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8 Internet Printing Protocol (IPP):

9 **Printer Driver Extension**

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21 **Abstract**

22 A common configuration for printing from a workstation requires that a printer driver specific to the printer
23 being used be installed on that workstation. Traditionally, the selection and installation of the correct printer
24 driver has been error prone. The selection and installation process can be simplified and/or automated if the
25 workstation can learn some key information about the printer. This document describes an IPP extension
26 that enables workstations to obtain the information needed to perform a proper printer driver installation
27 using IPP.

28 The full set of IPP documents includes:

29 Design Goals for an Internet Printing Protocol [RFC2567]

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

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

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

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

34 Mapping between LPD and IPP Protocols [RFC2569]

35

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

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

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

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

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

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73 **1 Introduction**

74 A common configuration for printing from a workstation requires that a printer driver specific to the printer
75 being used be installed on that workstation. Selection and configuration of the appropriate printer driver can
76 be simplified and even automated if the workstation can obtain some key information about the printer.
77 With a few extensions, IPP provides a reliable and simple vehicle for printers to convey this information to
78 interested workstations. The IPP extensions described in this document enable a flexible solution for
79 installing printer drivers on workstations running different operating systems, for printers of all makes and
80 models, using printer driver repositories of different sorts. A possible repository for the printer driver is the
81 printer itself. The extensions necessary for getting a printer driver from the printer are also described in this
82 document.

83 **2 Terminology**

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

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

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

90 **REQUIRED:** if an implementation supports the extensions described in this document, it **MUST** support
91 a **REQUIRED** feature.

92 **OPTIONAL:** if an implementation supports the extensions described in this document, it **MAY** support
93 an **OPTIONAL** feature.

94 **3 Model Extensions**

95 To assist workstations in the printer driver installation process, an IPP printer needs to provide the
96 workstation with information about the driver, such as the driver's name and location/s. This information
97 needs to match the workstation's specific environment, such as its operating system, preferred natural
98 language, and preferred document format.

99 An IPP Printer uses the new printer-description attribute "printer-driver-supported" to represent its printer
100 driver information. This information **MAY** include one or more uri's indicating where to obtain the binary
101 files for each printer driver it supports. Given this information, the workstation may use the protocol
102 implied by an uri to obtain the printer driver implementation. Standard uri types (e.g., ftp, http, and ipp) as
103 well uri types associated with proprietary protocols may be used. To enable using existing protocols for
104 downloading printer driver binaries, all the files necessary to install a given printer driver **MUST** be
105 compressed into a single file.

106 If one of the uri's returned is an IPP uri, the workstation may download the binaries from the printer using
107 "get-printer-attributes", as explained below.

108 The following extensions allow a workstation to retrieve the printer driver information it needs from the
109 printer using the existing "get-printer-attributes" operation.

110 **3.1 Get-Printer-Attributes Request Extension**

111 A printer may contain information on multiple printer drivers to match the different operating systems,
112 natural languages and document formats it supports. A workstation may query this information by including
113 "printer-driver-supported" in the "requested-attributes" operational attribute of the "get-printer-attributes
114 operation". To enable the workstation to control what printer driver information a printer returns, the
115 following new operational attribute is defined for the "get-printer-attributes" operation.

116 "printer-driver-info-request" (collection: printer-driver-info-request-coll)

117 The IPP Printer is **REQUIRED** to support this operational attribute. An IPP Client **MAY** supply the
118 attribute if it wishes to restrict the printer driver information it receives from the printer.

119 A client **MUST** provide the "printer-driver-info-request" attribute with the "binary-download-request" field
120 explicitly set to **TRUE** in order to download a printer driver from the printer, given the printer supports the
121 feature (see the table below for a description of the "printer-driver-info-request-coll" collection).

122 If "printer-driver-info-request" is not specified as a "get-printer-attributes" operational attribute, the default
123 printer behavior should be as if the attribute had been provided with the field "binary-downloaded-
124 requested" set to **FALSE** and all other field left empty.

125 It is recommended that workstations first use "get-printer-attributes" in combination with "printer-driver-
126 info-request" to get a list of the potential printer drivers that meet the workstation's requirements and their
127 locations. The workstation can then choose from the printer driver information returned which print driver
128 to use and where to get it. If one of the "printer-driver-uri" returned is an IPP uri, the workstation can
129 retrieve the printer driver from that printer by invoking "get-printer-attributes" a second time to get the
130 "printer-driver-supported" attribute with the criteria narrowed down in "printer-driver-info-request" and the
131 "binary-downloaded-requested" field set to **TRUE**.

132 The table below provides the definition and intended use of the "printer-driver-info-request-coll" collection.

133

Member attributes of the "printer-driver-info-request-coll" collection	Comment
os-type-requested (1setOf type3 keyword)	OPTIONAL. If present, this field instructs the printer to only return information on printer drivers that support the specified operating systems. If not present, the printer does not filter the information it returns based on operating systems supported.
document-format-requested (1setOf mimeType)	OPTIONAL. If present, this field instructs the printer to only return information on printer drivers that support the specified document formats. If not present, the printer does not filter the information it returns based on document format supported.
natural-language-requested (1setOf naturalLanguage)	OPTIONAL. If present, this field instructs the printer to only return information on printer drivers that support the specified natural languages. If not present, the printer does not filter the information it returns based on natural language supported.
Compression-requested (1setOf type3 keyword)	OPTIONAL. If present, this field instructs the printer to only return information on printer drivers that use the specified compressions. If not present, the printer does not filter the information it returns based on compression supported.
binary-download-requested (boolean)	OPTIONAL. If set to TRUE, this field instructs the printer to download the binary files associated with all the printer drivers that match the criteria specified in this collection value. If this field or the "driver-info-request" operational attribute is not present, the printer behaves as if this value was set to FALSE.

134

135 **3.2 Get-Printer-Attributes Response Extension**

136 A new printer-description-attribute is defined for printers to provide printer driver information to interested
 137 workstations. This section defines the syntax and semantics of this new attribute.

138 "printer-driver-supported" (1setOf printer-driver-supported-coll collection)

139 Each value of this REQUIRED attribute MUST refer to one and only one set of printer driver files, even if
 140 the printer driver files may be downloadable from multiple locations.

141 The following table describes the "printer-driver-supported-coll" collection.

Member attributes of the "printer-driver-supported-coll" collection	Comment
printer-driver-uri (1setOf uri)	OPTIONAL. The uri of the different repositories whence the printer driver may be downloaded. Examples of url types that may be found here are ftp, http, and ipp. If this field is not present, the workstation will have to prompt the user for the location of a printer driver repository.
os-type-supported (1setOf type3 keyword)	REQUIRED. The operating system types supported by this printer driver.
document-format-supported (1setOf mimeType)	REQUIRED. The document formats supported by this printer driver.
natural-language (naturalLanguage)	REQUIRED. The natural language used by this printer driver's UI.
compression (type3 keyword)	REQUIRED. The mechanism used to compress the printer driver binary files. All files needed for the installation of a printer driver MUST be compressed into a single file.
driver-install-name (name(MAX))	REQUIRED. This name by which the printer driver will be installed on the workstation. This is also the name that identifies this printer driver in an .inf file.
binary-file (octetString) Note: An exception to the 1024 maximum value length limit is made for this attribute field.	OPTIONAL. This field contains the compressed binary files that comprise this printer driver. It MUST be present if the "printer-driver-uri" field in this collection value included an IPP uri. This field MUST only be returned in the result of a get-printer-attributes operation if the request contains a "printer-driver-request" operational attribute and the "download-binary" field in that attribute is present and its value is TRUE.

142 The "printer-driver-supported" printer description attribute **MAY** be preset at manufacturing time or set via
 143 the IPP set-printer-attribute operation or through administrative means outside the scope of IPP.

144 **4 Encoding of the Operation Layer**

145 This extension uses the operation layer encoding described in [ipp-pro]. The 'collection' is a new IPP
 146 attribute syntax described in [ipp-coll].

147 **5 Encoding of Transport Layer**

148 This extension uses the transport layer encoding described in [ipp-pro].

149 **6 IANA Considerations**

150 There are no additional IANA consideration to those already addressed IPP.

151 **7 Internationalization Considerations**

152 The definition

153 **8 Security Considerations**

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

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

161 **9 References**

162

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