< install-file-type=printer-driver<
160   install-file-name=CompanyX-ModelY-driver.gz<
161   policy=manufacturer-recommended<

162   uri=ftp://mycompany.com/root/drivers/win95/CompanyX/ModelY.gz<
163   os-type=windows-95< cpu-type=x86-32<
164   document-format=application/postscript,application/vnd.hp-PCL<
165   natural-language=en,fr< compression=gzip< install-file-type=printer-driver<
166   install-file-name=Company T Model Z driver.gz<
167   policy=manufacturer-recommended<

168 The above examples have been broken onto separate lines for readability in this document. However, there
169 MUST NOT be any line breaks in the actual values.

170 The "client-print-support-files-supported" Printer Description attribute MAY be preset at manufacturing time or set
171 via the IPP Set-Printer-Attribute operation or through administrative means outside the scope of IPP.

172 **3.2 Get-Printer-Attributes Operation Extension**

173 The "client-print-support-files-supported" Printer Description attribute defined in section 3.1 contains information,
174 such as operating system, natural language, and document format, about *all* of the sets of Client Print Support
175 Files. This section defines an extension to the Get-Printer-Attributes operation that allows a workstation to filter
176 out all but the Client Print Support Files of interest.

177 **3.2.1 Get-Printer-Attributes Request**

178 A Printer MAY contain information about multiple sets of Client Print Support Files to match the different operating
179 systems, natural languages and document formats it supports. A workstation may query this information by
180 including the 'client-print-support-files-supported' keyword as a value of the "requested-attributes" operation
181 attribute of the Get-Printer-Attributes operation.

182 **3.2.1.1 client-print-support-files-filter (octetString(MAX)) operation attribute**

183 The client can request a subset of the values of the "client-print-support-files-supported" Printer attribute by
184 supplying the "client-print-support-files-filter" (octetString(MAX)) operation attribute in the request as a filter. The
185 filter value indicates in which Client Print Support Files the client is interested. The client MAY supply this attribute.
186 The Printer MUST support this attribute.

187 The filter value of the "client-print-support-files-filter" attribute is a composite string with the same format as that of
188 "client-print-support-files-supported" (see Table 1 - "client-print-support-files-supported" attribute fields in section
189 3.1) with the following exceptions:

190 **Table 2 - "client-print-support-files-filter" attribute fields**

Field Name	**Field Value** in the "client-print-support-files-filter" attribute
uri-scheme	One or more REQUIRED comma-separated LOWER-CASE 'uriScheme' string values identifying the uri scheme to be filtered on. Example URI schemes are: ftp, http, and ipp. The Printer SHOULD support the ipp scheme. If supplied by the client, this field NEED NOT be first. If this field is omitted by the client, the Printer returns all schemes.
xxx	All of the fields in "Table 1 - "client-print-support-files-supported" attribute fields, with the single exception of the "uri" field which a client MUST NOT supply and a Printer MUST NOT support. Any field can have more than one value separated by a COMMA (,), including the fields that Table 1 indicates MUST BE single valued.

191

192   Clients MAY supply additional fields and/or additional values of defined fields.

193   The Printer returns only the values of the "client-print-support-files-supported" Printer Description attribute that
194   match the filter in the "client-print-support-files-filter" operation attribute. A match occurs if at least one value of
195   each field supplied in the filter matches a Client Print Support File value. A match for a CASE-INSENSITIVE
196   field occurs independent of the case of the letters supplied by the client and those stored by the Printer, while a
197   match for a LOWER-CASE field is a strict character for character match.

198   The following are two examples of a "client-print-support-files-filter" filter value:

199   os-type=windows-95< cpu-type=x86-32<
200   document-format=application-postscript< natural-language=en,de<
201
202   uri-scheme=ipp< os-type=windows-95< cpu-type=x86-32<
203   document-format=application-postscript< natural-language=en,de<
204

205   See section 3.2.2 for example matching in the response.

206   The IPP Printer is REQUIRED to support this operation attribute and the following member fields in a "client-print-
207   support-files-filter" operation attribute filter in the Get-Printer-Attributes request:

208   1. uri-scheme
209   2. os-type
210   3. cpu-type
211   4. document-format
212   5. natural-language

213   Printer implementations MAY support additional fields and additional values of defined fields. Printers MUST
214   ignore fields they do not support.

215   If the "client-print-support-files-filter" operation attribute filter is not supplied by the client, the printer should
216   behave as if the attribute had been provided with all fields left empty (i.e., return an unfiltered list).

217   It is RECOMMENDED that workstations first use the Get-Printer-Attributes operation in combination with
218   "client-print-support-files-filter" operation attribute filter to get a list of the potential Client Print Support Files that
219   meet the workstation's requirements. The workstation can then choose from the returned list which Client Print
220   Support Files to use and where to get them. If one of the URIs returned is an IPP uri, the workstation can retrieve
221   the Client Print Support Files from an IPP printer via the Get-Client-Print-Support-Files operation (see section
222   3.3).

223 **3.2.2 Get-Printer-Attributes Response**

224 A Printer MUST return the "client-print-support-files-supported" (1setOf octetString(MAX)) attribute in the
225 Printer Object Attributes group (group 3) when requested by a client. Each returned attribute value must satisfy
226 the criteria specified by the client in the request.

227 For example, if the request contains the following "client-print-support-files-filter" filter:

228   os-type=windows-95< cpu-type=x86-32< document-format=application-postscript<
229   natural-language=en,de<

230 A conforming response is the following two octet String values:

231   uri=ipp://mycompany.com/myprinter<
232   os-type=windows-95< cpu-type=x86-32<
233   document-format=application/postscript<
234   natural-language=en< compression=gzip< install-file-type=printer-driver<
235   install-file-name=CompanyX-ModelY-driver.gz<
236   policy=manufacturer-recommended<

237   uri=ftp://mycompany.com/root/drivers/win95/CompanyX/ModelY.gz<
238   os-type=windows-95< cpu-type=x86-32<
239   document-format=application/postscript,application/vnd.hp-PCL<
240   natural-language=en,fr< compression=gzip< install-file-type=printer-driver<
241   install-file-name=CompanyX-ModelY-driver.gz<
242   policy=manufacturer-recommended<

243 These examples have been broken onto separate lines for readability in this document. However, there MUST
244 NOT be any line breaks in the actual values.

245 As an other example, if the above request had also contained the "uri-scheme" field in the following "client-print-
246 support-files-filter" filter:

247   uri-scheme=ipp< os-type=windows-95< cpu-type=x86-32<
248   document-format=application-postscript<
249   natural-language=en,de<

250 Then only the first value would have been returned as a single octetString value:

251   uri=ipp://mycompany.com/myprinter<
252   os-type=windows-95< cpu-type=x86-32<
253   document-format=application/postscript<
254   natural-language=en< compression=gzip< install-file-type=printer-driver<
255   install-file-name=CompanyX-ModelY-driver.gz<

256   policy=manufacturer-recommended<

3.3   Get-Client-Print-Support-Files

258   This RECOMMENDED operation allows a client to download Client Print Support Files from an IPP Printer.

3.3.1   Get-Client-Print-Support-Files Request

260   The following sets of attributes are part of the Get-Client-Print-Support-Files request:

261   Group 1: Operation Attributes

262   Natural Language and Character Set:
263   The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911],
264   section 3.1.4.1.

265   Target:
266   The "printer-uri" (uri) operation attribute which is the target for this operation as described in
267   [RFC2911], section 3.1.5.

268   Requesting User Name:
269   The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as described
270   in [RFC2911], section 8.3.

271   "client-print-support-files-uri" (uri):
272   The client MUST supply this attribute specifying the uri for the desired Client Print Support Files, i.e.,
273   the value of the "uri" field returned by the Get-Printer-Attributes in one of the values of the "client-
274   print-support-files-supported" (1setOf octetString(MAX)) Printer attribute. The URI scheme must be
275   ipp.

276   Note: This uri is neither the Printer's target "printer-uri" nor the URI in the HTTP header.

3.3.2   Get-Client-Print-Support-Files Response

278   The Printer object returns the following sets of attributes as part of the Get-Client-Print-Support-Files Response:

279   Group 1: Operation Attributes

280   Status Message:
281   In addition to the REQUIRED status code returned in every response, the response OPTIONALLY
282   includes a "status-message" (text(255)) operation attribute as described in [RFC2911], sections 13
283   and 3.1.6.

284   Natural Language and Character Set:
285   The "attributes-charset" and "attributes-natural-language" attributes as described in [RFC2911],
286   section 3.1.4.2.
287
288 Group 2: Unsupported Attributes
289   See [RFC2911], section 3.1.7 for details on returning Unsupported Attributes.
290
291 Group 3: Printer Object Attributes
292   "client-print-support-files-supported" (octetString(MAX)).
293   This attribute identifies the properties of the returned Client Print Support Files. The Printer object
294   MUST return this attribute if the response includes Group 4 (i.e., if a set of Client Print Support Files
295   identified by the supplied "client-support-files-uri" was found). The Printer MUST return the format
296   shown in section 3.1.
297
298 Group 4: Client Print Support Files
299   The printer MUST supply the Client Print Support Files that match the client's criteria following the "end-
300   of-attributes" tag. All necessary files must be compressed into a single file.

301 **4   Conformance**

302 A Printer conforming to this specification:

303   1. MUST support the "client-print-support-files-supported" Printer Description attribute as defined in section
304   3.1, including all of the REQUIRED fields defined in Table 1 and MAY support the OPTIONAL fields
305   defined in Table 1.

306   2. MUST support the "client-print-support-files-filter" operation attribute in the Get-Printer-Attributes request
307   as defined in section 3.2, including all of the fields defined in Table 2 and ignoring any fields not recognized.

308   3. MUST support at least one of the following URI schemes that identify the support files: ftp, http, or ipp, of
309   which the ipp scheme is the RECOMMENDED one.

310   4. SHOULD support the Get-Client-Print-Support-Files operation as described in section 3.3. If this
311   operation is supported, then one of the supported schemes MUST be ipp.

312 A client conforming to this specification:

313   1. MUST ignore any fields returned by the Printer in the "client-print-support-files-supported" Printer
314   Description attribute that the client does not recognize or support.

315   2. SHOULD be able to retrieve Client Print Support Files by either ftp Get or http Get operations.

316   3.   MUST be able to retrieve Client Print Support Files using the Get-Client-Print-Support-Files operation,
317   i.e., support the ipp scheme.

5   Encoding of the Operation Layer

319   This extension uses the operation layer encoding described in [RFC2910].

6   Encoding of Transport Layer

321   This specification uses the transport layer encoding described in [RFC2910] with the following extensions.

322   New Error codes:

323   0x0417   client-error-client-print-support-file-not-found

324   New Operation code

325   0x0021   Get-Client-Print-Support-Files

7   IANA Considerations

327   The IANA-registered operating system names that IANA has registered [os-names] are required by this spec.

328   The "cpu-type" is not a current IANA registry. The current IANA machine registration [cpu-names] is really a
329   machine model number, not a CPU type. Also whether a CPU is 16-bit, 32-bit, or 64-bit needs to be indicated in
330   the CPU name which is not currently reflected in the IANA CPU registry. Therefore, the os-type will be a new
331   type of registration with initial values assigned in Table 1 under "os-type", as with other elements in IPP [see
332   RFC2911 section 6 and 11].

333   All other IANA considerations are already addressed by IPP.

8   Internationalization Considerations

335   All text representations introduced by this specification adhere to the internationalization-friendly representation
336   supported by IPP. This work is also accommodates the use of Client Print Support Files of different languages.

9   Security Considerations

338   The IPP Model and Semantics document [RFC2911] discusses high-level security requirements (Client
339   Authentication, Server Authentication and Operation Privacy). Client Authentication is the mechanism by which the
340   client proves its identity to the server in a secure manner. Server Authentication is the mechanism by which the
341   server proves its identity to the client in a secure manner. Operation Privacy is defined as a mechanism for
342   protecting operations from eavesdropping.

343 Only operators of a printer should be allowed to set the "printer-driver-supported" attribute and only users of the
344 printer should be allowed to query that information.

345 Printers that support the Get-Client-Print-Support-Files operation are REQUIRED to implement TLS to enable
346 users to reliably authenticate the source of the Client Print Support Files.

347 **10 References**
348
349 [cpu-names]
350   IANA Registry of CPU Names at ftp://ftp.isi.edu/in-notes/iana/assignments/XXX.

351 [os-names]
352   IANA Registry of Operating System Names at ftp://ftp.isi.edu/in-notes/iana/assignments/operating-system-
353   names.

354 [RFC2026]
355   S. Bradner, "The Internet Standards Process -- Revision 3", RFC 2026, October 1996.

356 [RFC2518]
357   Goland, Y., et al, "HTTP Extensions for Distributed Authoring -- WEBDAV", RFC 2518, February
358   1999.

359 [RFC2616]
360   R. Fielding, J. Gettys, J. Mogul, H. Frystyk, L. Masinter, P. Leach, T. Berners-Lee, "Hypertext Transfer
361   Protocol - HTTP/1.1", RFC 2616, June 1999.

362 [RFC2911]
363   R. deBry, T. Hastings, R. Herriot, S. Isaacson, P. Powell, "Internet Printing Protocol/1.0: Model and
364   Semantics", <draft-ietf-ipp-model-v11-06.txt>, March 1, 2000.

365 [RFC2910]
366   Herriot, R., Butler, S., Moore, P., Tuner, R., "Internet Printing Protocol/1.1: Encoding and Transport",
367   draft-ietf-ipp-protocol-v11-05.txt, March 1, 2000.

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