



The Printer Working Group

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Working Draft**

Common Log Format (PWG-LOG)

Status: Stable

Abstract: This standard defines a common log format for hardcopy device events that can be used with existing logging protocols such as SYSLOG. While the focus of this format is on security and auditing of devices, it also supports logging of arbitrary events such as those defined by the IPP Event Notifications and Subscriptions (RFC 3995) specification.

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67

68 **About the Imaging Device Security Workgroup**

69 The Imaging Device Security (IDS) workgroup is chartered to enable Hardcopy Device
70 support in the Network Assessment Protocols that measure and assess the health of client
71 computers and other devices that are attached to enterprise class networks.

72 For additional information regarding IDS visit:

73 <http://www.pwg.org/ids/>

74 Implementers of this specification are encouraged to join the IDS Mailing List in order to
75 participate in any discussions of the specification. Suggested additions, changes, or
76 clarification to this specification, should be sent to the IDS Mailing list for consideration.

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145 **1. Introduction**

146 Logging is a critical component for security monitoring, compliance auditing, maintenance,
147 and accounting in hardcopy devices. This standard defines a common log format for
148 hardcopy device events that can be used with existing logging protocols such as The Syslog
149 Protocol [RFC5424]. The Syslog protocol also supports the use of existing secure transport
150 services such as Transport Layer Security v1.2 [RFC5246] and the Transport Layer Security
151 (TLS) Transport Mapping for Syslog [RFC5425].

152 While the focus of this format is on security and auditing of devices as defined in IEEE Std
153 2600™-2008 [IEEE2600] [IEEE2600.1] [IEEE2600.2] [IEEE2600.3] [IEEE2600.4], it also
154 supports logging of arbitrary events such as those defined by the IPP: Event Notifications
155 and Subscriptions [RFC3995] specification.

156 **2. Terminology**

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

158 **2.1 Conformance Terminology**

159 Capitalized terms, such as MUST, MUST NOT, RECOMMENDED, REQUIRED, SHOULD,
160 SHOULD NOT, MAY, and OPTIONAL, have special meaning relating to conformance as
161 defined in Key words for use in RFCs to Indicate Requirement Levels [RFC2119].

162 **2.2 Other Terminology**

163 In addition, the following terms are imported or generalized from other source documents:

164 FQDN: The Fully Qualified Domain Name of a Printer as defined in Domain Names -
165 Implementation and Specification [RFC1035].

166 Imaging Device: A printer or multifunction device capable of performing print, scan, copy,
167 or facsimile functions, or a projector or monitor capable of displaying images.

168 Job: A data object, created and managed by a Service, that contains the description,
169 processing, and status information of a Job submitted by a User. The Job can contain zero
170 or more Document objects.

171 Service: An Imaging Service (or MFD Service) that accepts and processes requests to
172 create, monitor and manage Jobs, or to directly support other Imaging Services in an
173 imaging-specific way (i.e., the Resource Service). The Service accepts and processes
174 requests to monitor and control the status of the Service itself and its associated Resources.
175 A Service may be hosted either locally or remotely to the MFD.

176 TitleCase: A keyword that uses concatenated words with capital [UNICODE] letters at the
177 beginning of each word. TitleCase keywords can be easily converted to and from keywords
178 using hyphenated words, e.g., "InputTrayMissing" and "input-tray-missing".

179 **2.3 Acronyms and Organizations**

180 *HIPAA*: Health Insurance Portability and Accountability Act

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

182 *IEEE*: Institute of Electrical and Electronics Engineers, <http://www.ieee.org/>

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

184 *IP*: Internet Protocol

185 *IPP*: Internet Printing Protocol

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

187 *MIB*: Management Information Base

188 *MFD*: Multi-Function Device

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

190 *RFC*: Request For Comments

191 *URI*: Uniform Resource Identifier

192 *UUID*: Universally Unique IDentifier

193

194 **3. Requirements**

195 **3.1 Rationale for PWG Common Log Format**

196 The Syslog Protocol [RFC5424] [RFC5425] [RFC5426] defines a standard log message
197 format with attached machine-readable key/value parameters and human-readable
198 message content.

199 The PWG Common Log Format should therefore:

- 200 1. Define a common message format to support encoding and storing of Imaging
201 Device log messages;
- 202 2. Define Imaging Device-specific parameters necessary to support automated
203 analysis of log data;
- 204 3. Define Imaging Device-specific parameters necessary to support common
205 regulatory requirements;
- 206 4. Define Imaging Device-specific parameters necessary to support basic
207 accounting of device usage; and
- 208 5. Define Imaging Device-specific parameters necessary to support security
209 auditing.

210 **3.2 Use Cases**

211 **3.2.1 Log Analysis at a Physician's Office**

212 John manages the Imaging Devices at a physician's office. He monitors and audits the
213 devices for US HIPAA [US-HIPAA] compliance to ensure that only authorized users are
214 printing, copying, or faxing documents, and that outgoing documents are directed at
215 authorized recipients.

216 **3.2.2 Log Analysis for Managed Print Services**

217 Jill provides reprographics services to several companies in her area. She uses secure
218 logging from leased Imaging Devices to her service office to track the usage of those
219 devices, generate monthly billing statements, and schedule supply deliveries and service
220 appointments as needed.

221 **3.2.3 Log Analysis for Printer Maintenance**

222 Bob is in charge of ordering printer supplies and replacement parts for a school's printers.
223 He uses Imaging Device log files to look for low-supply and printer fault conditions and
224 orders new supplies and replacement parts as needed.

225

226 **3.3 Out of Scope**

227 The following items are considered out of scope for this specification:

- 228 1. Definition of interfaces necessary for remote retrieval of log files.
- 229 2. Strategies for automated log analysis.
- 230 3. Billing algorithms.
- 231 4. Supply and service scheduling algorithms.
- 232 5. Log retention policies.
- 233 6. Data protection policies aside from requirements to support them.

234 **3.4 Design Requirements**

235 The PWG Common Log Format design requirements are:

- 236 1. Define Imaging Device-specific parameters in support of the use cases; and
- 237 2. Define a Syslog Protocol binding of the common log format.

238

239 **4. PWG Common Log Format**

240 The Syslog Protocol [RFC5424] supports secure logging of plain text messages with
241 attached key/value pairs and date/time information. The PWG Common Log Format uses
242 the Syslog message format with a PWG parameter block. Imaging Devices MUST use this
243 format both for internal logging and for logs distributed off the device.

244 **4.1 General Message Format**

245 The general message format is as follows:

```
246     <PRI>1 YYYY-MM-DDTHH:MM:SS.SSSSSSZ HOSTNAME - - - [PWG PARAMETER="VALUE"  
247     ...] MESSAGE
```

248 PRI is the message priority and is composed of a facility code followed by a severity code.
249 Imaging Devices MUST use the following severity codes as defined in the Syslog Protocol
250 specification:

251 3 for error conditions,

252 4 for warning conditions, and

253 6 for informational or report messages.

254 Imaging Devices SHOULD use facility code 6 ("line printer subsystem") which yields PRI
255 values of:

256 63 for error conditions,

257 64 for warning conditions, and

258 66 for informational or report messages.

259 The date (YYYY-MM-DD) and time (HH:MM:SS.SSSSSSZ) MUST be present to ensure
260 that the correct timestamp is recorded.

261 HOSTNAME is the FQDN or numeric IP address used by the service. The value "-" MAY
262 be used; however, Imaging Devices SHOULD make reasonable attempts to discover their
263 FQDN if it is not configured by the administrator.

264 The PARAMETER="VALUE" pairs are specific to the type of event being logged. Because
265 the Syslog protocol only requires a server to support a 480 byte line buffer, Imaging Devices
266 SHOULD use the abbreviated parameter names.

267 The MESSAGE value contains the <service>StateMessage or JobStateMessage strings
268 [PWG5108.1], as appropriate.

269 4.1.1 Mapping Message Severity to/from IPP Severity Suffixes

270 The severity code in the PRI value of a message maps directly to the three defined severity
 271 suffixes for IPP "printer-state-reasons" keyword values in section 4.4.12 of the IPP/1.1
 272 Model and Semantics [RFC2911]. Table 1 lists the severity codes and the corresponding
 273 IPP severity suffixes.

274 **Table 1 - Mapping the Severity Code to IPP Severity Suffixes**

| Severity Code | IPP Severity Suffix |
|---------------|---------------------|
| 3 | -error |
| 4 | -warning |
| 6 | -report |

275

276 4.2 Service Message Format

277 Every service message MUST provide the applicable general parameters defined in section
 278 5.1 and the applicable service parameters defined in section 5.2. The MESSAGE text
 279 corresponds to the <service>StateMessage value.

280 4.3 Job Message Format

281 Every job message MUST provide the applicable general parameters defined in section 5.1
 282 and the applicable job parameters defined in section 5.3. The MESSAGE text corresponds
 283 to the JobStateMessage value.

284 4.4 Example Messages

285 Bad authorization service configured:

```
286 <63>1 2010-10-18T12:34:56.789012Z printer.example.com - - - [PWG NL="en-
287 US" DUU="urn:uuid:b52a247b-c2de-4224-803c-ccf67ded7c84"
288 E="PrintInternalError" IAJ="F" ST="Idle" SR="" SUU="urn:uuid:21c85055-
289 f117-3781-4029-efb0ebcd9954" URI="ipp://printer.example.com/ipp"]
290 ActiveDirectory server 'ad.example.com' does not exist.
```

291 Authentication failure when processing a print job creation request:

```
292 <63>1 2010-10-18T12:34:56.789012Z printer.example.com - - - [PWG NL="en-
293 US" DUU="urn:uuid:b52a247b-c2de-4224-803c-ccf67ded7c84"
294 E="PrintJobCreated" S="ClientErrorNotAuthenticated"
295 UH="client.example.com" URI="ipp://printer.example.com/ipp"] Refused
296 print job - not authenticated.
```

297 Successful print job creation with an authenticated user:

```
298 <66>1 2010-10-18T12:34:56.789012Z printer.example.com - - - [PWG NL="en-
299 US" DUU="urn:uuid:b52a247b-c2de-4224-803c-ccf67ded7c84"
```

300 E="PrintJobCreated" S="SuccessfulOk" ST="Pending" UH="client.example.com"
301 UN="example user" UR="user" URI="ipp://printer.example.com/ipp"
302 UU="urn:uuid:052cc3a5-1269-3296-45eb-e437bf9419b5" JID="123" JUU="
303 urn:uuid:70fe0e41-1e92-3189-6dbe-bb459dc93296"] Created job 123, 42 page
304 PDF document.

305 Progress messages, the first from the service and the second for the job itself:

306 <66>1 2010-10-18T12:34:56.789012Z printer.example.com - - - [PWG NL="en-
307 US" DUU="urn:uuid:b52a247b-c2de-4224-803c-ccf67ded7c84"
308 E="PrintStateChanged" IAJ="T" ST="Processing" SR=""
309 SUU="urn:uuid:21c85055-f117-3781-4029-efb0ebcd9954"
310 URI="ipp://printer.example.com/ipp"] Started printing job 123.
311 <66>1 2010-10-18T12:34:56.789012Z printer.example.com - - - [PWG NL="en-
312 US" DUU="urn:uuid:b52a247b-c2de-4224-803c-ccf67ded7c84"
313 E="PrintJobStateChanged" ST="Processing" JID="123"
314 JUU="urn:uuid:70fe0e41-1e92-3189-6dbe-bb459dc93296" JIC="0" JR=""
315 UN="example user" URI="ipp://printer.example.com/ipp"
316 UU="urn:uuid:052cc3a5-1269-3296-45eb-e437bf9419b5"] Started printing job
317 123.

318 Printer state changes - out of paper and cover open:

319 <64>1 2010-10-18T12:34:56.789012Z printer.example.com - - - [PWG NL="en-
320 US" DUU="urn:uuid:b52a247b-c2de-4224-803c-ccf67ded7c84"
321 E="PrintStateChanged" IAJ="T" ST="Processing" SR="media-empty-warning"
322 SUU="urn:uuid:21c85055-f117-3781-4029-efb0ebcd9954"
323 URI="ipp://printer.example.com/ipp"] The printer is out of paper.
324 <63>1 2010-10-18T12:34:56.789012Z printer.example.com - - - [PWG NL="en-
325 US" DUU="urn:uuid:b52a247b-c2de-4224-803c-ccf67ded7c84"
326 E="PrintStateChanged" IAJ="F" ST="Stopped" SR="cover-open-error"
327 SUU="urn:uuid:21c85055-f117-3781-4029-efb0ebcd9954"
328 URI="ipp://printer.example.com/ipp"] The printer cover is open.

329 Print job processing resumes after the correction of the printer conditions:

330 <66>1 2010-10-18T12:34:56.789012Z printer.example.com - - - [PWG NL="en-
331 US" DUU="urn:uuid:b52a247b-c2de-4224-803c-ccf67ded7c84"
332 E="PrintStateChanged" IAJ="T" ST="Processing" SR=" " SUU="
333 urn:uuid:21c85055-f117-3781-4029-efb0ebcd9954"
334 URI="ipp://printer.example.com/ipp"] The printer has resumed printing.

335 Print job has completed printing:

336 <66>1 2010-10-18T12:34:56.789012Z printer.example.com - - - [PWG NL="en-
337 US" DUU="urn:uuid:b52a247b-c2de-4224-803c-ccf67ded7c84"
338 E="PrintJobStateChanged" ST="Completed" JID="123" JUU="
339 urn:uuid:70fe0e41-1e92-3189-6dbe-bb459dc93296" JIC="42" JR=" " UN="example
340 user" URI="ipp://printer.example.com/ipp" UU="urn:uuid:052cc3a5-1269-
341 3296-45eb-e437bf9419b5"] Finished printing job 123.

342

343 5. PWG Parameter Definitions

344 The following sections describe the parameters defined by this specification. For each
345 parameter, a primary name is listed along with an accepted abbreviation, if any, in
346 parenthesis.

347 5.1 General Event Parameters

348 5.1.1 DeviceUUID (DUU)

349 DeviceUUID specifies the globally-unique 45-octet "urn:uuid:" URI associated with the
350 Imaging Device as defined in A Universally Unique Identifier (UUID) URN Namespace
351 [RFC4122].

352 5.1.2 Event (E)

353 The Event specifies the type of event being logged. Event names are TitleCase keywords.
354 The following standard event names were originally defined by the IPP: Event Notifications
355 and Subscriptions [RFC3995]. The <service> names were originally defined by the MFD
356 Model and Common Semantics [PWG5108.1]:

- 357 • <service>Authentication; user authentication was attempted
- 358 • <service>ConfigChanged; the service configuration was (or was not) changed
- 359 • <service>Identification; user identification was attempted
- 360 • <service>InternalError; an internal error (such as a configuration issue or failed
361 connection) has occurred
- 362 • <service>QueueOrderChanged; the order of jobs was (or was not) changed
- 363 • <service>Restarted; the service was (or was not) restarted
- 364 • <service>Shutdown; the service was (or was not) shut down
- 365 • <service>StateChanged; the service state did (or did not) change state
- 366 • <service>Stopped; the service was (or was not) stopped
- 367 • <service>JobCompleted; a job has (or has not) completed
- 368 • <service>JobConfigChanged; a job was (or was not) reconfigured
- 369 • <service>JobCreated; a job was (or was not) created
- 370 • <service>JobForwarded; job data was (or was not) forwarded
- 371 • <service>JobStateChanged; a job did (or did not) change state
- 372 • <service>JobStopped; a job did (or did not) stop

373 Service names include "Copy", "EmailIn", "EmailOut", "FaxIn", "FaxOut", "Print",
374 "Resource", "Scan", "System", and "Transform". Most log events map directly from the
375 corresponding IPP notification events; however, logged events are sent both for success
376 and failure.

377 Additional event names may also come from the IANA Printer MIB [IANA-MIB] registry for
378 prtAlertCodeTC - names from this registry have their first letter capitalized to convert them
379 to TitleCase form.

380 5.1.3 LogNaturalLanguage (NL)

381 The LogNaturalLanguage specifies the language used for the MESSAGE content in the log
382 line. Parameter values are not considered to be values localized by the Services of the
383 Imaging Device.

384 5.1.4 Status (S)

385 The Status specifies the status code returned to the Client for the request, if any. The value
386 is either the StatusString as defined in [PWG5108.1] or a TitleCase version of a registered
387 IANA IPP status code string as defined in section 13.1 of [RFC2911], e.g.,
388 "ClientErrorNotFound" for "client-error-not-found".

389 This parameter MUST be included when logging Client requests and MUST NOT be
390 included for internally-generated events.

391 5.1.5 <service>URI (URI)

392 The URI specifies the service URI.

393 5.1.6 UserHost (UH)

394 The UserHost specifies the FQDN or numeric IP address of the user associated with the
395 service or job operation.

396 This parameter MUST be included when logging Client requests and MUST NOT be
397 included for internally-generated events.

398 5.1.7 UserName (UN)

399 The UserName specifies the name of the user associated with the service or job operation.

400 This parameter MUST be included when logging authenticated Client requests and MUST
401 NOT be included for internally-generated events.

402 5.1.8 UserRole (UR)

403 The UserRole specifies the role of the user associated with the service or job operation.
404 The following example roles are defined in the IDS Security Model specification [IDS-
405 MODEL]:

406 "Administrator", a user who is authorized to manage all aspects of a device or service,

407 "FieldTechnician", a user that is allowed to install physical devices, accessories, and
408 imaging services, and

409 "GroupMember", a user that is allowed to access any operation and resources allowed
410 for the assigned group,

- 411 "Guest", a user who has limited and temporary access to basic imaging functions such
412 as print, fax or scan.
- 413 "LocalUser", a user who is interacting with an Imaging Device or Service from within
414 physical proximity to the device or service),
- 415 "NetworkAdministrator", a user who is authorized to manage network configuration
416 and access parameters of the device and services,
- 417 "Operator", the user who typically oversees the printer and is allowed to query and
418 control the printer, jobs and documents based on site policy,
- 419 "Owner", the user who owns a particular work object such as a print job, an imaging
420 service or device, or a service registration,
- 421 "ReadOnlyUser", This is a role that allows a user to only perform query and read
422 operations on the managed elements,
- 423 "RemoteUser", a user who is interacting with an Imaging Device or Service from a
424 remote location (i.e. a location not within physical proximity to a device),
- 425 "SecurityAdministrator", a user who is authorized to manage security aspects of the
426 device and services, such as defining access by user roles, installing security
427 certificates, etc.,
- 428 "ServiceTechnician", a user that is allowed to perform authorized repair and servicing
429 of the physical device,
- 430 "User", a user who is authorized to perform normal hard copy and imaging operations,
431 The actual mapping of user privileges to roles is implementation-specific.
- 432 This parameter MUST be included when logging authenticated Client requests and MUST
433 NOT be included for internally-generated events.
- 434 **5.1.9 UserURI (UU)**
- 435 UserURI specifies the URI of the user associated with the service or job operation. The
436 value is typically a UUID encoded as defined in A Universally Unique Identifier (UUID) URN
437 Namespace [RFC4122] or an email address encoded as defined in The "mailto:" URI
438 scheme [RFC6068], although any valid URI may be supplied.
- 439 This parameter MUST be included when logging authenticated Client requests with an
440 authenticated user URI and MUST NOT be included for internally-generated events.

441 **5.2 Service Events and Parameters**

442 **5.2.1 <service>IsAcceptingJobs (IAJ)**

443 <service>IsAcceptingJobs specifies a boolean value indicating that the service is (T) or is not
444 (F) accepting new jobs.

445 **5.2.2 <service>State (ST)**

446 <service>State specifies the current state of the device:

- 447 • Unknown; the service has just been created
- 448 • Down; the service is offline
- 449 • Testing; the service is offline and running tests
- 450 • Idle; the service is waiting to process a job
- 451 • Processing; the service is processing a job
- 452 • Stopped; the service has been stopped and is not processing jobs

453 These values are described in detail in section 4.7 of the MFD Model and Common
454 Semantics [PWG5108.1].

455 **5.2.3 <service>StateReasons (SR)**

456 <service>StateReasons specifies zero or more TitleCase reasons associated with the current
457 state, separated by commas. For the Print service, the IANA registry for the IPP "printer-state-
458 reasons" attribute [IANA-IPP] provides the definitive list of valid <service>StateReasons
459 strings (converted to TitleCase), with the exception that the "none" value should be mapped
460 to the empty string or by omitting the <service>StateReasons parameter.

461 **5.2.4 <service>UUID (SUU)**

462 <service>UUID specifies the globally-unique 45-octet "urn:uuid:" URI associated with the
463 service as defined in A Universally Unique Identifier (UUID) URN Namespace [RFC4122].

464 **5.3 Job Events and Parameters**

465 **5.3.1 JobID (JID)**

466 JobID specifies an integer representing the job for the service as defined in sections 2.4
467 and 4.3.2 of the Internet Printing Protocol/1.1: Model and Semantics [RFC2911].

468 **5.3.2 JobUUID (JUU)**

469 JobUUID specifies the globally-unique 45-octet "urn:uuid:" URI representing the job for the
470 service as defined in A Universally Unique Identifier (UUID) URN Namespace [RFC4122].

471 5.3.3 JobImagesCompleted (JIM)

472 JobImagesCompleted specifies the number of images completed for the job so far.

473 5.3.4 JobImpressionsCompleted (JIC)

474 JobImpressionsCompleted specifies the number of impressions completed for the job so
475 far.

476 5.3.5 JobDestinationURI (JD)

477 JobDestinationURI specifies one or more destination URIs associated with the Job event
478 being reported, separated by commas.

479 5.3.6 JobState (JS)

480 JobState specifies the current job state:

- 481 • Pending
- 482 • PendingHeld
- 483 • Processing
- 484 • ProcessingStopped
- 485 • Canceled
- 486 • Aborted
- 487 • Completed

488 5.3.7 JobStateReasons (JR)

489 JobStateReasons specifies zero or more TitleCase reasons associated with the current job
490 state, separated by commas. For the Print service, the IANA registry for the IPP "job-state-
491 reasons" [IANA-IPP] attribute provides the definitive list of valid JobStateReasons strings
492 (converted to TitleCase), with the exception that the "none" value should be mapped to the
493 empty string or by omitting the JobStateReasons parameter.

494 5.3.8 JobAccountingID (JA)

495 JobAccountingID specifies an identifier, such as a billing number, for accounting purposes.

496 This parameter MUST be omitted when the JobAccountID is not set or is the empty string.

497 5.3.9 JobAccountingUserName (JAUN)

498 JobAccountingUserName specifies the user name for accounting purposes.

499 This parameter MUST be omitted when the JobAccountingUserName is not set or is the
500 empty string.

501 5.3.10 JobAccountingUserURI (JAUU)

502 JobAccountingUserURI specifies the user's URI for accounting purposes. The value is
503 typically a UUID encoded as defined in A Universally Unique Identifier (UUID) URN
504 Namespace [RFC4122] or an email address encoded as defined in The "mailto:" URI
505 scheme [RFC6068], although any valid URI may be supplied.

506 This parameter **MUST** be omitted when the JobAccountingUserURI is not set or is the empty
507 string.

508

509 6. Conformance Requirements

510 Imaging Devices that conform to this specification MUST:

- 511 1. Support logging using the Syslog protocol [RFC5424];
- 512 2. Protect log data that is stored on the Imaging Device from disclosure to
513 unauthorized entities or any modification;
- 514 3. Protect log data in transit off the Imaging Device from disclosure to unauthorized
515 entities or any modification;
- 516 4. Use the PWG Common Log Format for log files that can be accessed remotely;
- 517 5. Use the key/value pairs defined in section 5.1, 5.2, and 5.3 of this document;
- 518 6. Use UTF-8 and Byte-Order Marks as defined in section 8 of this document; and
- 519 7. Conform to the security considerations defined in section 9 of this document.

520 7. IANA and PWG Considerations

521 This section provides the registration information to be used by the Printer Working Group for
522 the registration of the PWG Common Log Format event keywords. The values defined in this
523 specification are contained in Table 2. The general rule is to convert the IPP event name [IANA-
524 IPP] to TitleCase, remove any leading "Printer" from the name, and then prepend the service
525 name. Thus, "printer-config-changed" for the Scan service becomes "ScanConfigChanged".

526 **Table 2 - PWG Event Names**

| PWG Event | IPP Event |
|----------------------------|-----------------------------|
| <service>Authentication | |
| <service>ConfigChanged | printer-config-changed |
| <service>Identification | |
| <service>InternalError | |
| <service>QueueOrderChanged | printer-queue-order-changed |
| <service>Restarted | printer-restarted |
| <service>Shutdown | printer-shutdown |
| <service>StateChanged | printer-state-changed |
| <service>Stopped | printer-stopped |
| <service>JobCompleted | job-completed |
| <service>JobConfigChanged | job-config-changed |
| <service>JobCreated | job-created |
| <service>JobStateChanged | job-state-changed |
| <service>JobStopped | job-stopped |

527

528

529 **8. Internationalization Considerations**

530 For interoperability and basic support for multiple languages, conforming Printer
531 implementations MUST support the UTF-8 [STD63] encoding of Unicode [UNICODE]
532 [ISO10646]. However, unlike the recommendations in [UNICODE], Unicode messages MUST be
533 preceded by a Unicode Byte Order Mark (BOM) as described in Syslog section 6.4 [RFC5424].
534 For internal or file-based logging, the BOM is OPTIONAL and MUST appear only at the
535 beginning of the file, if included.

536 Note that the use of a BOM is not in agreement with Unicode recommendations [UNICODE].

537 **9. Security Considerations**

538 Security considerations are defined in section 8 of The Syslog Protocol [RFC5424] and Signed
539 Syslog Messages [RFC5848]. An Imaging Device MUST protect log messages from alteration or
540 unauthorized disclosure both on the device and when distributed outside the device. Imaging
541 Devices SHOULD support Signed Syslog Messages [RFC5848] to protect log messages from
542 alteration, and Transport Layer Security v1.2 [RFC5246] and the Transport Layer Security
543 (TLS) Transport Mapping for Syslog [RFC5425] to protect log messages when distributed
544 outside the device. When transmitting log messages via UDP, Datagram Transport Layer
545 Security Version 1.2 [RFC6347] and Datagram Transport Layer Security (DTLS) Transport
546 Mapping for Syslog [RFC6012] SHOULD be used.

547 **10. References**

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620

621 12. Change History

622 [To be removed before publication.]

623 12.1 May 15, 2015

624 1. Section 5.1.3: Updated NL definition.

625 12.2 May 7, 2015

- 626 1. Fixed examples per feedback (remove spaces between priority and version,
627 TitleCase all status codes, use correct event for bad ActiveDirectory server)
- 628 2. Section 5.1.2: Add <service>InternalError event for internally-generated
629 ServerErrorInternalError statuses.
- 630 3. Table 2: Add <service>InternalError event.

631 12.3 May 4, 2015

- 632 1. Updated to current PWG document template
- 633 2. Sections 4.2, 4.3: Added “appropriate” qualifier for requirements.
- 634 3. Section 4.4: Added <> around priority numbers, missing DUU fields
- 635 4. Sections 5.x: Update subsections to clarify when parameters MUST or MUST
636 NOT be specified.