



The Printer Working Group

April 18, 2019  
Best Practice Draft

## Job Accounting with IPP

Status: Initial

Abstract: This white paper discusses how to perform different kinds of job accounting with IPP.

This is a PWG Best Practice. For a definition of a "PWG Best Practice", see:

<https://ftp.pwg.org/pub/pwg/general/pwg-process30.pdf>

This best practice is available electronically at:

<https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippaccounting10-20190418.docx>

<https://ftp.pwg.org/pub/pwg/ipp/wd/wd-ippaccounting10-20190418.pdf>

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2 Title: *Job Accounting with IPP*

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## 53 **1. Introduction**

54 This document discusses how to perform different kinds of job accounting with IPP, including  
55 auditing of content and usage, billing, supply and service management, and diagnostics and  
56 debugging.

## 57 **2. Terminology**

### 58 **2.1 Conformance Terminology**

59 Capitalized terms, such as MUST, MUST NOT, RECOMMENDED, REQUIRED, SHOULD,  
60 SHOULD NOT, MAY, and OPTIONAL, have special meaning relating to conformance as  
61 defined in Key words for use in RFCs to Indicate Requirement Levels [BCP14]. The term  
62 CONDITIONALLY REQUIRED is additionally defined for a conformance requirement that  
63 applies when a specified condition is true.

64 The term DEPRECATED is used for previously defined and approved protocol elements that  
65 SHOULD NOT be used or implemented. The term OBSOLETE is used for previously defined  
66 and approved protocol elements that MUST NOT be used or implemented.

### 67 **2.2 Printing Terminology**

68 Normative definitions and semantics of printing terms are imported from the Internet Printing  
69 Protocol/1.1 [STD92].

70 *Document*: An object created and managed by a Printer that contains the description,  
71 processing, and status information. A Document object may have attached data and is  
72 bound to a single Job.

73 *Job*: An object created and managed by a Printer that contains description, processing, and  
74 status information. The Job also contains zero or more Document objects.

75 *Job Accounting*: Collection of Metadata to audit, bill, or otherwise report on the origin,  
76 processing, and disposition of Jobs and Documents.

77 *Logical Device*: a print server, software service, or gateway that processes jobs and either  
78 forwards or stores the processed job or uses one or more Physical Devices to render output.

79 *Metadata*: Information about a Job or Document such as name, originator, owner, format,  
80 state, counters, dates and times, content, and template attributes.

81 *Output Device*: a single Logical or Physical Device

82 *Personal Data*: Information related to a person that can be used to identify the person such  
83 as a name, email address, government-issued identification, medical information, and so  
84 forth. [IPPPRIVACY]

85 *Physical Device*: a hardware implementation of a endpoint device, e.g., a marking engine, a  
86 fax modem, etc.

## 87 **2.3 Protocol Role Terminology**

88 The following protocol roles are defined to specify unambiguous conformance requirements:

89 *Client*: Initiator of outgoing connections and sender of outgoing operation requests  
90 (Hypertext Transfer Protocol -- HTTP/1.1 [RFC7230] User Agent).

91 *Printer*: Listener for incoming connections and receiver of incoming operation requests  
92 (Hypertext Transfer Protocol -- HTTP/1.1 [RFC7230] Server) that represents one or more  
93 Physical Devices or a Logical Device.

## 94 **2.4 Acronyms and Organizations**

95 *IANA*: Internet Assigned Numbers Authority, <http://www.iana.org/>

96 *IETF*: Internet Engineering Task Force, <http://www.ietf.org/>

97 *ISO*: International Organization for Standardization, <http://www.iso.org/>

98 *PWG*: Printer Working Group, <http://www.pwg.org/>

99

## 100 **3. Rationale**

### 101 **3.1 Use Cases**

#### 102 **3.1.1 Auditing of Printing Usage**

103 who prints, what kinds of jobs are printed, how are those jobs submitted, where are they  
104 printed, etc.

#### 105 **3.1.2 Auditing of Print Content**

106 Is someone printing inappropriate or disallowed things?

#### 107 **3.1.3 Billing**

108 charged per job, sheet/side, color vs. B&W, duplex vs. simplex, finishing options

#### 109 **3.1.4 Diagnostics and Debugging**

110 Using accounting data to reproduce a problem

#### 111 **3.1.5 Supplying Required Information**

112 Ability of Client to query Printer for its accounting capabilities/requirements, and then supply  
113 unique identifiers for account IDs, billing codes, etc.

## 114 **3.2 Exceptions**

115 **Add exceptions when we have them.**

## 116 **3.3 Out of Scope**

117 The following are considered out of scope for this document:

118 **1. Add when we have them.**

## 119 **3.4 Design Requirements**

120 The design requirements for this document are:

- 121 1. Authentication of Client, Printer, and/or User
- 122 2. Collection of (potentially required) metadata from Client: owner, format,  
123 organization/account id, document information (subject, copyright, etc.),  
124 application and OS information for reasons other than access control, and  
125 template attributes

- 126 3. Generation of metadata by Printer: ID, state, dates and times, receipt attributes,  
127 and work counters
- 128 4. Explicit privacy and data collection policies that are accessible to/discoverable  
129 by Client
- 130 5. Audit logging
- 131 6. Data protection
- 132 7. Validation of metadata
- 133 8. Interoperability

## 134 **4. Job Accounting with IPP**

### 135 **4.1 Client Supplied Metadata**

136 All Job Template and operation attributes supplied in a Job or Document Creation request.

137 "job-accounting-user-id" is sometimes used to specify a user identifier for the accounting  
138 system separate from the authenticated user but is itself not authenticated. The value can  
139 be validated against the authenticated user.

140 "job-accounting-user-id" and "job-account-id" are sometimes used together to specify a  
141 logical user for a given organizational account.

### 142 **4.2 Printer Generated Metadata**

143 All Job and Document Status attributes generated by Printer.

144 Per the Internet Printing Protocol/1.1 [STD92], the "job-originating-user-name" and "job-  
145 originating-user-uri" Job Status attributes contain the most authenticated identity of the Job  
146 owner.

147 The "job-impressions", "job-impressions-col", "job-k-octets", "job-media-sheets", "job-  
148 media-sheets-col", "job-pages", and "job-pages-col" attributes can be provided by a Client  
149 in a Job Creation request but are best generated by the Printer after inspection of the  
150 Document data. Similarly, the "impressions", "impressions-col", "k-octets", "media-sheets",  
151 "media-sheets-col", "pages", and "pages-col" attributes can be provided by a Client in a  
152 Document Creation request but are best generated by the Printer after inspection of the  
153 Document data.

154 **Look at Job Monitoring MIB for additional Job/Document work counters, etc. that aren't**  
155 **already in IPP.**

### 156 **4.3 Requiring Attributes in Job Creation Requests**

157 The "printer-mandatory-job-attributes" Printer Description attribute [PWG5100.13] is used  
158 by a Printer to list the operation and Job Template attributes that a Client MUST supply in a

159 Job Creation Request. Clients MUST support this attribute and Printers MUST supply this  
160 attribute if specific attributes are needed for Job Accounting.

## 161 **5. Internationalization Considerations**

162 For interoperability and basic support for multiple languages, conforming implementations  
163 support:

- 164 1. The Universal Character Set (UCS) Transformation Format -- 8 bit (UTF-8)  
165 [STD63] encoding of Unicode [UNICODE] [ISO10646]; and
- 166 2. The Unicode Format for Network Interchange [RFC5198] which requires  
167 transmission of well-formed UTF-8 strings and recommends transmission of  
168 normalized UTF-8 strings in Normalization Form C (NFC) [UAX15].

169 Unicode NFC is defined as the result of performing Canonical Decomposition (into base  
170 characters and combining marks) followed by Canonical Composition (into canonical  
171 composed characters wherever Unicode has assigned them).

## 172 **6. Security Considerations**

173 The IPP extensions defined in this document require the same security considerations as  
174 defined in the IPP/1.1: Model and Semantics [RFC8011]. The following subsections provide  
175 considerations specific to this document.

### 176 **6.1 Client Considerations**

177 Clients MUST:

- 178 1. Allow a User to examine a Printer's privacy and data handling policies,
- 179 2. Provide confidentiality of data in transit using TLS encryption [RFC5246] of  
180 Printer connections,
- 181 3. Authenticate their connections to Printers, such as by validating the Printer's  
182 X.509 certificate or using other in-band mutual authentication protocols, and  
183 4. Support authentication of Users using HTTP authentication methods.

### 184 **6.2 Printer Considerations**

185 Printers MUST:

- 186 1. Provide information on configured privacy and data handling policies,
- 187 2. Validate the HTTP Host request header in order to protect against DNS  
188 rebinding attacks,
- 189 3. Provide confidentiality of data in transit using TLS encryption [RFC5246] of  
190 Client connections,



- 191 4. Support authentication of Clients using X.509 certificate validation, HTTP  
192 authentication methods, and/or other mechanisms,  
193 5. Support authentication of Users using HTTP authentication methods, and  
194 6. Provide confidentiality of Document and Job data at rest.

### 195 **6.3 Privacy and Data Collection**

196 Printers SHOULD consider all Job and Document attributes as potentially containing  
197 Personal Data. The following attributes explicitly contain Personal Data:

198 "document-metadata": Contains author information

199 "job-originating-user-name" and "job-originating-user-uri": The most authenticated  
200 Job owner

201 The following attributes can be used to identify individuals:

202 "document-format-details": Contains application and operating system information

### 203 **6.4 Data Protection**

### 204 **6.5 Data Validation**

205 TPM mechanisms to provide signed information?

206 Using Client/Printer/User authentication as a source of trust?

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## 235 8. Author's Address

236 Primary author:

237 Michael Sweet  
238 Apple Inc.  
239 One Apple Park Way  
240 M/S 111-HOMC  
241 Cupertino, CA 95014  
242 USA  
243 msweet@apple.com

244 The author would also like to thank the following individuals for their contributions to this best  
245 practice:

246 Cihan Colakoglu - Kyocera  
247 Smith Kennedy - Hewlett Packard  
248 Ira McDonald - High North  
249 Jeremy Reitz - Xerox

250 **9. Change History**

251 **9.1 April 18, 2019**

252 Initial revision.