

1 INTERNET-DRAFT **There remain 2 unresolved ISSUES**
2 <draft-ietf-ipp-install-00.txt>

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8 Internet Printing Protocol (IPP):
9 **Printer Installation Extension**

10
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21 **Abstract**

22 Various client platforms require that some setting up take place at the workstation before the client can
23 properly submit jobs to a specific printer. This setup process is sometimes referred to as printer installation.
24 Most clients need some information about the printer being installed as well as support files to complete the
25 printer installation. The nature of the support files varies depending on the specific client platform, from
26 simple configuration files to highly sophisticated printer drivers. This document refers to these support files
27 as "client print support files". Traditionally, the selection and installation of the correct client print support
28 files has been error prone. The selection and installation process can be simplified and even automated if the
29 workstation can learn some key information about the printer. This document describes the IPP extensions
30 that enable workstations to obtain the information needed to perform a proper printer driver installation
31 using IPP.

32 The full set of IPP documents includes:

33 Design Goals for an Internet Printing Protocol [RFC2567]

34 Rationale for the Structure and Model and Protocol for the Internet Printing Protocol [RFC2568]

35 Internet Printing Protocol/1.1: Model and Semantics [ipp-mod]

36 Internet Printing Protocol/1.1: Encoding and Transport [ipp-pro]

37 Internet Printing Protocol/1.1: Implementer's Guide [ipp-iig]

38 Mapping between LPD and IPP Protocols [RFC2569]

39

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

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

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

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

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

60

61

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81 1 Introduction

82 A common configuration for printing from a workstation requires that some client print support files (e.g.,
83 PPD, printer driver files) specific to the target printer be installed on that workstation. Selection and
84 configuration of the appropriate client print support files can be simplified and even automated if the
85 workstation can obtain some key information about the printer. With a few extensions, IPP provides a
86 simple and reliable vehicle for printers to convey this information to interested workstations. The IPP
87 extensions described in this document enable a flexible solution for installing client print support files on
88 workstations running different operating systems and for printers of all makes and models. It allows client
89 print support files to be downloaded from repositories of different sorts. A possible repository for the files is
90 the printer itself. The extensions necessary for getting client print support files from the printer are included
91 in this document.

92 2 Terminology

93 This document uses terms such as "attributes", "keywords", and "support". These terms have special
94 meaning and are defined in the model terminology [ipp-mod] section 12.2.

95 Capitalized terms, such as MUST, MUST NOT, REQUIRED, SHOULD, SHOULD NOT, MAY, NEED
96 NOT, and OPTIONAL, have special meaning relating to conformance. These terms are defined in [ipp-
97 mod] section 12.1 on conformance terminology, most of which is taken from RFC 2119 [RFC2119].

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

- 99 REQUIRED: if an implementation supports the extensions described in this document, it MUST support
100 a REQUIRED feature.
101 OPTIONAL: if an implementation supports the extensions described in this document, it MAY support
102 an OPTIONAL feature.

103 3 Model Extensions

104 To assist workstations in the printer installation process, an IPP printer needs to provide the workstation
105 with information about the client print support files, such as the their name and location/s. This information
106 needs to match the workstation's specific environment, such as its operating system, preferred natural
107 language, and preferred document format.

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

- 110 - A new REQUIRED printer-description attribute: "client-print-support-files-supported".
- 111 - A new REQUIRED Get-Printer-Attributes operational attribute: "client-print-support-files-
112 request".
- 113 - A new OPTIONAL printer operation: Get-Client-Print-Support-Files.

114 **3.1 "client-print-support-files-supported" (1setOf octetString(MAX))**

115 An IPP Printer uses the REQUIRED printer-description attribute "client-print-support-files-supported" to
 116 represent relevant information about the client print support files it supports. Each value is a composite
 117 ASCII string with well-defined fields (see Table 1). Each value string must be formatted as follows:

118 "uri=val₁< field-name₂=val_{2,1},...,val_{2,p}< ... < field-name_n=val_{n,1},...,val_{n,q}<".

Field name	Field value
"uri"	One REQUIRED 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 types that may be found here are FTP, HTTP, and IPP. FTP and HTTP uri's identify the archive file that contains all the necessary client support files. IPP uri's identify the printer object from which the archive file may be obtained (see section 3.3).
"os-type"	One or more REQUIRED comma-separated 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].
"cpu-type"	One or more REQUIRED comma-separated strings identifying the CPU types supported by this set of client print support files. Valid values include the operating system names defined in the IANA document [cpu-names]. "unknown" is a valid value.
"document-format"	One or more REQUIRED comma-separated strings identifying the document formats supported by this set of client print support files. Valid values are the string representation of the IPP mimeType syntax. "unknown" is a valid value.
"natural-language"	One or more REQUIRED comma-separated 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 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". "none" is allowed but limits the uncompressed client print support file to a single file.
"install-file-type"	One or more REQUIRED comma-separated strings identifying the type of the client print support files. Valid values are: "printer-driver", "ppd", "updf", "gpd".
"install-file-name"	One REQUIRED string identifying the name by which the client print support files will be installed on the workstation. For client print support files of type "printer-driver", this is also the name that identifies this printer driver in an .inf file.

119 **Table 1. client-print-support-files-supported fields**

120 Each value MUST refer to one and only one set of client print support files, even if the files are
121 downloadable from various repositories (i.e., even if they are associated with multiple uris).

122 The following illustrates what two valid values of "client-print-support-files-supported" might look like,
123 **ISSUE 1: What strings should be used for CPU types in the examples?**

```
124 "uri=ipp://mycompany.com/myprinter< os-type=windows-95<  
125 cpu-type=Intell-P5< document-format=application/postscript<  
126 natural-language=en< compression=gzip< install-file-type=printer-driver<  
127 install-file-name=ManufacturerName<"
```

```
128 "uri=ftp://mycompany.com/root/drivers/win95/CompanyX/ModelY.zip<  
129 os-type=windows-95< cpu-type=Intell-P5<  
130 document-format=application/postscript,application/vnd.hp-PCL<  
131 natural-language=en,fr< compression=gzip< install-file-type=printer-driver<  
132 install-file-name=ManufacturerName<"
```

133 The "client-print-support-files-supported" printer description attribute may be preset at manufacturing time
134 or set via the IPP set-printer-attribute operation or through administrative means outside the scope of IPP.

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

137 **3.2 Get-Printer-Attributes Extension**

138 The following extensions allow a workstation to retrieve information on the client print support files a
139 printer supports using the existing Get-Printer-Attributes operation.

140 **3.2.1 Get-Printer-Attributes Request**

141 A printer may contain information on multiple client print support files to match the different operating
142 systems, natural languages and document formats it supports. A workstation may query this information by
143 including "client-print-support-files-supported" in the "requested-attributes" operational attribute of the
144 Get-Printer-Attributes operation. The workstation can control what information a printer returns by
145 including the "client-print-support-files-request" operational attribute.

146 "client-print-support-files-request" (octetString(MAX)) is used as follows.

147 The IPP Printer is REQUIRED to support this operational attribute and all its member fields. An IPP Client
148 MAY supply the attribute if it wishes to restrict the printer driver information it receives from the printer.
149 Its text value is a composite string with the same format as that of "client-print-support-files-supported" (see
150 section 3.1). Table 2 describes the fields that may be included in this string.

151 If "client-print-support-files-request" is not specified by the client, the printer should behave as if the
 152 attribute had been provided with all fields left empty (i.e., return an unfiltered list).

153 It is recommended that workstations first use Get-Printer-Attributes in combination with "client-print-
 154 support-files-request" to get a list of the potential client print support files that meet the workstation's
 155 requirements. The workstation can then choose from the returned list which client print support files to use
 156 and where to get them. If one of the uri's returned is an IPP uri, the workstation can retrieve the client print
 157 support files from an IPP printer via the Get-Client-Print-Support-Files operation (see section 3.3).

Field name	Field value
"uri-scheme"	One or more OPTIONAL strings instructing the printer to only return information on client print support files that can be located at uri's of the specified uri schemes. If not present, the printer does not filter the information it returns based on uri-scheme.
"os-type"	One or more OPTIONAL strings instructing the printer to only return information on client print support files that support the specified operating systems. If not present, the printer does not filter the information it returns based on os-type.
"cpu-type"	One or more OPTIONAL strings instructing the printer to only return information on client print support files that support the specified CPU types. If not present, the printer does not filter the information it returns based on cpu-type.
"document-format"	One or more OPTIONAL strings instructing the printer to only return information on client print support files that support the specified document formats. If not present, the printer does not filter the information it returns based on document format.
"natural-language"	One or more OPTIONAL strings instructing the printer to only return information on client print support files that support the specified natural languages. If not present, the printer does not filter the information it returns based on natural language.
"compression"	One or more OPTIONAL strings instructing the printer to only return information on client print support files that use the specified compressions. If not present, the printer does not filter the information it returns based on compression.

158 **Table 2. client-print-support-files-request fields**

159 3.2.2 Get-Printer-Attributes Response

160 A printer MUST return the "client-print-support-files-supported" attribute in the "printer-object" attribute
 161 group when a requested by a client. Each returned attribute value must satisfy the criteria specified by the
 162 client in the request.

163 3.3 Get-Client-Print-Support-Files

164 This OPTIONAL operation allows a client to download client print support files from an IPP Printer.

165 3.3.1 Get-Client-Print-Support-Files Request

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

167 Group 1: Operation Attributes

168 Natural Language and Character Set:

169 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod],
170 section 3.1.4.1.

171 Target:

172 The "printer-uri" (uri) operation attribute which is the target for this operation as described in
173 [ipp-mod], section 3.1.5.

174 Requesting User Name:

175 The "requesting-user-name" (name(MAX)) attribute SHOULD be supplied by the client as
176 described in [ipp-mod], section 8.3.

177 "client-print-support-files-request" (octetString(MAX)) :

178 The client MUST supply this attribute specifying the criteria the returned client print support
179 files should meet. If more than one set of client print support files meet the specified criteria, the
180 printer returns the first one it encounters. The format and semantics of this attribute's value are
181 identical to those of the Get-Printer-Attributes operational attribute of the same name described
182 in section 3.2.1.

183 3.3.2 Get-Client-Print-Support-Files Response

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

186 Group 1: Operation Attributes

187 Status Message:

188 In addition to the REQUIRED status code returned in every response, the response
189 OPTIONALLY includes a "status-message" (text(255)) operation attribute as described in [ipp-
190 mod], sections 13 and 3.1.6.

191 Natural Language and Character Set:

192 The "attributes-charset" and "attributes-natural-language" attributes as described in [ipp-mod],
193 section 3.1.4.2.

194

195 Group 2: Unsupported Attributes

196 See [ipp-mod], section 3.1.7 for details on returning Unsupported Attributes.

197

198 Group 3: Printer Object Attributes

199 "client-print-support-files-supported" (octetString(MAX)).

200 The Printer object MUST return this attribute if the response includes Group 4 (i.e., if a set of
201 client print support files that meets the client's criteria was found and is included in the
202 response). The provided text string MUST use the format shown in section 3.1. This attribute
203 identifies the properties of the returned client print support files.

204

205 Group 4: Client Print Support Files

206 The printer MUST supply the client print support files that match the client's criteria following the
207 "end-of-attributes" tag. All necessary files must be compressed into a single file.

208 **4 Encoding of the Operation Layer**

209 This extension uses the operation layer encoding described in [ipp-pro].

210 **5 Encoding of Transport Layer**

211 This specification uses the transport layer encoding described in [ipp-pro] with the following extensions.

212 New Error codes:

213 0x0417 clnt-err-client-print-support-file-not-found

214 New Operation code

215 0x0021 Get-Client-Print-Support-Files

216 **6 IANA Considerations**

217 IANA-registered operating system names are required by this spec. All other IANA considerations are
218 already addressed by IPP. **ISSUE 2: Should mention IANA's future support for CPU types?**

219 **7 Internationalization Considerations**

220 All text representations introduced by this specification adhere to the internationalization-friendly
221 representation supported by IPP. This work is also accommodates the use of client print support files of
222 different languages.

223 8 Security Considerations

224 The IPP Model and Semantics document [ipp-mod] discusses high-level security requirements (Client
225 Authentication, Server Authentication and Operation Privacy). Client Authentication is the mechanism by
226 which the client proves its identity to the server in a secure manner. Server Authentication is the mechanism
227 by which the server proves its identity to the client in a secure manner. Operation Privacy is defined as a
228 mechanism for protecting operations from eavesdropping.

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

231 Printers that support the Get-Client-Print-Support-Files operation are REQUIRED to implement TLS to
232 enable users to reliably authenticate the source of the client print support files.

233 9 References

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